



NSAI
Standards

Irish Standard
I.S. EN 62321-7-2:2017

Determination of certain substances in
electrotechnical products - Part 7-2:
Hexavalent chromium - Determination of
hexavalent chromium (Cr(VI)) in polymers
and electronics by the colorimetric method

I.S. EN 62321-7-2:2017

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National Foreword

I.S. EN 62321-7-2:2017 is the adopted Irish version of the European Document EN 62321-7-2:2017, Determination of certain substances in electrotechnical products - Part 7-2: Hexavalent chromium - Determination of hexavalent chromium (Cr(VI)) in polymers and electronics by the colorimetric method

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EUROPEAN STANDARD

EN 62321-7-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2017

ICS 31.020; 71.040.50

Supersedes EN 62321:2009 (partially)

English Version

**Determination of certain substances in electrotechnical products
- Part 7-2: Hexavalent chromium - Determination of hexavalent
chromium (Cr(VI)) in polymers and electronics by the
colorimetric method
(IEC 62321-7-2:2017)**

Détermination de certaines substances dans les produits
électrotechniques - Partie 7-2: Chrome hexavalent -
Détermination du chrome hexavalent (Cr(VI)) dans les
polymères et les produits électroniques par méthode
colorimétrique
(IEC 62321-7-2:2017)

Verfahren zur Bestimmung von bestimmten Substanzen in
Produkten der Elektrotechnik - Teil 7-2: Bestimmung von
sechswertigem Chrom (Cr(VI)) in Polymeren und Elektronik
durch kolorimetrische Verfahren
(IEC 62321-7-2:2017)

This European Standard was approved by CENELEC on 2017-05-02. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

EN 62321-7-2:2017**European foreword**

The text of document 111/408/CDV, future edition 1 of IEC 62321-7-2, 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 62321-7-2:2017.

The following dates are fixed:

- latest date by which the document has to be (dop) 2018-02-02
implemented at national level by
publication of an identical national
standard or by endorsement
- latest date by which the national (dow) 2020-05-02
standards conflicting with the
document have to be withdrawn

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 62321:2008	NOTE	Harmonized as EN 62321:2009.
IEC 62321-2	NOTE	Harmonized as EN 62321-2.
ISO 648	NOTE	Harmonized as EN ISO 648.

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 1 When 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.cenelec.eu.

<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	-
ISO 3696	-	Water for analytical laboratory use - Specification and test methods	EN ISO 3696	-

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IEC 62321-7-2

Edition 1.0 2017-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Determination of certain substances in electrotechnical products –
Part 7-2: Hexavalent chromium – Determination of hexavalent chromium (Cr(VI))
in polymers and electronics by the colorimetric method**

**Détermination de certaines substances dans les produits électrotechniques –
Partie 7-2: Chrome hexavalent – Détermination du chrome hexavalent (Cr(VI))
dans les polymères et les produits électroniques par méthode colorimétrique**



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IEC 62321-7-2

Edition 1.0 2017-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Determination of certain substances in electrotechnical products –
Part 7-2: Hexavalent chromium – Determination of hexavalent chromium (Cr(VI))
in polymers and electronics by the colorimetric method**

**Détermination de certaines substances dans les produits électrotechniques –
Partie 7-2: Chrome hexavalent – Détermination du chrome hexavalent (Cr(VI))
dans les polymères et les produits électroniques par méthode colorimétrique**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

DETERMINATION OF CERTAIN SUBSTANCES IN ELECTROTECHNICAL PRODUCTS –

Part 7-2: Hexavalent chromium – Determination of hexavalent chromium (Cr(VI)) in polymers and electronics by the colorimetric method

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 62321-7-2 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 62321-7-2 is a partial replacement of IEC 62321:2008, forming a structural revision and generally replacing Annex C. IEC 62321-7-2 is the final replacement part of the corresponding clauses in IEC 62321:2008.

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

CDV	Report on voting
111/408/CDV	111/432/RVC

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

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

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 "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

The widespread use of electrotechnical products has drawn increased attention to their impact on the environment. In many countries all over the world this has resulted in the adaptation of regulations affecting wastes, substances and energy use of electrotechnical products.

The use of hexavalent chromium in electrotechnical products is of concern in many regions of the world.

The purpose of this document is therefore to provide test methods that will allow the electrotechnical industry to determine the levels of hexavalent chromium in electrotechnical products on a consistent global basis.

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.

DETERMINATION OF CERTAIN SUBSTANCES IN ELECTROTECHNICAL PRODUCTS –

Part 7-2: Hexavalent chromium – Determination of hexavalent chromium (Cr(VI)) in polymers and electronics by the colorimetric method

1 Scope

This part of IEC 62321 describes procedures to measure hexavalent chromium, Cr(VI), quantitatively in samples of polymers and electronics. This method employs organic solvent to dissolve or swell the sample matrix, followed by an alkaline digestion procedure to extract Cr(VI) from samples. Studies have shown that organic/alkaline solution is more effective than acidic solution in extracting Cr(VI) from soluble and insoluble samples. Minimal reduction of Cr(VI) to Cr(III) or oxidation of Cr(III) to Cr(VI) occurs under alkaline conditions.

For soluble polymers consisting of ABS (Acrylonitrile- butadiene-styrene), PC (Polycarbonate) and PVC (poly(vinyl chloride)), the samples are first dissolved in an appropriate organic solvent and Cr(VI) is then extracted by an alkaline extraction solution.

For insoluble/unknown polymers, or electronic materials that do not contain antimony (Sb), the samples are digested in a toluene/alkaline solution at 150 °C to 160 °C. Then the organic phase in the extracts are separated and discarded; the inorganic phase is retained for Cr(VI) analysis.

The Cr(VI) concentration in the extract is determined by its reaction under acidic conditions with 1,5-diphenylcarbazide. Cr(VI) is reduced to Cr(III) in the reaction with diphenylcarbazide which is oxidized to diphenylcarbazone. The Cr(III) and diphenylcarbazone form a red-violet-coloured complex in the reaction. The complex solution is measured quantitatively by a colorimeter or a spectrophotometer at 540 nm.

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, *Determination of certain substances in electrotechnical products – Part 1: Introduction and overview*

ISO 3696, *Water for analytical laboratory use – Specification and test methods*

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.

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