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Standards

Irish Standard  
I.S. EN 62321-5:2014

Determination of certain substances in electrotechnical products -- Part 5: Cadmium, lead and chromium in polymers and electronics and cadmium and lead in metals by AAS, AFS, ICP-OES and ICP-MS

**I.S. EN 62321-5:2014**

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**EN 62321-5**

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English version

**Determination of certain substances in electrotechnical products -  
Part 5: Cadmium, lead and chromium in polymers and electronics and  
cadmium and lead in metals by AAS, AFS, ICP-OES and ICP-MS  
(IEC 62321-5:2013)**

Détermination de certaines substances  
dans les produits électrotechniques -  
Partie 5: Du cadmium, du plomb et du  
chrome dans les polymères et les produits  
électroniques, du cadmium et du plomb  
dans les métaux par AAS, AFS, ICP-OES  
et ICP-MS  
(CEI 62321-5:2013)

Verfahren zur Bestimmung von  
bestimmten Substanzen in Produkten der  
Elektrotechnik -  
Teil 5: Cadmium, Blei und Chrom in  
Polymeren und Elektronik und Cadmium  
und Blei in Metallen mit AAS, AFS, ICP-  
OES und ICP-MS  
(IEC 62321-5:2013)

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Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels**

## **Foreword**

The text of document 111/297/FDIS, future edition 1 of IEC 62321-5, 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 62321-5:2014.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-10-25
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-11-15

EN 62321-5:2014 is a partial replacement of EN 62321:2009, forming a structural revision and generally replacing Clauses 8 to 10, as well as Annexes F, G and H.

Future parts in the EN 62321 series will gradually replace the corresponding clauses from EN 62321:2009. Until such time as all parts are published, however, EN 62321:2009 remains valid for those clauses not yet re-published as a separate part.

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<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 62321-1	-	Determination of certain substances in electrotechnical products - Part 1: Introduction and overview	EN 62321-1	-
IEC 62321-2	-	Determination of certain substances in electrotechnical products - Part 2: Disassembly, disjunction and mechanical sample preparation	EN 62321-2	-
IEC 62321-3-1	-	Determination of certain substances in electrotechnical products - Part 3-1: Screening electrotechnical products for lead, mercury, cadmium, total chromium and total bromine using X-ray Fluorescence Spectrometry	EN 62321-3-1	-
ISO 3696	-	Water for analytical laboratory use - Specification and test methods	EN ISO 3696	-
ISO 5961	-	Water quality - Determination of cadmium by atomic absorption spectrometry	EN ISO 5961	-

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**IEC 62321-5**

Edition 1.0 2013-06

# **INTERNATIONAL STANDARD**

# **NORME INTERNATIONALE**



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**Determination of certain substances in electrotechnical products –  
Part 5: Cadmium, lead and chromium in polymers and electronics and cadmium  
and lead in metals by AAS, AFS, ICP-OES and ICP-MS**

**Détermination de certaines substances dans les produits électrotechniques –  
Partie 5: Du cadmium, du plomb et du chrome dans les polymères et les  
produits électroniques, du cadmium et du plomb dans les métaux par AAS,  
AFS, ICP-OES et ICP-MS**



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**IEC 62321-5**

Edition 1.0 2013-06

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Determination of certain substances in electrotechnical products –  
Part 5: Cadmium, lead and chromium in polymers and electronics and cadmium  
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Partie 5: Du cadmium, du plomb et du chrome dans les polymères et les  
produits électroniques, du cadmium et du plomb dans les métaux par AAS,  
AFS, ICP-OES et ICP-MS**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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### DETERMINATION OF CERTAIN SUBSTANCES IN ELECTROTECHNICAL PRODUCTS –

#### Part 5: Cadmium, lead and chromium in polymers and electronics and cadmium and lead in metals by AAS, AFS, ICP-OES and ICP-MS

#### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 62321-5 has been prepared by IEC technical committee 111: Environmental standardization for electrical and electronic products and systems.

The first edition of IEC 62321:2008 was a 'stand-alone' standard that included an introduction, an overview of test methods, a mechanical sample preparation as well as various test method clauses.

This first edition of IEC 62321-5 is a partial replacement of IEC 62321:2008, forming a structural revision and generally replacing Clauses 8 to 10, as well as Annexes F, G and H.

Future parts in the IEC 62321 series will gradually replace the corresponding clauses from IEC 62321:2008. Until such time as all parts are published, however, IEC 62321:2008 remains valid for those clauses not yet re-published as a separate part.

The text of this standard is based on the following documents:

FDIS	Report on voting
111/297/FDIS	111/307/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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## 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 adaptation 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 (PBDE's)) 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.

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

## **DETERMINATION OF CERTAIN SUBSTANCES IN ELECTROTECHNICAL PRODUCTS –**

### **Part 5: Cadmium, lead and chromium in polymers and electronics and cadmium and lead in metals by AAS, AFS, ICP-OES and ICP-MS**

#### **1 Scope**

This Part of IEC 62321 describes the test methods for lead, cadmium and chromium in polymers, metals and electronics by AAS, AFS, ICP-OES and ICP-MS.

This standard specifies the determination of the levels of cadmium (Cd), lead (Pb) and chromium (Cr) in electrotechnical products. It covers three types of matrices: polymers/polymeric workpieces, metals and alloys and electronics.

This standard refers to the sample as the object to be processed and measured. What the sample is or how to get to the sample is defined by the entity carrying out the tests. Further guidance on obtaining representative samples from finished electronic products to be tested for levels of regulated substances may be found in IEC 62321-2. It is noted that the selection and/or determination of the sample may affect the interpretation of the test results.

This standard describes the use of four methods, namely AAS (atomic absorption spectrometry), AFS (atomic fluorescence spectrometry), ICP-OES (inductively coupled plasma optical emission spectrometry), and ICP-MS (inductively coupled plasma mass spectrometry) as well as several procedures for preparing the sample solution from which the most appropriate method of analysis can be selected by experts.

As the hexavalent-Cr analysis is sometimes difficult to determine in polymers and electronics, this standard introduces the screening methods for chrome in polymers and electronics except from AFS. Chromium analysis provides information about the existence of hexavalent-Cr in materials. However, elemental analyses cannot selectively detect hexavalent-Cr; it determines the amount of Cr in all oxidation states in the samples. If Cr amounts exceed the hexavalent-Cr limit, testing for hexavalent-Cr should be performed.

The test procedures described in this standard are intended to provide the highest level of accuracy and precision for concentrations of Pb, Cd and Cr that range, in the case of ICP-OES and AAS, from 10 mg/kg for Pb, Cd and Cr, in the case of ICP-MS, from 0,1 mg/kg for Pb and Cd in the case of AFS, the range is from 10 mg/kg for Pb and 1.5 mg/kg for Cd. The procedures are not limited for higher concentrations.

This standard does not apply to materials containing polyfluorinated polymers because of their stability. If sulfuric acid is used in the analytical procedure, there is a risk of losing Pb, thus resulting in erroneously low values for this analyte. In addition, sulfuric acid and hydrofluoric acid are not suitable for determining Cd by AFS, because it disturbs the reduction of Cd.

Limitations and risks occur due to the solution step of the sample, e.g. precipitation of the target or other elements may occur, in which case the residues have to be checked separately or dissolved by another method and then combined with the test sample solution.

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