Heitmed püsiallikatest. PCDD/PCDF ja dioksiinilaadsete PCB-de massikontsentratsiooni määramine. Osa 4: Dioksiinilaadsetest PCB-dest proovivõtt ja analüüsimine

Stationary source emissions - Determination of the mass concentration of PCDDs/PCDFs and dioxin-like PCBs - Part 4: Sampling and analysis of dioxin-like PCBs

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 1948-4:2010+A1:2013 sisaldab Euroopa standardi EN 1948-4:2010+A1:2013 inglisekeelset teksti.	This Estonian standard EVS-EN 1948-4:2010+A1:2013 consists of the English text of the European standard EN 1948-4:2010+A1:2013.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 04.12.2013.	Date of Availability of the European standard is 04.12.2013.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 13.040.40

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1948-4:2010+A1

December 2013

ICS 13.040.40

Supersedes EN 1948-4:2010

English Version

Stationary source emissions - Determination of the mass concentration of PCDDs/PCDFs and dioxin-like PCBs - Part 4: Sampling and analysis of dioxin-like PCBs

Émissions de sources fixes - Détermination de la concentration massique en PCDD/PCDF et PCB de type dioxine - Partie 4: Prélèvement et analyse des PCB de type dioxine

Emissionen aus stationären Quellen - Bestimmung der Massenkonzentration von PCDD/PCDF und dioxinähnlichen PCB - Teil 4: Probenahme und Analyse dioxinähnlicher PCB

This European Standard was approved by CEN on 28 August 2010 and includes Amendment 1 approved by CEN on 23 October 2013.

CEN 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 CEN 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 CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Ref. No. EN 1948-4:2010+A1:2013 E

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Foreword

This document (EN 1948-4:2010+A1:2013) has been prepared by Technical Committee CEN/TC 264 “Air quality”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2014, and conflicting national standards shall be withdrawn at the latest by June 2014.

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

This document includes Amendment 1 approved by CEN on 21 October 2013.

This document supersedes ▌A1⟩ EN 1948-4:2010 ⟨A1▌.

Annex H provides details of significant technical changes between this European Standard and the previous document CEN/TS 1948-4:2007.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

The start and finish of text introduced or altered by amendment is indicated by tags ▌A1⟩ ⟨A1▌.

EN 1948 consists of several parts dealing with the determination of the mass concentration of PCDDs, PCDFs and PCBs in stationary source emissions:

— *Part 1: Sampling of PCDDs/PCDFs*

— *Part 2: Extraction and clean-up of PCDDs/PCDFs*

— *Part 3: Identification and quantification of PCDDs/PCDFs*

— *Part 4: Sampling and analysis of dioxin-like PCBs*

The first three parts are necessary for the performance of the PCDD/PCDF measurements. In addition this document EN 1948-4 describes the sampling, extraction and analyses of dioxin-like PCBs and requires references to EN 1948-1, −2, −3.

The precision and the performance characteristics of the measurement of PCBs were determined between 2006 and 2008 in a comparison and validation trial at both a waste incinerator and a shredder plant sponsored by the European Commission and the European Free Trade Association. The basic requirements of the determination of PCBs were first published as CEN/TS 1948-4, which served as a basis for these mandated validation measurements. This document EN 1948-4 additionally includes important guidance for sampling and analysis over a broad concentration range gained during the mandated validation measurements.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

Polychlorinated biphenyls (PCBs) are a group of chlorinated aromatic compounds similar in structure to polychlorinated dibenzo-*p*-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) which consist of 209 individual substances (see Figure 1 for the basic structure).

PCBs have been produced intentionally over approximately 50 years until the end of the 1990s with different uses in open and closed systems, e.g. as electrical insulators or dielectric fluids in capacitors and transformers, specialised hydraulic fluids, as a plasticiser in sealing material, etc. Worldwide, more than one million tons of PCBs were produced.

PCBs as well as PCDD/PCDF are emitted from thermal and other processes. PCB can contribute to the Total WHO-TEQ as reported for Germany [1]; [2], Great Britain [3], Poland [4], Spain [5], Japan [6]; [7], Korea [8].

In 1997 a group of experts of the World Health Organisation (WHO) defined toxicity equivalent factors (TEFs) for PCDDs/PCDFs and 12 PCBs, known as dioxin-like PCBs [9, 10] (see Annex A). These 12 dioxin-like PCBs consist of four non-ortho PCBs and eight mono-ortho PCBs (no or only one chlorine atoms in 2-, 2'-, 6- and 6'-position), having a planar or mostly planar structure, see Figure 1. In the meanwhile these toxicity equivalent factors were revised (see Annex A).

This document deals with the determination of these *dioxin-like* PCBs in emissions from stationary sources. Additionally informative annexes are provided, describing the analyses of the marker PCBs and hexachlorobenzene (HCB) in the same sample (Annex F and Annex G).

Only skilled operators who are trained in handling highly toxic compounds should apply this document.

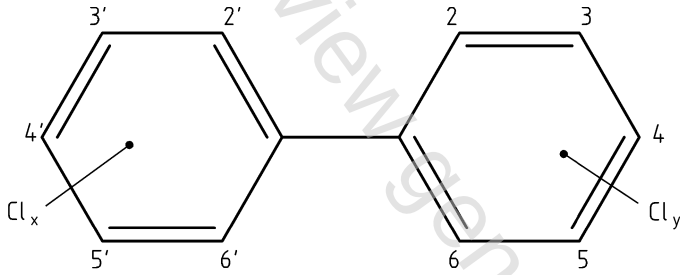

Figure 1 —Structure of PCB

1 Scope

This European Standard specifies sampling from stationary sources, extraction, clean-up, identification and quantification procedures of the dioxin-like PCBs. The procedure described lays down requirements to measure the PCB congeners given in Annex A (see Table A.1). It is applicable to the 12 non- and mono-ortho PCB designated by the WHO. It is optimised to measure PCB concentrations of about 0,01 ng WHO-TEQ_{PCB}/m^3.

In addition to the 12 non- and mono-ortho-PCB the present document is also applicable to measure further PCB-congeners like the “marker PCB” 28, 52, 101, 138, 153, 180 (see Annex F).

This document specifies a framework of quality control requirements for any PCB sampling, extraction, clean-up, identification and quantification methods to be applied.

As a result of their similar chemical behaviour PCBs, as shown in the validation campaign, can be sampled from stationary sources together with the PCDDs/PCDFs. Therefore, it is possible to measure PCBs together with PCDDs/PCDFs by applying EN 1948-1, −2, −3 and −4. The complete sampling procedure is described in EN 1948-1. Each of the three sampling methods of EN 1948-1 can be combined with the methods described in this document to complete the measurement procedure. EN 1948-1 is an integral part of the complete measurement procedure and is necessary for the determination of PCBs.

The analyses of the following PCB congeners is described in this European Standard and is validated in the validation campaign:

a) Non-ortho substituted PCBs

   1) 3,3’,4,4’-TeCB(77)

   2) 3,4,4’,5-TeCB (81)

   3) 3,3’,4,4’,5-PeCB (126)

   4) 3,3’,4,4’,5,5’-HxCB (169)

b) Mono-ortho substituted PCBs

   1) 2,3,3’,4,4’-PeCB (105)

   2) 2,3,4,4’,5-PeCB (114)

   3) 2,3’,4,4’,5-PeCB (118)

   4) 2’,3,4,4’,5-PeCB (123)

   5) 2,3,3’,4,4’,5-HxCB (156)

   6) 2,3,3’,4,4’,5’-HxCB (157)

   7) 2,3’,4,4’,5,5’-HxCB (167)

   8) 2,3,3’,4,4’,5,5’-HpCB (189)

c) Marker PCBs

   1) 2,4,4'- TriCB (28)

2) 2,2',5,5'-TeCB (52)

3) 2,2',4,5,5'- PeCB (101)

4) 2,2',3,4,4',5'- HxCB (138)

5) 2,2',4,4',5,5'- HxCB (153)

6) 2,2',3,4,4',5,5'- HpCB (180)

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 1948-1:2006, *Stationary source emissions - Determination of the mass concentration of PCDDs/PCDFs and dioxin-like PCBs - Part 1: Sampling of PCDDs/PCDFs*

EN 1948-2:2006, *Stationary source emissions - Determination of the mass concentration of PCDDs/PCDFs and dioxin-like PCBs - Part 2: Extraction and clean-up of PCDDs/PCDFs*

EN 1948-3:2006, *Stationary source emissions - Determination of the mass concentration of PCDDs/PCDFs and dioxin-like PCBs - Part 3: Identification and quantification of PCDDs/PCDFs*

EN 13284-1:2001, *Stationary source emissions - Determination of low range mass concentration of dust – Part 1: Manual gravimetric method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1948-1:2006, EN 1948-2:2006, EN 1948-3:2006 and the following apply.

3.1
analytical blank value
value determined by a blank sample covering the complete analytical procedure including extraction, clean-up, identification and quantification including all the relevant reagents and materials

3.2
congener
any one of the 209 individual PCBs

3.3
dioxin-like PCB
WHO-PCB
non- and mono-ortho PCB with an affinity to the Ah-receptor, showing similar toxic effects as the 2,3,7,8-substituted PCDDs/PCDFs according to WHO [9]

3.4
extraction standard
quantification standard
$^{13}C_{12}$-labelled PCBs, added before extraction and used for calculating results