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Standards

Irish Standard  
I.S. EN 62321-3-1:2014

Determination of certain substances in  
electrotechnical products -- Part 3-1:  
Screening - Lead, mercury, cadmium, total  
chromium and total bromine by X-ray  
fluorescence spectrometry

**I.S. EN 62321-3-1:2014**

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**EN 62321-3-1**

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English version

**Determination of certain substances in electrotechnical products -  
Part 3-1: Screening -  
Lead, mercury, cadmium, total chromium and total bromine by X-ray  
fluorescence spectrometry  
(IEC 62321-3-1:2013)**

Détermination de certaines substances  
dans les produits électrotechniques -  
Partie 3-1: Méthodes d'essai -  
Plomb, du mercure, du cadmium, du  
chrome total et du brome total par la  
spectrométrie par fluorescence X  
(CEI 62321-3-1:2013)

Verfahren zur Bestimmung von  
bestimmten Substanzen in Produkten der  
Elektrotechnik -  
Teil 3-1: Screening -  
Blei, Quecksilber, Cadmium,  
Gesamtchrom und Gesamtbrom durch  
Röntgenfluoreszenz-Spektrometrie  
(IEC 62321-3-1:2013)

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Europäisches Komitee für Elektrotechnische Normung

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

## Foreword

The text of document 111/298/FDIS, future edition 1 of IEC 62321-3-1, 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 62321-3-1:2014.

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

<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	-
ISO/IEC Guide 98-1	-	Uncertainty of measurement - Part 1: Introduction to the expression of uncertainty in measurement	-	-

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**IEC 62321-3-1**

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# **INTERNATIONAL STANDARD**

# **NORME INTERNATIONALE**



**Determination of certain substances in electrotechnical products –  
Part 3-1: Screening – Lead, mercury, cadmium, total chromium and total bromine  
by X-ray fluorescence spectrometry**

**Détermination de certaines substances dans les produits électrotechniques –  
Partie 3-1: Méthodes d'essai – Plomb, du mercure, du cadmium, du chrome total  
et du brome total par la spectrométrie par fluorescence X**



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**IEC 62321-3-1**

Edition 1.0 2013-06

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Determination of certain substances in electrotechnical products –  
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et du brome total par la spectrométrie par fluorescence X**

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## CONTENTS

FOREWORD .....	5
INTRODUCTION .....	7
1 Scope .....	8
2 Normative references .....	10
3 Terms, definitions and abbreviations .....	10
4 Principle .....	10
4.1 Overview .....	10
4.2 Principle of test .....	11
4.3 Explanatory comments .....	11
5 Apparatus, equipment and materials .....	12
5.1 XRF spectrometer .....	12
5.2 Materials and tools .....	12
6 Reagents .....	12
7 Sampling .....	12
7.1 General .....	12
7.2 Non-destructive approach .....	12
7.3 Destructive approach .....	12
8 Test procedure .....	13
8.1 General .....	13
8.2 Preparation of the spectrometer .....	13
8.3 Test portion .....	14
8.4 Verification of spectrometer performance .....	14
8.5 Tests .....	15
8.6 Calibration .....	15
9 Calculations .....	16
10 Precision .....	17
10.1 General .....	17
10.2 Lead .....	17
10.3 Mercury .....	17
10.4 Cadmium .....	17
10.5 Chromium .....	18
10.6 Bromine .....	18
10.7 Repeatability statement for five tested substances sorted by type of tested material .....	18
10.7.1 General .....	18
10.7.2 Material: ABS (acrylonitrile butadiene styrene), as granules and plates .....	18
10.7.3 Material: PE (low density polyethylene), as granules .....	19
10.7.4 Material: PC/ABS (polycarbonate and ABS blend), as granules .....	19
10.7.5 Material: HIPS (high impact polystyrene) .....	19
10.7.6 Material: PVC (polyvinyl chloride), as granules .....	19
10.7.7 Material: Polyolefin, as granules .....	19
10.7.8 Material: Crystal glass .....	20
10.7.9 Material: Glass .....	20
10.7.10 Material: Lead-free solder, chips .....	20

10.7.11 Material: Si/Al Alloy, chips .....	20
10.7.12 Material: Aluminum casting alloy, chips .....	20
10.7.13 Material: PCB – Printed circuit board ground to less than 250 $\mu\text{m}$ .....	20
10.8 Reproducibility statement for five tested substances sorted by type of tested material .....	20
10.8.1 General .....	20
10.8.2 Material: ABS (Acrylonitrile butadiene styrene), as granules and plates .....	21
10.8.3 Material: PE (low density polyethylene), as granules .....	21
10.8.4 Material: PC/ABS (Polycarbonate and ABS blend), as granules .....	21
10.8.5 Material: HIPS (high impact polystyrene) .....	21
10.8.6 Material: PVC (polyvinyl chloride), as granules .....	22
10.8.7 Material: Polyolefin, as granules .....	22
10.8.8 Material: Crystal glass .....	22
10.8.9 Material: Glass .....	22
10.8.10 Material: Lead-free solder, chips .....	22
10.8.11 Material: Si/Al alloy, chips .....	22
10.8.12 Material: Aluminum casting alloy, chips .....	22
10.8.13 Material: PCB – Printed circuit board ground to less than 250 $\mu\text{m}$ .....	22
11 Quality control .....	23
11.1 Accuracy of calibration .....	23
11.2 Control samples .....	23
12 Special cases .....	23
13 Test report .....	23
Annex A (informative) Practical aspects of screening by X-ray fluorescence spectrometry (XRF) and interpretation of the results .....	25
Annex B (informative) Practical examples of screening with XRF .....	31
Bibliography .....	40
Figure B.1 – AC power cord, X-ray spectra of sampled sections .....	32
Figure B.2 – RS232 cable and its X-ray spectra .....	33
Figure B.3 – Cell phone charger shown partially disassembled .....	34
Figure B.4 – PWB and cable of cell phone charger .....	35
Figure B.5 – Analysis of a single solder joint on a PWB .....	36
Figure B.6 – Spectra and results obtained on printed circuit board with two collimators .....	36
Figure B.7 – Examples of substance mapping on PWBs .....	38
Figure B.8 – SEM-EDX image of Pb free solder with small intrusions of Pb (size = 30 $\mu\text{m}$ ) ...	39
Table 1 – Tested concentration ranges for lead in materials .....	8
Table 2 – Tested concentration ranges for mercury in materials .....	9
Table 3 – Tested concentration ranges for cadmium in materials .....	9
Table 4 – Tested concentration ranges for total chromium in materials .....	9
Table 5 – Tested concentration ranges for total bromine in materials .....	9
Table 6 – Recommended X-ray lines for individual analytes .....	14
Table A.1 – Effect of matrix composition on limits of detection of some controlled elements .....	26

Table A.2 – Screening limits in mg/kg for regulated elements in various matrices .....	27
Table A.3 – Statistical data from IIS2 .....	29
Table A.4 – Statistical data from IIS4 .....	30
Table B.1 – Selection of samples for analysis of AC power cord .....	32
Table B.2 – Selection of samples (testing locations) for analysis after visual inspection – Cell phone charger.....	34
Table B.3 – Results of XRF analysis at spots (1) and (2) as shown in Figure B.6 .....	37

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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### DETERMINATION OF CERTAIN SUBSTANCES IN ELECTROTECHNICAL PRODUCTS –

#### Part 3-1: Screening – Lead, mercury, cadmium, total chromium and total bromine by X-ray fluorescence spectrometry

#### FOREWORD

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International Standard IEC 62321-3-1 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 62321-3-1 is a partial replacement of IEC 62321:2008, forming a structural revision and generally replacing Clauses 6 and Annex D.

Future parts in the IEC 62321 series will gradually replace the corresponding clauses in 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
111/298/FDIS	111/308/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*

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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 (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.

**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 3-1: Screening – Lead, mercury, cadmium, total chromium and total bromine by X-ray fluorescence spectrometry

#### 1 Scope

Part 3-1 of IEC 62321 describes the screening analysis of five substances, specifically lead (Pb), mercury (Hg), cadmium (Cd), total chromium (Cr) and total bromine (Br) in uniform materials found in electrotechnical products, using the analytical technique of X-ray fluorescence (XRF) spectrometry.

It is applicable to polymers, metals and ceramic materials. The test method may be applied to raw materials, individual materials taken from products and “homogenized” mixtures of more than one material. Screening of a sample is performed using any type of XRF spectrometer, provided it has the performance characteristics specified in this test method. Not all types of XRF spectrometers are suitable for all sizes and shapes of sample. Care should be taken to select the appropriate spectrometer design for the task concerned.

The performance of this test method has been tested for the following substances in various media and within the concentration ranges as specified in Tables 1 to 5.

**Table 1 – Tested concentration ranges for lead in materials**

Substance/ element	Lead									
Parameter	Unit of measure	Medium/material tested								
		ABS <sup>a</sup>	PE <sup>b</sup>	Low- alloy steel	Al, Al-Si alloy	Lead- free solder	Ground PWB <sup>c</sup>	Crystal glass	PVC <sup>d</sup>	Poly- olefine
Concentration or concentration range tested	mg/kg	15,7 to 954	14 to 108	30 <sup>e</sup>	190 to 930	174	22 000 to 23 000	240 000	390 to 665	380 to 640
<sup>a</sup> Acrylonitrile butadiene styrene. <sup>b</sup> Polyethylene. <sup>c</sup> Printed wiring board. <sup>d</sup> Polyvinyl chloride. <sup>e</sup> This lead concentration was not detectable by instruments participating in tests.										



**Table 2 – Tested concentration ranges for mercury in materials**

Substance/element	Mercury		
Parameter	Unit of measure	Medium/material tested	
		ABS <sup>a</sup>	PE <sup>b</sup>
Concentration or concentration range tested	mg/kg	100 to 942	4 to 25
<sup>a</sup> Acrylonitrile butadiene styrene.			
<sup>b</sup> Polyethylene.			

**Table 3 – Tested concentration ranges for cadmium in materials**

Substance/element	Cadmium			
Parameter	Unit of measure	Medium/material tested		
		Lead-free solder	ABS <sup>a</sup>	PE <sup>b</sup>
Concentration or concentration range tested	mg/kg	3 <sup>c</sup>	10 to 183	19,6 to 141
<sup>a</sup> Acrylonitrile butadiene styrene.				
<sup>b</sup> Polyethylene.				
<sup>c</sup> This cadmium concentration was not detectable by instruments participating in tests.				

**Table 4 – Tested concentration ranges for total chromium in materials**

Substance/element	Chromium					
Parameter	Unit of measure	Medium/material tested				
		ABS <sup>a</sup>	PE <sup>b</sup>	Low-alloy steel	Al, Al-Si alloy	Glass
Concentration or concentration range tested	mg/kg	16 to 944	16 to 115	240	130 to 1 100	94
<sup>a</sup> Acrylonitrile butadiene styrene.						
<sup>b</sup> Polyethylene.						

**Table 5 – Tested concentration ranges for total bromine in materials**

Substance/element	Bromine			
Parameter	Unit of measure	Medium/material tested		
		HIPS <sup>c</sup> , ABS <sup>a</sup>	PC/ABS <sup>d</sup>	PE <sup>b</sup>
Concentration or concentration range tested	mg/kg	25 to 118 400	800 to 2 400	96 to 808
<sup>a</sup> Acrylonitrile butadiene styrene.				
<sup>b</sup> Polyethylene.				
<sup>c</sup> High impact polystyrene.				
<sup>d</sup> Polycarbonate and ABS blend.				

These substances in similar media outside of the specified concentration ranges may be analysed according to this test method; however, the performance has not been established for this standard.

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