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

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62321-5

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ICS 13.020; 43.040.10

Supersedes EN 62321:2009 (partially)

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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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• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-11-15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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
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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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.

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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

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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.