

**Heitmed püsiallikatest. PCDD/PCDF  
massikontsentratsiooni määramine. Osa  
3: Kvalitatiivne ja kvantitatiivne  
analüüsimine**

Stationary source emissions - Determination of the  
mass concentration of PCDDs/PCDFs - Part 3:  
Identification and quantification

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 1948-3:1999 sisaldab Euroopa standardi EN 1948-3:1996 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 12.12.1999 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 1948-3:1999 consists of the English text of the European standard EN 1948-3:1996.</p> <p>This document is endorsed on 12.12.1999 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p><b>Käsitlusala:</b> Standardi käesolev osa määrab kindlaks prooviks võetud PCDD/PCDF kvalitatiivse ja kvantitatiivse analüüsi. See on tervikliku mõõtmisprotseduuri lahutamatu osa. PCDD/PCDF määramiseks on vaja kasutada ka standardi kahte ülejäänud osa EN 1948-1:1996 ja EN 1948-2:1996, mis kirjeldavad vastavalt proovivõtmist ning ekstraheerimist ja puhastamist.</p>	<p><b>Scope:</b></p>
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**ICS** 13.040.40

**Võtmesõnad:** emissioon, gaaskromatograafia, heitgaasid, identifitseerimine, kontsentratsioon, kvaliteet, kvantiteedi kontrollimine, massispektromeetria, määramine, pcdd, pcdf, saastumine, õhk

ICS 13.040.40

Descriptors: Air quality, PCDD, PCDF, emission, measurements.

**English version**

Stationary source emissions

**Determination of the mass concentration  
of PCDDs/PCDFs**

**Part 3: Identification and quantification**

Emissions de sources fixes –  
Détermination de la concentration  
massique en PCDDs/PCDFs – Partie 3:  
Identification et quantification

Emissionen aus stationären Quellen –  
Bestimmung der Massenkonzentration  
von PCDD/PCDF – Teil 3: Identifizierung  
und Quantifizierung

This European Standard was approved by CEN on 1996-12-27.

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 Central Secretariat or to any CEN member.

The European Standards exist 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

**CEN**

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

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## Contents

	Page
Foreword	4
Introduction	6
1 Scope	7
2 Normative references	7
3 Definitions and abbreviations	8
3.1 Definitions	8
3.2 Abbreviations	10
4 Principles of identification and quantification	11
5 Reagents, materials and equipment	12
6 Safety measures	12
7 Quality control requirements for identification and quantification	12
7.1 Minimum requirements for identification of PCDD/PCDF congeners	12
7.2 Isomer sums of PCDD/PCDF congeners	13
7.3 Minimum requirements for quantification	14
8 Quality assurance criteria for extraction/clean-up/quantification procedure blanks	15
9 Calibration of the GC/MS	16
10 Quantification of GC/MS results	18
10.1 Quantification of the sample	18
10.2 Calculation of the recovery rates of the extraction standards	19
10.3 Calculation of the recovery rates of the sampling standards	20
11 Calculation of the measurement results	21
12 Analytical report	22
13 Performance characteristics	23
13.1 General aspects	23
13.2 Intralaboratory results	24
13.3 Interlaboratory results	25
13.4 Lower detection limits	25
14 Interferences	26
Annex A (informative) Examples of operation Gas chromatography / mass spectrometry analyses of PCDDs/PCDFs in emission samples	28

<b>Annex B (informative)</b>	<b>Bibliography</b>	<b>38</b>
<b>Annex C (informative)</b>	<b>Mass of ions monitored for PCDDs and PCDFs</b>	<b>41</b>
<b>Annex D (informative)</b>	<b>Relative abundance of chlorine isotope ions and their ratio for PCDD/PCDF congeners containing 4 to 8 chlorine substituents</b>	<b>42</b>
<b>Annex E (informative)</b>	<b>Further general recommendations for separation, detection and quantification of PCDDs/PCDFs</b>	<b>42</b>
<b>Annex F (informative)</b>	<b>Variability determination based on the results of the validation test</b>	<b>44</b>
<b>Annex G (informative)</b>	<b>Clauses of this European Standard addressing essential requirements or other provisions of EU Directives</b>	<b>54</b>

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## Foreword

This European Standard 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 1997, and conflicting national standards shall be withdrawn at the latest by June 1997.

This European Standard 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(s).

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

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

This European Standard EN 1948:1996 consists of three parts dealing with the determination of the mass concentration of PCDDs and PCDFs in stationary source emissions:

Part 1:        Sampling

Part 2:        Extraction and clean-up

Part 3:        Identification and quantification

All three parts are necessary for the performance of the dioxin measurements.

This European Standard was developed on the basis of the following national standards or guidelines:

NFX 43-313:1991

Air Quality - Stationary Source Emissions -  
Determination of PCDD/PCDF

- Nordic:1987** Recommended method for dioxin measurements in flue gases from waste incineration, Swedish Environmental Protection Agency
- Unichim Method N° 825:1989** Stationary source emission measurements - Conveyed gas flows - Sampling and determination of organic micropollutants
- Sampling
  - PAH determination
  - PCDD and PCDF determination
  
  - PCB determination
- VDI 3499 Part 1:1990 (draft)** Emission measurement - Measurement of residual materials. Determination of polychlorinated dibenzodioxins and dibenzofurans in flue and stack gas of incineration and firing plants - Dilution method - Determination in filter dust, potash and slag
- VDI 3499 Part 2:1993 (draft)** Emission measurement - Determination of polychlorinated dibenzo-p-dioxins (PCDD) and dibenzofurans (PCDF) - Filter/condenser method
- VDI 3499 Part 3:1996 (draft)** Emission measurement - Determination of polychlorinated dibenzo-p-dioxins (PCDD) and dibenzofurans (PCDF) - Cooled probe method

## **Introduction**

This European Standard was elaborated by

AENOR (Spain)  
AFNOR (France)  
BSI (United Kingdom)  
DIN (Germany)  
DS (Denmark)  
NNI (Netherlands)  
NSF (Norway)  
ON (Austria)  
SFS (Finland)  
SIS (Sweden)  
SNV (Switzerland)  
UNI (Italy)

The precision and the performance characteristics were determined in four comparative and validation trials at waste incinerators sponsored by the Commission of the European Communities, the European Free Trade Association and the German Federal Environment Agency.

Two groups of related chlorinated aromatic ethers are known as polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs); they consist of a total of 210 individual substances (congeners): 75 PCDDs and 135 PCDFs.

PCDDs and PCDFs can form in the combustion of organic materials; they also occur as undesirable by-products in the manufacture or further processing of chlorinated organic chemicals. PCDDs/PCDFs enter the environment via these emission paths and through the use of contaminated materials. In fact, they are universally present at very small concentrations. The 2,3,7,8-substituted congeners are toxicologically significant. Toxicologically much less significant than the tetrachlorinated to octachlorinated dibenzodioxins/dibenzofurans are the 74 monochlorinated to trichlorinated dibenzodioxins/dibenzofurans (for toxicity equivalent factors, see Annex A of EN 1948-1:1996).

Only skilled operators who are trained in handling highly toxic compounds should apply this part of the Standard.

## 1 Scope

The present Part of the Standard specifies the identification and quantification procedures of the sampled PCDDs/PCDFs. It is an integral part of the complete measurement procedure. The use of the other two Parts of this Standard, EN 1948-1:1996 and EN 1948-2:1996, describing sampling and extraction and clean-up, respectively, is necessary for the determination of the PCDDs/PCDFs.

This Standard has been designed to measure PCDD/PCDF concentrations at about 0,1 ng I-TEQ/m<sup>3</sup> in stationary source emissions.

This Standard specifies both method validation and a framework of quality control requirements which have to be fulfilled by any PCDD/PCDF identification and quantification methods to be applied. Some methods are described in detail in Annex A as examples of proven procedures.

Each of the three sampling methods (Part 1) can be combined with the extraction and clean-up (Part 2) and the identification and quantification to complete the measurement procedure.

During comparison measurements on a municipal waste incinerator at the level of about 0,1 ng I-TEQ/m<sup>3</sup> these three methods have been deemed comparable within the expected range of uncertainty. Validation trials were performed on the flue gas of municipal waste incinerators at the level of about 0,1 ng I-TEQ/m<sup>3</sup> and a dust loading of from 1 mg/m<sup>3</sup> to 15 mg/m<sup>3</sup>.

In principle it is not possible to evaluate the accuracy (trueness and precision) of emission measurements. Following the validation trials the internal and external variabilities were calculated for the process considered and are given in clause 13. These variabilities given an indication of the variabilities which have been observed when using this Standard and need to be taken into account when expressing results.

The procedure described in the three parts of the EN 1948:1996 lays down requirements in order to measure every 2,3,7,8-chlorine substituted PCDD/PCDF congener required to calculate the total I-TEQ (see Table A.1 of EN 1948-1:1996).

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in

the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 1948-1:1996	Stationary source emissions - Determination of the mass concentration of PCDDs/PCDFs - Part 1: Sampling
EN 1948-2:1996	Stationary source emissions - Determination of the mass concentration of PCDDs/PCDFs - Part 2: Extraction and clean-up
ISO 5725-2:1994	Accuracy (trueness and precision) of measurement methods and results - Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method

A bibliography is shown in Annex B (informative).

### 3 Definitions and abbreviations

#### 3.1 Definitions

For the purposes of this Standard, the following definitions apply:

<b>3.1.1 Spiking</b>	Addition of $^{13}\text{C}_{12}$ -labelled PCDD/PCDF standards
<b>3.1.2 Isokinetic sampling</b>	Sampling at a rate such that the velocity of the gas entering the sampling nozzle is the same as that of the gas in the duct at the sampling point [ISO 9096:1992]