

STN	Stanovenie obsahu určených látok v elektrotechnických výrobkoch Časť 3-4: Preverovanie ftalátov v polyméroch elektrotechnických výrobkov vysokoúčinnou kvapalinovou chromatografiou s ultrafialovým detektorom (HPLC-UV), chromatografiou na tenkej vrstve (TLC) a tepelnou desorpčnou hmotnostnou spektrometriou (TD-MS)	STN EN IEC 62321-3-4 34 6705
------------	--	--

Determination of certain substances in electrotechnical products - Part 3-4: Screening - Phthalates in polymers of electrotechnical products by high performance liquid chromatography with ultraviolet detector (HPLC-UV), thin layer chromatography (TLC) and thermal desorption mass spectrometry (TD-MS)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 08/23

Obsahuje: EN IEC 62321-3-4:2023, IEC 62321-3-4:2023

137239

EUROPEAN STANDARD

EN IEC 62321-3-4

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2023

ICS 13.020.01; 29.100.01; 01.110

English Version

Determination of certain substances in electrotechnical products
- Part 3-4: Screening - Phthalates in polymers of electrotechnical
products by high performance liquid chromatography with
ultraviolet detector (HPLC-UV), thin layer chromatography (TLC)
and thermal desorption mass spectrometry (TD-MS)
(IEC 62321-3-4:2023)

Détermination de certaines substances dans les produits
électrotechniques - Partie 3-4: Détection - Phtalates dans
les polymères des produits électrotechniques par
chromatographie en phase liquide à haute performance
avec détecteur d'ultraviolets (HPLC-UV), par
chromatographie sur couche mince (CCM) et par
spectrométrie de masse par désorption thermique (TD-MS)
(IEC 62321-3-4:2023)

Verfahren zur Bestimmung von bestimmten Substanzen in
Produkten der Elektrotechnik - Teil 3-4: Screening von
Phthalaten in Polymeren von Produkten der Elektrotechnik
durch Hochleistungs-Flüssigkeitschromatographie mit
Ultraviolett-detektor (HPLC-UV),
Dünnschichtchromatographie (TLC) und
Thermodesorptions-Massenspektroskopie (TD-MS)
(IEC 62321-3-4:2023)

This European Standard was approved by CENELEC on 2023-06-07. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 62321-3-4:2023 (E)**European foreword**

The text of document 111/695/FDIS, future edition 1 of IEC 62321-3-4, 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 IEC 62321-3-4:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2024-03-07 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2026-06-07 document have to be withdrawn

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

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 62321-3-4:2023 was approved by CENELEC as a European Standard without any modification.

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

IEC 62321-8:2017 NOTE Approved as EN 62321-8:2017 (not modified)

IEC 62321-6:2015 NOTE Approved as EN 62321-6:2015 (not modified)

ISO 3696 NOTE Approved as EN ISO 3696

ISO/IEC 17025 NOTE Approved as EN ISO/IEC 17025

Annex A (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where 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.cencenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 62321-1	2013	Determination of certain substances in electrotechnical products - Part 1: Introduction and overview	EN 62321-1	2013
IEC 62321-2	2021	Determination of certain substances in electrotechnical products - Part 2: Disassembly, disjointment and mechanical sample preparation	EN IEC 62321-2	2021



IEC 62321-3-4

Edition 1.0 2023-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Determination of certain substances In electrotechnical products –
Part 3-4: Screening – Phthalates in polymers of electrotechnical products by
high performance liquid chromatography with ultraviolet detector (HPLC-UV),
thin layer chromatography (TLC) and thermal desorption mass spectrometry
(TD-MS)**

**Détermination de certaines substances dans les produits électrotechniques –
Partie 3-4: Détection – Phtalates dans les polymères des produits
électrotechniques par chromatographie en phase liquide à haute performance
avec détecteur d'ultraviolets (HPLC-UV), par chromatographie sur couche mince
(CCM) et par spectrométrie de masse par désorption thermique (TD-MS)**



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2023 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC -

webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 300 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 19 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.



IEC 62321-3-4

Edition 1.0 2023-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Determination of certain substances In electrotechnical products –
Part 3-4: Screening – Phthalates in polymers of electrotechnical products by
high performance liquid chromatography with ultraviolet detector (HPLC-UV),
thin layer chromatography (TLC) and thermal desorption mass spectrometry
(TD-MS)**

**Détermination de certaines substances dans les produits électrotechniques –
Partie 3-4: Détection – Phtalates dans les polymères des produits
électrotechniques par chromatographie en phase liquide à haute performance
avec détecteur d'ultraviolets (HPLC-UV), par chromatographie sur couche mince
(CCM) et par spectrométrie de masse par désorption thermique (TD-MS)**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 01.110; 13.020.01; 29.100.01

ISBN 978-2-8322-6853-7

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references	9
3 Terms, definitions and abbreviated terms	9
3.1 Terms and definitions.....	9
3.2 Abbreviated terms.....	10
4 Principle	10
5 HPLC-UV and TLC method.....	11
5.1 Reagents and materials	11
5.1.1 Reagents and materials of HPLC-UV method.....	11
5.1.2 Reagents and materials of TLC method.....	11
5.2 Equipment, apparatus and tools.....	12
5.2.1 Equipment, apparatus and tools for HPLC-UV method.....	12
5.2.2 Equipment, apparatus and tools for TLC method	12
5.3 Sampling.....	12
5.4 Procedure	13
5.4.1 Procedure of HPLC-UV method	13
5.4.2 Procedure of TLC method.....	15
5.5 Calculation of phthalates concentration.....	17
5.6 Precision.....	17
5.6.1 Precision of HPLC-UV method.....	17
5.6.2 Precision of TLC method	18
5.7 Quality assurance and control.....	19
5.7.1 Quality assurance and control of HPLC-UV method	19
5.7.2 Quality assurance and control of TLC method.....	21
5.8 Test report.....	22
6 TD-MS method	22
6.1 Reagents and materials	22
6.2 Equipment, apparatus and tools.....	22
6.2.1 Equipment	22
6.2.2 Apparatus and tools.....	22
6.3 Sampling.....	22
6.4 Procedure.....	23
6.4.1 Procedure of APCI-MS method	23
6.4.2 Procedure of IA-MS method.....	25
6.5 Calculation of phthalates concentration.....	27
6.6 Precision.....	27
6.7 Quality assurance and control.....	28
6.7.1 Sensitivity.....	28
6.7.2 Stability test.....	28
6.7.3 Blank test	29
6.7.4 Limit of detection (LOD) or method detection limit (MDL) and limit of quantification (LOQ)	29
6.8 Test report.....	29
Annex A (informative) FT-IR method	30

A.1	Principle	30
A.2	Reagents and materials	32
A.3	Apparatus	32
A.4	Sampling.....	33
A.5	Procedure	33
A.5.1	Sample preparation	33
A.5.2	Instrumental parameters	33
A.5.3	Calibration	33
A.6	Calculation of phthalates concentration.....	34
A.7	Precision.....	34
A.8	Quality assurance and control.....	35
A.9	Test report	35
Annex B (informative)	Details of analysis by TLC method	36
B.1	Separation by TLC	36
B.2	Detection by image analysis.....	36
B.3	Re-measurement	38
Annex C (informative)	Examples of spectrums and chromatograms at suggested conditions	41
C.1	FT-IR spectrum	41
C.2	HPLC-UV chromatogram.....	41
C.3	TLC chromatogram	42
C.4	APCI-MS mass spectrum	42
C.5	IA-MS mass spectrum	43
Annex D (informative)	Commercially available reference materials and solutions considered suitable for the suggested methods.....	44
Annex E (informative)	Flowchart of test methods	45
Annex F (informative)	Commonly used phthalates.....	46
Annex G (informative)	Results of international inter-laboratory study 3-4 (IIS 3-4).....	47
Bibliography.....		51
Figure 1	– Polymer samples in glass vials with acetonitrile (tightened with sealing tape)	15
Figure A.1	– Phthalate analysis in polymers (check)	31
Figure A.2	– Phthalate analysis in polymers with pre-treatment	31
Figure B.1	– Usage of TLC plate (20 cm × 10 cm).....	36
Figure B.2	– Set-up of camera-equipment for TLC (inside of darkroom)	37
Figure B.3	– TLC chromatogram	38
Figure B.4	– Separation by re-measurement conditions (in case of pattern a)).....	39
Figure B.5	– Peak shift affected by large amount of DEHA.....	39
Figure B.6	– TLC re-measurement by standard addition method (in case of pattern b)).....	40
Figure C.1	– Spectrum of FT-IR	41
Figure C.2	– Chromatogram of HPLC-UV	41
Figure C.3	– Developed TLC plate exposed to UV light of 254 nm	42
Figure C.4	– Image processed TLC chromatogram of Figure C.3	42
Figure C.5	– Mass spectrums of APCI-MS	43
Figure C.6	– Mass spectrums of IA-MS	43
Figure E.1	– Flowchart for screening step and verification test step	45

Table 1 – Standard mixture solution concentrations	13
Table 2 – Measurement conditions of HPLC-UV	14
Table 3 – Standard mixture solution concentrations	15
Table 4 – Measurement conditions of TLC	16
Table 5 – IIS 3-4 Repeatability and reproducibility of HPLC-UV	18
Table 6 – IIS 3-4 Repeatability and reproducibility of TLC	19
Table 7 – Measurement conditions of APCI-MS	24
Table 8 – Measurement conditions of IA-MS	26
Table 9 – IIS 3-4 Repeatability and reproducibility of TD-MS	28
Table A.1 – IIS 3-4 Repeatability and reproducibility of FT-IR	34
Table B.1 – Conditions of photography	37
Table B.2 – Range of R_f values of target phthalates	38
Table D.1 – Example list of commercially available reference materials	44
Table F.1 – Example list of commonly used phthalates in products	46
Table G.1 – Formulation of samples	47
Table G.2 – Statistical data for HPLC-UV	48
Table G.3 – Statistical data for TLC	49
Table G.4 – Statistical data for TD-MS	50
Table G.5 – Statistical data for FT-IR	50

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**DETERMINATION OF CERTAIN SUBSTANCES
IN ELECTROTECHNICAL PRODUCTS –**
**Part 3-4: Screening – Phthalates in polymers of electrotechnical
products by high performance liquid chromatography with ultraviolet
detector (HPLC-UV), thin layer chromatography (TLC) and thermal
desorption mass spectrometry (TD-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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 62321-3-4 has been prepared IEC technical committee 111: Environmental standardization for electrical and electronic products and systems. It is an International Standard.

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

Draft	Report on voting
111/695/FDIS	111/701/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,
- 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 certain substances (e.g. lead (Pb), cadmium (Cd), polybrominated diphenyl ethers (PBDEs) and specific phthalates) 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 62321-3-4 introduces a new part in the IEC 62321 series.

Appropriate test methods are required in order to facilitate the monitoring of the contents of certain substances in affected materials. Faced with the enormous task of testing a diversity of electronic and electric equipment, the industry adopted the concept of 'screening' in order to reduce the amount of testing. As defined in IEC 62321-1:2013, 3.1.10, "*...screening is an analytical procedure to determine the presence or absence of substances in the representative part or section of a product, relative to the value or values chosen as the criterion for presence, absence or further testing*". Executed as a predecessor to any other test analysis of the product, the main objective of screening is to quickly, expediently, inexpensively and preferably in a non-destructive manner, determine whether the screened product:

- contains a certain substance at a concentration significantly higher than its value accepted as criterion, and therefore can be rejected as being above the threshold;
- contains a certain substance at a concentration significantly lower than its value accepted as criterion, and therefore can be considered below the threshold;
- contains a certain substance at a concentration so close to the value accepted as criterion that when all possible errors of measurement and safety factors and measurement uncertainty are considered, no conclusive decision can be made about the absence or presence of substance and, therefore, a follow-up action can be required, such as another, more specific or more precise and accurate analysis.

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 3-4: Screening – Phthalates in polymers of electrotechnical products by high performance liquid chromatography with ultraviolet detector (HPLC-UV), thin layer chromatography (TLC) and thermal desorption mass spectrometry (TD-MS)

1 Scope

This part of IEC 62321 specifies procedures for the screening of di-isobutyl phthalate (DIBP), di-n-butyl phthalate (DBP), benzyl butyl phthalate (BBP), di-(2-ethylhexyl) phthalate (DEHP) in polymers of electrotechnical products by using high performance liquid chromatography with ultraviolet detector (HPLC-UV), thin layer chromatography (TLC) and thermal desorption mass spectrometry (TD-MS).

High performance liquid chromatography with ultraviolet detector (HPLC-UV), thin layer chromatography (TLC) and thermal desorption mass spectrometry (TD-MS) techniques are described in the normative part of this document. Fourier transform infrared spectroscopy (FT-IR) is described in the informative annexes of this document.

The HPLC-UV and TLC techniques are suitable for screening and semi-quantitative analysis of DIBP, DBP, BBP and DEHP in polymers that are used as parts in electrotechnical products above 300 mg/kg.

The TD-MS technique is suitable for screening and semi-quantitative analysis of DIBP, DBP, BBP and DEHP in polymers that are used as parts in electrotechnical products above 300 mg/kg.

The FT-IR technique is suitable for preliminary screening of total phthalates (DIBP, DBP, BBP, DEHP and so forth) in polymers that are used as parts in electrotechnical products above 50 000 mg/kg.

These test methods have been evaluated by testing polyethylene (PE), polyvinyl chloride (PVC) materials containing individual phthalates between 500 mg/kg to 3 000 mg/kg as depicted in this document. The use of the methods described in this document for other polymer types, phthalate compounds or concentration ranges other than those specified above has not been specifically evaluated.

A flow chart is given as an example of how each method included in this document can be used for screening. The test methods in this document differ from those given in IEC 62321-8 [1]¹ in that not all phthalates in this scope are separated from each other. Detectable combinations are DIBP + DBP + BBP and DEHP for the HPLC-UV technique, DIBP + DBP, BBP and DEHP for the TLC technique and TD-MS technique, total phthalates for the FT-IR technique. FT-IR is a suitable analytical technique for preliminary screening in the first step of phthalates screening. These test methods are characterized by a shorter measuring time compared with IEC 62321-8 because all phthalates in this scope are not separated from each other.

NOTE See Annex F for commonly used phthalates in products.

This document has the status of a horizontal publication in accordance with IEC Guide 108 [2].

¹ Numbers in square brackets refer to the Bibliography.

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 62321-2:2021, *Determination of certain substances in electrotechnical products – Part 2: Disassembly, disjointment and mechanical sample preparation*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN