



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Field Test Experiments and Validation of CEN/TS 1948-4 Dioxin-like PCBs from stationary sources

– CEN/TC 264/WG 1 “Dioxins and PCBs (Emission)” –

Annex 6b

Measurement report filter/condenser method



Secretariat:

Kommission Reinhaltung der Luft im VDI und DIN – Normenausschuss KRdL

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CEN Validation measurements of DL-PCB, marker-PCB and HCB

**Service contract WP 6.
Field validation test in Vienna
using the filter/condenser method**

June 2007

Reported by FORCE Technology

Accredited Report No.: 3504-01

Project No.: 107-28412

Project Manager: Ole Schleicher

he test report may only be used in agreement with FORCE Technology.

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1. Introduction

On behalf of Dr. Ljuba Woppowa, DIN Deutsches Institut für Normung e. V., FORCE Technology has carried out the validations measurement according to:

- Service contract WP 6, Field validation test using the filter/condenser method, and at the Flötzersteig municipal waste incineration plant in Vienna

The measurement campaign was carried out in the period from the 20th June to the 26th of June 2007, by Technician Steen Meldorf and Project Manager Ole Schleicher.

Sampling and analyses of PCB was performed according to EN 1948-1, -2, -3 and CEN TS 1948-4

Sampling was carried out according to the FORCE Technology DS/EN ISO/IEC 17025 accreditation no. 51 from the Danish accreditation body DANAK.

Analysis was carried out by ERGO Forschungsgesellschaft GmbH i Hamburg in accordance to their to DIN EN ISO/IEC 17025 accreditation from the German Federal Pollution Control Act (§§ 26, 28).

Sampling campaign included six duplicate emissions measurements, three field blanks, and in order to check the PCB breakthrough, three of the sampling should have an additional adsorption unit, which is analyzed separately.

2. Plant description

See the MonitoringSystem report for:

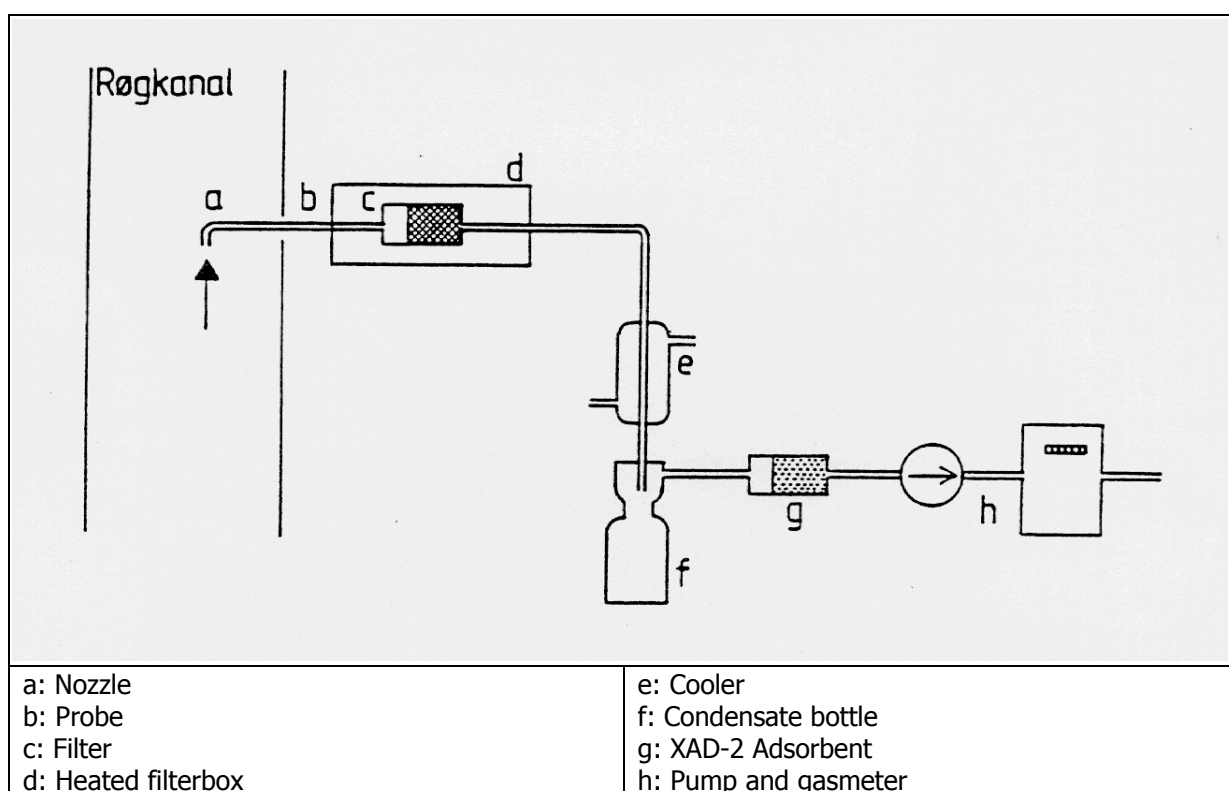
- Selection of the operating conditions
- Description of the measurement positions
- Plant data during validation tests from EMIDAT system

And see the FORCE Technology report WP Gas parameters for flue gas data during sampling.

Measurements positions for the filter cooler sampling train was the short probe of 570 mm in flange E at the East side, and the long probe of 1750 mm in flange B at the West side.

3. Filter cooler sampling train

A schematic of the filter cooler sampling train is shown in the figure below.



Prior to each sampling, the whole sampling train is rinsed with acetone and toluene. The procedure is first two times rinse with 50 ml acetone followed by two times rinse with 50 ml toluene.

The pre rinse is performed to be sure the equipment is clean and not contaminated from previous sampling. This rinse is stored, and can be analyzed as an control of the cleanness of the equipment. The rinse from after each sampling is analyzed as a part of the sample.

When the glass equipment is reused for the next sample, it is pre rinsed as when using a new equipment.



Figure 1. Sample train at east side in flange E

4. Samples

Sample data is shown in Table 1.

Date	Sample period		Numbering				Number of bottles	
	Start	Stop	Sample	Filter	XAD	XAD-Extra	Condensate	Rinse
20-06-2007	11:10	17:10	1A	F169	6281		3	1
20-06-2007	11:12	17:12	1B	F170	6282		3	1
21-06-2007	09:50	15:50	2A	F171	6283	6293	2	1
21-06-2007	09:50	15:50	2B	F172	6284		2	1
22-06-2007	09:35	15:35	3A	F173	6285		3	1
22-06-2007	09:35	15:35	3B	F174	6286		3	1
23-06-2007	04:10	10:10	4A	F175	6287		2	1
23-06-2007	04:10	10:10	4B	F176	6288	6298	2	1
25-06-2007	09:45	15:45	5A	F177	6289		3	1
25-06-2007	09:45	15:45	5B	F178	6290		3	1
26-06-2007	08:50	14:50	6A	F179	6291	6295	3	1
26-06-2007	08:50	14:50	6B	F180	6292		3	1
19-06-2007	17:10	17:45	Blank 1	F181	6296			1
22-06-2007	15:35	16:10	Blank 2	F182	6297			1
25-06-2007	08:30	09:10	Blank 3	F183	6294			1

Table 1. Sample data

Sampling data is shown in Annex 2

5. Results

Analytical data and calculated emission values is shown in the analytical report from ERGO in Annex 3.

FORCE Technology

10/31/2007

Revised 02/11/08

Ole Schleicher
Project Manager

6. Annex

Annex 1 Filter cooler sampling train
 Annex 2 Sampling data
 Annex 3 Analytical data

Annex 1

Filter cooler sampling train

Rapport nr. 3504-01

Dates of measurement campaign:	Date of measurement: 19. - 26. June 2007
Sampling site: Waste Incinerator Flötzersteig	Sampling personnel: Ole Schleicher and Steen Meldorf

Sampling train

All part of the sampling train, which is in contact with the gas or condensate, is made of glass.

Method	Filter cooler		
Laboratory	FORCE Technology		
Sample train position		East Flange E	West Flange B
Train identification:	FORCE No.	47008	47007
Nozzle material		Glas	
Sampling nozzle Depth to wall	cm	57	175
Probe material		Glas	
Probe diameter	mm	10	
Probe length	cm	100	220
Distance nozzle - filter	cm	115	235
Distance nozzle - cooler	cm	145	265
Filter:			
Type		Whatman 680 QM-A	
Material		Quarts	
Quality		Ultra-pure QM-A	
Area	cm ²	12,6	
Condenser:			
Type		Laboratory spiral type	
Material		Glas	
Diameter	cm	4,2	
Lenght	cm	27	
Adsorbent stage:			
Type		XAD-2	
Material		Glas	
Quantity	cm ³	57	
Diameter	mm	30	
Length	mm	80	
Compartment spiked		Filter	

Other parameters - remarks

Prior to each sampling, the whole sampling train is rinsed with acetone and toluene. The procedure is first two times rinse with 50 ml acetone followed by two times rinse with 50 ml toluene.

The prerinse is performed to be sure the equipment is clean and not contaminated from previous sampling. This rinse is stored, and can be analysed as an control of the cleanness of the equipment. The rinse from after each sampling is analysed as a part of the sample. When the glasequipment is reused for the next sample, it is prerinsed as when using a new equipment.

Annex 2

Sampling data

Rapport nr. 3504-01

FORCE Technology Sampling data		Sample A = East side of ducy, flange E, Short probe.			
Plant/stack: MWA Flötzersteig Wien		Sample B = West side of duct, flange B, long probe.			
Parameter	Unit	1A	1B	2A	2B
Date	dd-mm-yy	20-06-07	20-06-07	21-06-07	21-06-07
Measuring period	hh:mm	11:10-17:10	11:10-17:10	09:50-15:50	09:50-15:50
Filter	No.	F169	F170	F171	F172
XAD	No.	6281	6282	6283	6284
XAD-Extra	No.			6293	
Sampling volume	m ³ (s,d)	8,724	7,597	7,180	6,618
Sampling volume	m ³ (ref)	5,784	5,037	4,731	4,361
Barometric pressure	mbar	982		978	
Stack pressure	mbar	0,4	0,4	0,3	0,3
Velocity	m/s	16,7	16,7	16,2	16,7
Excess air (appr. value)	λ	3,18	3,18	3,20	3,20
H ₂ O	Vol %	16,0	15,7	15,6	16,0
Flowrate	m ³ (s,d)/h	149.104	149.442	144.758	148.755
Flowrate, operating conditions	m ³ /h	271.840	271.706	263.616	272.093
Flue gas parameters		Flowrate in B-samples is based on the kontinuous measurements with pitottube and logged dP-measurements			
Temperature	°C	132,5		132,3	
CO ₂	Vol %, dry	5,67		5,31	
O ₂	Vol %, dry	14,35		14,39	
CO	mg/m ³ (s,d)	11		17	
CO	mg/m ³ (ref)	16		26	

(s,d) indicates dry gas at standard conditions (0°C, 101,3 kPa)

(ref) indicates dry flue gas at standard conditions (0°C, 101,3 kPa) and 11 % oxygen

Rapport nr. 3504-01

FORCE Technology Sampling data Plant/stack: MWA Flötzersteig Wien		Sample A = East side of ducy, flange E, Short probe. Sample B = West side of duct, flange B, long probe.			
Parameter	Unit	3A	3B	4A	4B
Date	dd-mm-yy	22-06-07	22-06-07	23-06-07	23-06-07
Measuring period	hh:mm	09:35-15:35	09:35-15:35	04:10-10:10	04:10-10:10
Filter	No.	F173	F174	F175	F176
XAD	No.	6285	6286	6287	6288
XAD-Extra	No.				6298
Sampling volume	m ³ (s,d)	8,170	7,618	5,792	5,520
Sampling volume	m ³ (ref)	7,923	7,388	6,573	6,264
Barometric pressure	mbar	979		981	
Stack pressure	mbar	0,3	0,3	-0,6	-0,6
Velocity	m/s	13,1	11,3	13,5	14,7
Excess air (appr. value)	λ	2,17	2,17	1,86	1,86
H2O	Vol %	17,1	17,2	19,3	19,7
Flowrate	m ³ (s,d)/h	116.611	100.691	115.405	125.111
Flowrate, operating conditions	m ³ /h	212.635	183.839	219.701	239.390

Flue gas parameters

Temperature	°C	125,9	132,9
CO ₂	Vol %, dry	8,26	9,74
O ₂	Vol %, dry	11,30	9,66
CO	mg/m ³ (s,d)	23	42
CO	mg/m ³ (ref)	24	37

(s,d) indicates dry gas at standard conditions (0°C, 101,3 kPa)

(ref) indicates dry flue gas at standard conditions (0°C, 101,3 kPa) and 11 % oxygen

Rapport nr. 3504-01

FORCE Technology Sampling data Plant/stack: MWA Flötzersteig Wien		Sample A = East side of ducy, flange E, Short probe. Sample B = West side of duct, flange B, long probe.			
Parameter	Unit	5A	5B	6A	6B
Date	dd-mm-yy	25-06-07	25-06-07	26-06-07	26-06-07
Measuring period	hh:mm	09:45 -15:45	09:45-15:45	08:50-14:50	08:50-14:50
Filter	No.	F177	F178	F179	F180
XAD	No.	6289	6290	6291	6292
XAD-Extra	No.			6295	
Sampling volume	m ³ (s,d)	5,164	5,425	6,152	5,446
Sampling volume	m ³ (ref)	6,063	6,370	7,328	6,487
Barometric pressure	mbar	978		974	
Stack pressure	mbar	-0,9	-0,8	-1,5	-1,1
Velocity	m/s	14,2	14,5	14,0	14,6
Excess air (appr. value)	λ	1,79	1,79	1,77	1,77
H2O	Vol %	20,8	21,5	21,0	21,1
Flowrate	m ³ (s,d)/h	118.512	119.757	116.471	121.376
Flowrate, operating conditions	m ³ /h	230.790	235.514	228.308	238.035

Flue gas parameters

Temperature	°C	133,3	132,9
CO ₂	Vol %, dry	10,2	10,4
O ₂	Vol %, dry	9,27	9,10
CO	mg/m ³ (s,d)	36	27
CO	mg/m ³ (ref)	30	22

(s,d) indicates dry gas at standard conditions (0°C, 101,3 kPa)

(ref) indicates dry flue gas at standard conditions (0°C, 101,3 kPa) and 11 % oxygen

Rapport nr. 3504-01

FORCE Technology Sampling data Plant/stack: MWA Flötzersteig Wien		Sample A = East side of ducy, flange E, Short probe. Sample B = West side of duct, flange B, long probe.		
Parameter	Unit	Blank 1	Blank 2	Blank 3
Date	dd-mm-yy	19-06-07	22-06-07	25-06-07
Measuring period	hh:mm	17:10-17:45	15:35-16:10	8:30-9:10
Filter	No.	F181	F182	F183
XAD	No.	6296	6297	6294
XAD-Extra	No.			
Sampling volume	m ³ (s,d)	8,161	7,894	5,295
Sampling volume	m ³ (ref)	5,410	7,656	6,216

(s,d) indicates dry gas at standard conditions (0°C, 101,3 kPa)

(ref) indicates dry flue gas at standard conditions (0°C, 101,3 kPa) and 11 % oxygen

Annex 3

Analytical data

ERGO Report 0675-07-400_01

Analytical report for the validation measurement for dioxinlike PCB according to EN 1948-4, at the Waste Incinerator Flötzersteig in Vienna, from June 20th to June 26th 2007.

a) Test references

Sampling was performed by FORCE Technology
Project leader Ole Schleicher and technician Steen Meldorf

Analysis was performed by ERGO Forschungsgesellschaft mbH, referee Dennis Binge.
Sampling data and codes are shown together with the analytical results.

a) Statement

The analysis was performed in accordance with EN 1948-1 and EN 1948-4.

b) Precision

Indications of the reproducibility and repeatability which may be expected under similar conditions to the validation measurements are given in this Standard.
- Cannot be indicated, as this is the validations measurements.

c) Sample storage

From sampling to shipment the June 27th the samples was stores protected form sunlight at the ambient temperature at the sampling site. From shipment to arrival at ERGO on July 2, the samples was protected from sunlight but exposed for the surrounding temperature.

After arrival to the laboratory, the samples were stored light protected by ambient temperature, from arriving 02.07.07 until extraction on the 17.07.07.

d) Extraction

50% of the extraction standard (100 µl) was added to the filter and the other 50% was added to the XAD on the 13.07.07.

The recovery rates are shown together with the analytical results

e) Concentration

The final extract volume after concentration was 25 µl per sample.

f) Addition of recovery standards

The date of the recovery standard addition was the 01.08 for Dioxin and the 06.08 for PCB.

The date of injection was the 02.08 for Dioxin, the 06.08 for coplanar PCB and the 10.08 for PCB.

The volume at injection was 2 µl for coplanar PCB and Dioxin, and 1 µl for PCB.

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2605 BRØNDBY
DÄNEMARK

Report 0675-07-400_01

1 Order

The order was given in writing on 29.06.2007, Force sags nr.: 107-28412, project manager Mr. Ole Schleicher, by the client mentioned above .

The order has the following internal project code: A-0675-07-400.

2 Sampling

The sampling was done by the customer.

3 Description of sample

Sample code	Client code	Matrix	Receipt of sample	Date of the test performance
H-07-07-0067	Force sags nr.: 107-28412, 20/6-07 Sample 1A Filter F169, XAD 6281 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0068	Force sags nr.: 107-28412, 20/6-07 Sample 1B Filter F170, XAD 6282 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007



Testing Laboratory accredited by the DACH Deutsche Akkreditierungsstelle Chemie GmbH according to DIN EN ISO/IEC 17025. The Accreditation applies for the Testing Methods mentioned in the List attached to the Certificate.

Accreditation by the German Authorities (Notification) related to §§ 26, 28 BImSchG, Emission- and Ambient Air Measurement, Olfactometry and Function Test.

Laboratory for Dioxin Testing in Feeding Stuff listed by the European Commission (DG IV).

Sample code	Client code	Matrix	Receipt of sample	Date of the test performance
H-07-07-0069	Force sags nr.: 107-28412, 21/6-07 Sample 2A Filter F171, XAD 6283 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0070	Force sags nr.: 107-28412, 21/6-07 Sample 2A, XAD 6293 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0071	Force sags nr.: 107-28412, 21/6-07 Sample 2B Filter F172, XAD 6284 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0072	Force sags nr.: 107-28412, 22/6-07 Sample 3A, Filter F173, XAD 6285 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0073	Force sags nr.: 107-28412, 22/6-07\ Sample 3B, Filter F174, XAD 6286 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0074	Force sags nr.: 107-28412, 23/6-07 Sample 4A, Filter F175, XAD 6287 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0075	Force sags nr.: 107-28412, 23/6-07 Sample 4B, Filter F176, XAD 6288 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0076	Force sags nr.: 107-28412, 23/6-07 Sample 4B, XAD 6298 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007

Sample code	Client code	Matrix	Receipt of sample	Date of the test performance
H-07-07-0077	Force sags nr.: 107-28412, 25/6-07 Sample 5A, Filter F177, XAD 6289 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0078	Force sags nr.: 107-28412, 25/6-07 Sample 5B, Filter F178, XAD 6290 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0079	Force sags nr.: 107-28412, 26/6-07 Sample 6A, Filter F179, XAD 6291 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0080	Force sags nr.: 107-28412, 26/6-07 Sample 6A, XAD 6295 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0081	Force sags nr.: 107-28412, 26/6-07 Sample 6B, Filter F180, XAD 6292 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0082	Force sags nr.: 107-28412, 19/6-07 Blank 1, Filter F181, XAD 6296 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0083	Force sags nr.: 107-28412, Blank 2 Filter F182, XAD 6297 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007
H-07-07-0084	Force sags nr.: 107-28412, 25/6-07 Blank 3, Filter F183, XAD 6294 Sample for: CEN	flue gas	02.06.2007	13.07.2007 – 27.08.2007

3.1 The following Standard/Spike solutions were delivered and used within this Project

Species	Lable
Sampling Spike	EN-1948-4 PCB Sampling Spike
Extraction Spike	EN-1948-4 Marker PCB Extraction
Extraction Spike	EN-1948-4 WHO PCB Extraction Spike
Injection Standard	EN-1948-4 PCB Recovery Standard

The sampling spike was used for the preparation of the sampling equipment.

4 Analytical methods

4.1 PCDDs/PCDFs in flue gas samples according to EN 1948, part 2 and 3

Emission samples were analyzed according to the EN 1948, part 2 and 3. In the following, important steps of the method are described:

Before the extraction the delivered extraction spikes were added to the sample in addition to the following ^{13}C -UL-labeled internal standards:

Internal standards (^{13}C -UL), PCDDs/PCDFs			
PCDDs		PCDFs	
2,3,7,8	-Tetra-CDD	2,3,7,8	-Tetra-CDF
1,2,3,7,8	-Penta-CDD	2,3,4,7,8	-Penta-CDF
1,2,3,4,7,8	-Hexa-CDD	1,2,3,4,7,8	-Hexa-CDF
1,2,3,6,7,8	-Hexa-CDD	1,2,3,6,7,8	-Hexa-CDF
		2,3,4,6,7,8	-Hexa-CDF
1,2,3,4,6,7,8	-Hepta-CDD	1,2,3,4,6,7,8	-Hepta-CDF
1,2,3,4,6,7,8,9	-Octa-CDD	1,2,3,4,6,7,8,9	-Octa-CDF

After the spiking, the samples were extracted with appropriate solvents for ultratrace-analyses (e.g. nanograde). The cleanup was done on multicolumn systems involving carbon-on-glasfibre or carbon-on-celite. The measurement was done by means of high resolution gaschromatography and high resolution mass spectrometry (HRGC/HRMS) with VG-AutoSpec resp. Finnigan MAT 95 XL using DB-5 capillary columns. For each substance 2 isotope masses were measured. The Quantification was carried out with the use of internal and external standards.

The following PCDDs/PCDFs are reported:

PCDDs/PCDFs			
PCDDs		PCDFs	
2,3,7,8	-Tetra-CDD	2,3,7,8	-Tetra-CDF
1,2,3,7,8	-Penta-CDD	1,2,3,7,8	-Penta-CDF
		2,3,4,7,8	-Penta-CDF
1,2,3,4,7,8	-Hexa-CDD	1,2,3,4,7,8	-Hexa-CDF
1,2,3,6,7,8	-Hexa-CDD	1,2,3,6,7,8	-Hexa-CDF
1,2,3,7,8,9	-Hexa-CDD	1,2,3,7,8,9	-Hexa-CDF
		2,3,4,6,7,8	-Hexa-CDF
1,2,3,4,6,7,8	-Hepta-CDD	1,2,3,4,6,7,8	-Hepta-CDF
		1,2,3,4,7,8,9	-Hepta-CDF
1,2,3,4,6,7,8,9	-Octa-CDD	1,2,3,4,6,7,8,9	-Octa-CDF

In addition to the single results, calculations of the toxicity equivalents (I-TEQ) according to the NATO/CCMS system (on request also according to the NORDIC system) were carried out.

4.2 Dioxinlike PCBs in flue gas samples

The analysis of flue gas samples was performed according to prCEN/TS 1948-4:2006.

Within the scope of the investigation, the PCBs 77, 81, 126, 169, 105, 114, 118, 123, 156, 157, 167 and 189 are determined. The PCB fraction accrued within the second step of the clean up procedure of the PCDD/F analysis was taken, the delivered extraction spikes were already added within the PCDD/F analysis. The measurement was done by means of high resolution gaschromatography and high resolution mass spectrometry (HRGC/HRMS) with VG-AutoSpec resp. Finnigan MAT 95 XL using DB-5 capillary columns. For each substance 2 isotope masses were measured. The Quantification was carried out with the use of internal and external standards.

4.3 Combined analytical procedure used for Polychlorinated Biphenyls (PCB) and Hexachlorbenzene (HCB)

Within the scope of the investigation, the PCBs 28, 52, 101, 138, 153 and 180 are determined. The PCB fraction accrued within the second step of the clean up procedure of the PCDD/F analysis was taken, the delivered extraction spikes were already added within the PCDD/F analysis. In addition the following standard was given into the sample:

Hexachlorbenzene

¹³C-UL

After the spiking, the samples were extracted with appropriate solvents for ultratrace-analyses (e.g. nanograde). In the following, a column clean up was performed. The measurement was done by means of high resolution gaschromatography and mass spectrometry (HRGC/MS) using DB-5 capillary columns.

For each substance 2 isotope masses were measured. The Quantification was carried out with the use of internal and external standards.

5 Results

On the data sheets enclosed please find the detailed results.

The results are valid for the analyzed samples only in condition at delivery.

6 Final Remarks

For duplicating the report in parts a written permission by ERGO Forschungsgesellschaft mbH is required.

The samples are stored – on dependence of the test parameters – not longer than three months after the date of the report.

Hamburg, 30.10.2008

ERGO Forschungsgesellschaft mbH

Dipl.-Ing. (FH) Dennis Binge
analytical service manager

Analysis No.	H-07-07-0067	H-07-07-0068	H-07-07-0069	H-07-07-0070	H-07-07-0071
Matrix:	flue gas samples	flue gas samples	flue gas samples	flue gas samples	flue gas samples
Sample Code:	Force sags nr.: 107-28412 20/6-07 Sample 1A Filter F169, XAD 6281 Sample for: CEN	Force sags nr.: 107-28412 20/6-07 Sample 1B Filter F170, XAD 6282 Sample for: CEN	Force sags nr.: 107-28412 21/6-07 Sample 2A Filter F171, XAD 6283 Sample for: CEN	Force sags nr.: 107-28412 21/6-07 Sample 2A XAD 6293 Sample for: CEN	Force sags nr.: 107-28412 21/6-07 Sample 2B Filter F172, XAD 6284 Sample for: CEN
pg/sample					
2.3.7.8-Tetra-CDD	2,7	1,9	2,5	n.d.(2)	n.d.(0,9)
1.2.3.7.8-Penta-CDD	3,8	4,9	7,6	n.d.(2)	3,6
1.2.3.4.7.8-Hexa-CDD	5,8	2,8	6,0	n.d.(2)	3,0
1.2.3.6.7.8-Hexa-CDD	10	6,4	9,8	n.d.(1)	6,5
1.2.3.7.8.9-Hexa-CDD	6,2	4,2	3,8	n.d.(1)	4,0
1.2.3.4.6.7.8-Hepta-CDD	46	25	31	n.d.(2)	21
OCDD	80	41	45	n.d.(4)	25
2.3.7.8-Tetra-CDF	10	7,1	15	n.d.(1)	5,8
1.2.3.7.8-Penta-CDF	14	8,1	19	n.d.(1)	11
2.3.4.7.8-Penta-CDF	12	9,5	22	n.d.(0,9)	5,8
1.2.3.4.7.8-Hexa-CDF	17	11	21	n.d.(1)	11
1.2.3.6.7.8-Hexa-CDF	14	9,1	17	n.d.(0,9)	9,4
1.2.3.7.8.9-Hexa-CDF #	10	3,5	5,2	n.d.(1)	10
2.3.4.6.7.8-Hexa-CDF	14	11	21	n.d.(0,9)	7,5
1.2.3.4.6.7.8-Hepta-CDF	34	30	42	n.d.(1)	19
1.2.3.4.7.8.9-Hepta-CDF	15	5,5	7,5	n.d.(1)	8,1
OCDF	28	21	26	n.d.(2)	8,5
total 2.3.7.8-PCDD	154	86	105	n.d.	63
total 2.3.7.8-PCDF	167	115	196	n.d.	96
total 2.3.7.8-PCDD/PCDF	321	201	302	n.d.	159
total I-TEQ 2.3.7.8-PCDD (n.d.=0)	7,4	6,0	8,6	---	3,4
total I-TEQ 2.3.7.8-PCDF (n.d.=0)	13	9,6	20	---	8,1
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=0)	21	16	29	---	12
total I-TEQ 2.3.7.8-PCDD (n.d.=n.d.)	7,4	6,0	8,6	3,3	4,3
total I-TEQ 2.3.7.8-PCDF (n.d.=n.d.)	13	9,6	20	1,1	8,1
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=n.d.)	21	16	29	4,4	12
3,3',4,4'-Tetra-CB 77	150	120	685	n.d.(59)	231
3,4,4',5-Tetra-CB 81	13	10,0	45	n.d.(2)	22
3,3',4,4',5-Penta-CB 126	n.d.(16)	17	27	n.d.(16)	n.d.(16)
3,3',4,4',5,5'-Hexa-CB 169	3,7	5,1	9,6	n.d.(2)	4,8
Total non-ortho PCB	167	152	767	n.d.	258
Total WHO-TEQ non-ortho PCB (n.d.=0)	0,053	1,7	2,9	0,0	0,074
Total WHO-TEQ non-ortho PCB (n.d.=n.d.)	1,6	1,7	2,9	1,6	1,7
2,3,3',4,4'-Penta-CB 105	383	205	1132	79	481
2,3,4,4',5-Penta-CB 114	23	18	110	n.d.(14)	45
2,3',4,4',5-Penta-CB 118	2049	1098	4049	n.d.(221)	2018
2',3,4,4',5-Penta-CB 123	14	11	59	n.d.(15)	18
2,3,3',4,4',5-Hexa-CB 156	140	123	223	116	126
2,3,3',4,4',5'-Hexa-CB 157	25	26	27	29	30
2,3',4,4',5,5'-Hexa-CB 167	80	63	100	n.d.(22)	53
2,3,3',4,4',5,5'-Hepta-CB 189	21	21	48	n.d.(17)	15
Total mono-ortho PCB	2734	1565	5747	223	2786
Total WHO-TEQ mono-ortho PCB (n.d.=0)	0,34	0,22	0,71	0,080	0,35
Total WHO-TEQ mono-ortho PCB (n.d.=n.d.)	0,34	0,22	0,71	0,11	0,35
PCB #28	10625	5884	40588	n.d.(523)	15430
PCB #52	5615	3258	19788	n.d.(202)	9022
PCB #101	6443	3471	6274	n.d.(275)	4794
PCB #138 ¹⁾	1646	1008	1895	n.d.(350)	1304
PCB #153	3460	2341	3825	n.d.(417)	2660
PCB #180	689	661	940	n.d.(172)	268
total	28479	16623	73310	n.d.	33477
total * 5	142393	83117	366552	n.d.	167386
Hexachlorbenzene	61482	57181	177840	163	166718

Analysis No.	H-07-07-0072	H-07-07-0073	H-07-07-0074	H-07-07-0075	H-07-07-0076
Matrix:	flue gas samples	flue gas samples	flue gas samples	flue gas samples	flue gas samples
Sample Code:	Force sags nr.: 107-28412 22/6-07 Sample 3A Filter F173, XAD 6285 Sample for: CEN	Force sags nr.: 107-28412 22/6-07 Sample 3B Filter F174, XAD 6286 Sample for: CEN	Force sags nr.: 107-28412 23/6-07 Sample 4A Filter F175, XAD 6287 Sample for: CEN	Force sags nr.: 107-28412 23/6-07 Sample 4B Filter F176, XAD 6288 Sample for: CEN	Force sags nr.: 107-28412 23/6-07 Sample 4B XAD 6298 Sample for: CEN
pg/sample					
2.3.7.8-Tetra-CDD	n.d.(1)	1,6	2,0	n.d.(0,6)	n.d.(2)
1.2.3.7.8-Penta-CDD	4,8	5,5	2,8	3,6	n.d.(2)
1.2.3.4.7.8-Hexa-CDD	4,5	5,6	n.d.(0,7)	4,1	n.d.(2)
1.2.3.6.7.8-Hexa-CDD	4,6	7,7	3,2	6,3	n.d.(2)
1.2.3.7.8.9-Hexa-CDD	3,0	5,5	2,3	4,2	n.d.(2)
1.2.3.4.6.7.8-Hepta-CDD	19	27	12	26	9,3
OCDD	21	31	22	39	11
2.3.7.8-Tetra-CDF	17	12	9,4	6,6	n.d.(1)
1.2.3.7.8-Penta-CDF	25	19	14	11	n.d.(2)
2.3.4.7.8-Penta-CDF	19	29	6,2	9,8	n.d.(1)
1.2.3.4.7.8-Hexa-CDF	21	35	11	17	n.d.(2)
1.2.3.6.7.8-Hexa-CDF	18	22	7,1	13	n.d.(1)
1.2.3.7.8.9-Hexa-CDF #	7,1	14	6,5	8,8	n.d.(2)
2.3.4.6.7.8-Hexa-CDF	15	28	4,9	15	n.d.(1)
1.2.3.4.6.7.8-Hepta-CDF	28	42	12	30	n.d.(1)
1.2.3.4.7.8.9-Hepta-CDF	6,2	9,3	4,0	8,3	n.d.(2)
OCDF	11	23	8,5	14	n.d.(3)
total 2.3.7.8-PCDD	57	83	44	83	21
total 2.3.7.8-PCDF	166	233	84	133	n.d.
total 2.3.7.8-PCDD/PCDF	223	316	128	216	21
total I-TEQ 2.3.7.8-PCDD (n.d.=0)	3,8	6,5	4,0	3,6	0,10
total I-TEQ 2.3.7.8-PCDF (n.d.=0)	19	27	7,9	12	---
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=0)	23	33	12	15	0,10
total I-TEQ 2.3.7.8-PCDD (n.d.=n.d.)	4,9	6,5	4,1	4,1	4,0
total I-TEQ 2.3.7.8-PCDF (n.d.=n.d.)	19	27	7,9	12	1,5
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=n.d.)	24	33	12	16	5,5
3,3',4,4'-Tetra-CB 77	94	253	758	1001	n.d.(56)
3,4,4',5-Tetra-CB 81	10	20	48	61	n.d.(2)
3,3',4,4',5-Penta-CB 126	n.d.(16)	21	27	25	n.d.(17)
3,3',4,4',5,5'-Hexa-CB 169	5,5	7,5	3,3	6,1	n.d.(3)
Total non-ortho PCB	109	302	837	1094	0,0
Total WHO-TEQ non-ortho PCB (n.d.=0)	0,065	2,2	2,8	2,7	0,0
Total WHO-TEQ non-ortho PCB (n.d.=n.d.)	1,6	2,2	2,8	2,7	1,7
2,3,3',4,4'-Penta-CB 105	346	1102	2514	1090	n.d.(71)
2,3,4,4',5-Penta-CB 114	27	81	248	111	n.d.(13)
2,3',4,4',5-Penta-CB 118	1400	4568	17908	3964	n.d.(241)
2',3,4,4',5-Penta-CB 123	13	41	84	65	n.d.(14)
2,3,3',4,4',5-Hexa-CB 156	66	268	1026	205	n.d.(47)
2,3,3',4,4',5'-Hexa-CB 157	23	56	119	38	n.d.(11)
2,3',4,4',5,5'-Hexa-CB 167	25	140	638	87	n.d.(24)
2,3,3',4,4',5,5'-Hepta-CB 189	13	26	32	28	n.d.(15)
Total mono-ortho PCB	1912	6282	22568	5589	n.d.
Total WHO-TEQ mono-ortho PCB (n.d.=0)	0,24	0,78	2,8	0,69	0,0
Total WHO-TEQ mono-ortho PCB (n.d.=n.d.)	0,24	0,78	2,8	0,69	0,070
PCB #28	5319	12435	15431	42364	n.d.(361)
PCB #52	3236	10790	17008	16301	n.d.(159)
PCB #101	2326	11011	74849	7725	n.d.(212)
PCB #138 ¹⁾	638	2834	26137	1884	n.d.(200)
PCB #153	1099	5731	52998	3516	n.d.(327)
PCB #180	244	652	3492	822	n.d.(135)
total	12861	43453	189916	72612	n.d.
total * 5	64307	217266	949579	363062	n.d.
Hexachlorbenzene	26343	25360	279129	291596	n.d.(175)

Analysis No.	H-07-07-0077	H-07-07-0078	H-07-07-0079	H-07-07-0080	H-07-07-0081
Matrix:	flue gas samples	flue gas samples	flue gas samples	flue gas samples	flue gas samples
Sample Code:	Force sags nr.: 107-28412 25/6-07 Sample 5A Filter F177, XAD 6289 Sample for: CEN	Force sags nr.: 107-28412 25/6-07 Sample 5B Filter F178, XAD 6290 Sample for: CEN	Force sags nr.: 107-28412 26/6-07 Sample 6A Filter F179, XAD 6291 Sample for: CEN	Force sags nr.: 107-28412 26/6-07 Sample 6A XAD 6295 Sample for: CEN	Force sags nr.: 107-28412 26/6-07 Sample 6B Filter F180, XAD 6292 Sample for: CEN
pg/sample					
2.3.7.8-Tetra-CDD	10	1,5	n.d.(1)	n.d.(2)	n.d.(1,0)
1.2.3.7.8-Penta-CDD	35	5,3	n.d.(1)	n.d.(2)	3,7
1.2.3.4.7.8-Hexa-CDD	28	6,6	6,7	n.d.(2)	8,0
1.2.3.6.7.8-Hexa-CDD	43	8,3	6,1	n.d.(2)	11
1.2.3.7.8.9-Hexa-CDD	26	5,4	2,6	n.d.(1)	6,5
1.2.3.4.6.7.8-Hepta-CDD	132	33	49	n.d.(3)	59
OCDD	99	46	116	n.d.(5)	51
2.3.7.8-Tetra-CDF	49	16	6,6	n.d.(2)	12
1.2.3.7.8-Penta-CDF	80	51	6,0	n.d.(2)	37
2.3.4.7.8-Penta-CDF	84	18	5,6	n.d.(1)	17
1.2.3.4.7.8-Hexa-CDF	85	41	11	n.d.(2)	38
1.2.3.6.7.8-Hexa-CDF	71	32	6,4	n.d.(1)	29
1.2.3.7.8.9-Hexa-CDF #	28	20	3,4	n.d.(2)	22
2.3.4.6.7.8-Hexa-CDF	84	19	6,7	n.d.(1)	24
1.2.3.4.6.7.8-Hepta-CDF	150	46	22	n.d.(2)	51
1.2.3.4.7.8.9-Hepta-CDF	26	30	2,8	n.d.(2)	25
OCDF	49	23	14	n.d.(4)	22
total 2.3.7.8-PCDD	374	106	180	n.d.	139
total 2.3.7.8-PCDF	705	295	84	n.d.	278
total 2.3.7.8-PCDD/PCDF	1080	401	264	n.d.	417
total I-TEQ 2.3.7.8-PCDD (n.d.=0)	39	6,6	2,1	---	5,0
total I-TEQ 2.3.7.8-PCDF (n.d.=0)	80	25	6,8	---	24
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=0)	119	32	8,9	---	29
total I-TEQ 2.3.7.8-PCDD (n.d.=n.d.)	39	6,6	3,8	3,6	6,0
total I-TEQ 2.3.7.8-PCDF (n.d.=n.d.)	80	25	6,8	1,4	24
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=n.d.)	119	32	11	5,0	30
3,3',4,4'-Tetra-CB 77	356	231	243	n.d.(56)	84
3,4,4',5-Tetra-CB 81	30	15	14	n.d.(2)	5,1
3,3',4,4',5-Penta-CB 126	43	20	17	17	n.d.(17)
3,3',4,4',5,5'-Hexa-CB 169	21	3,4	4,1	n.d.(3)	2,6
Total non-ortho PCB	450	269	279	17	92
Total WHO-TEQ non-ortho PCB (n.d.=0)	4,6	2,0	1,8	1,7	0,035
Total WHO-TEQ non-ortho PCB (n.d.=n.d.)	4,6	2,0	1,8	1,8	1,7
2,3,3',4,4'-Penta-CB 105	541	565	548	n.d.(71)	223
2,3,4,4',5-Penta-CB 114	61	45	60	n.d.(12)	30
2,3',4,4',5-Penta-CB 118	2404	3385	2627	n.d.(284)	915
2',3,4,4',5-Penta-CB 123	33	27	26	n.d.(13)	9,4
2,3,3',4,4',5,-Hexa-CB 156	193	855	189	n.d.(47)	56
2,3,3',4,4',5'-Hexa-CB 157	37	72	16	n.d.(14)	n.d.(11)
2,3',4,4',5,5'-Hexa-CB 167	88	375	111	n.d.(34)	n.d.(34)
2,3,3',4,4',5,5'-Hepta-CB 189	33	104	23	n.d.(14)	15
Total mono-ortho PCB	3390	5428	3601	0,0	1248
Total WHO-TEQ mono-ortho PCB (n.d.=0)	0,45	0,90	0,46	0,0	0,16
Total WHO-TEQ mono-ortho PCB (n.d.=n.d.)	0,45	0,90	0,46	0,075	0,17
PCB #28	17084	10236	23800	n.d.(883)	7253
PCB #52	11453	9095	16170	n.d.(307)	6426
PCB #101	6439	6880	6440	n.d.(502)	2787
PCB #138 ¹⁾	1827	5829	2066	n.d.(415)	720
PCB #153	3522	9221	4300	n.d.(665)	1602
PCB #180	612	3230	690	n.d.(171)	n.d.(271)
total	40937	44492	53466	0,0	18788
total * 5	204685	222458	267330	0,0	93939
Hexachlorbenzene	25755	34405	28418	189	22063

Analysis No.	H-07-07-0082	H-07-07-0083	H-07-07-0084
Matrix:	flue gas samples	flue gas samples	flue gas samples
Sample Code:	Force sags nr.: 107-28412 19/6-07 Blank 1 Filter F181, XAD 6296 Sample for: CEN	Force sags nr.: 107-28412 Blank 2 Filter F182, XAD 6297 Sample for: CEN	Force sags nr.: 107-28412 25/6-07 Blank 3 Filter F183, XAD 6294 Sample for: CEN
pg/sample			
2.3.7.8-Tetra-CDD	n.d.(1)	n.d.(2)	n.d.(1)
1.2.3.7.8-Penta-CDD	n.d.(2)	n.d.(2)	n.d.(2)
1.2.3.4.7.8-Hexa-CDD	n.d.(1)	n.d.(2)	n.d.(2)
1.2.3.6.7.8-Hexa-CDD	n.d.(1,0)	n.d.(2)	n.d.(2)
1.2.3.7.8.9-Hexa-CDD	n.d.(0,9)	n.d.(1)	n.d.(1)
1.2.3.4.6.7.8-Hepta-CDD	3,4	n.d.(3)	4,5
OCDD	9,2	n.d.(7)	14
2.3.7.8-Tetra-CDF	n.d.(0,8)	n.d.(1)	n.d.(8)
1.2.3.7.8-Penta-CDF	n.d.(0,8)	n.d.(1)	3,2
2.3.4.7.8-Penta-CDF	n.d.(0,6)	n.d.(0,9)	2,1
1.2.3.4.7.8-Hexa-CDF	n.d.(0,8)	n.d.(2)	1,9
1.2.3.6.7.8-Hexa-CDF	n.d.(0,6)	n.d.(1)	n.d.(1,0)
1.2.3.7.8.9-Hexa-CDF #	n.d.(0,9)	n.d.(2)	n.d.(2)
2.3.4.6.7.8-Hexa-CDF	n.d.(0,6)	n.d.(1)	n.d.(1)
1.2.3.4.6.7.8-Hepta-CDF	3,5	3,6	5,6
1.2.3.4.7.8.9-Hepta-CDF	n.d.(0,9)	n.d.(3)	n.d.(2)
OCDF	6,7	n.d.(4)	4,6
total 2.3.7.8-PCDD	13	n.d.	18
total 2.3.7.8-PCDF	10	3,6	17
total 2.3.7.8-PCDD/PCDF	23	3,6	36
total I-TEQ 2.3.7.8-PCDD (n.d.=0)	0,043	---	0,059
total I-TEQ 2.3.7.8-PCDF (n.d.=0)	0,042	0,036	1,5
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=0)	0,084	0,036	1,5
total I-TEQ 2.3.7.8-PCDD (n.d.=n.d.)	2,3	3,2	2,6
total I-TEQ 2.3.7.8-PCDF (n.d.=n.d.)	0,74	1,3	2,6
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=n.d.)	3,1	4,5	5,3
3,3',4,4'-Tetra-CB 77	n.d.(56)	92	140
3,4,4',5-Tetra-CB 81	1,6	n.d.(5)	4,7
3,3',4,4',5-Penta-CB 126	n.d.(17)	n.d.(17)	n.d.(17)
3,3',4,4',5,5'-Hexa-CB 169	8,0	n.d.(4)	n.d.(3)
Total non-ortho PCB	9,6	92	144
Total WHO-TEQ non-ortho PCB (n.d.=0)	0,080	0,0092	0,014
Total WHO-TEQ non-ortho PCB (n.d.=n.d.)	1,8	1,7	1,7
2,3,3',4,4'-Penta-CB 105	n.d.(71)	97	187
2,3,4,4',5-Penta-CB 114	14	19	35
2,3',4,4',5-Penta-CB 118	n.d.(284)	466	848
2',3,4,4',5-Penta-CB 123	n.d.(9)	n.d.(9)	n.d.(9)
2,3,3',4,4',5-Hexa-CB 156	n.d.(47)	n.d.(47)	n.d.(47)
2,3,3',4,4',5'-Hexa-CB 157	n.d.(11)	n.d.(11)	n.d.(11)
2,3',4,4',5,5'-Hexa-CB 167	n.d.(34)	n.d.(34)	n.d.(34)
2,3,3',4,4',5,5'-Hepta-CB 189	n.d.(9)	n.d.(10)	n.d.(9)
Total mono-ortho PCB	14	582	1069
Total WHO-TEQ mono-ortho PCB (n.d.=0)	0,0068	0,066	0,12
Total WHO-TEQ mono-ortho PCB (n.d.=n.d.)	0,073	0,097	0,15
PCB #28	4109	3681	5486
PCB #52	2551	2621	2053
PCB #101	n.d.(535)	1673	965
PCB #138 ¹⁾	n.d.(538)	n.d.(538)	n.d.(538)
PCB #153	n.d.(853)	n.d.(853)	n.d.(853)
PCB #180	n.d.(271)	n.d.(271)	n.d.(271)
total	6660	7976	8504
total * 5	33301	39878	42520
Hexachlorbenzene	793	430	272

Analysis No.	H-07-07-0067	H-07-07-0068	H-07-07-0069	H-07-07-0070	H-07-07-0071
Matrix:	flue gas samples	flue gas samples	flue gas samples	flue gas samples	flue gas samples
Sample Code:	Force sags nr.: 107-28412 20/6-07 Sample 1A Filter F169, XAD 6281 Sample for: CEN	Force sags nr.: 107-28412 20/6-07 Sample 1B Filter F170, XAD 6282 Sample for: CEN	Force sags nr.: 107-28412 21/6-07 Sample 2A Filter F171, XAD 6283 Sample for: CEN	Force sags nr.: 107-28412 21/6-07 Sample 2A XAD 6293 Sample for: CEN	Force sags nr.: 107-28412 21/6-07 Sample 2B Filter F172, XAD 6284 Sample for: CEN
Nm³	8,7	7,6	7,2	7,2	6,6
pg/Nm³					
2.3.7.8-Tetra-CDD	0,31	0,25	0,34	n.d.(0,3)	n.d.(0,1)
1.2.3.7.8-Penta-CDD	0,43	0,64	1,0	n.d.(0,2)	0,53
1.2.3.4.7.8-Hexa-CDD	0,66	0,37	0,84	n.d.(0,3)	0,45
1.2.3.6.7.8-Hexa-CDD	1,2	0,84	1,4	n.d.(0,2)	0,98
1.2.3.7.8.9-Hexa-CDD	0,71	0,55	0,53	n.d.(0,2)	0,60
1.2.3.4.6.7.8-Hepta-CDD	5,2	3,3	4,2	n.d.(0,2)	3,1
OCDD	9,1	5,3	6,3	n.d.(0,5)	3,7
2.3.7.8-Tetra-CDF	1,2	0,93	2,1	n.d.(0,2)	0,87
1.2.3.7.8-Penta-CDF	1,6	1,1	2,6	n.d.(0,2)	1,7
2.3.4.7.8-Penta-CDF	1,3	1,2	3,0	n.d.(0,1)	0,87
1.2.3.4.7.8-Hexa-CDF	1,9	1,4	2,9	n.d.(0,2)	1,7
1.2.3.6.7.8-Hexa-CDF	1,6	1,2	2,4	n.d.(0,1)	1,4
1.2.3.7.8.9-Hexa-CDF #	1,2	0,45	0,71	n.d.(0,2)	1,5
2.3.4.6.7.8-Hexa-CDF	1,6	1,4	2,9	n.d.(0,1)	1,1
1.2.3.4.6.7.8-Hepta-CDF	3,9	3,9	5,9	n.d.(0,1)	2,8
1.2.3.4.7.8.9-Hepta-CDF	1,7	0,73	1,0	n.d.(0,2)	1,2
OCDF	3,2	2,8	3,7	n.d.(0,3)	1,3
total 2.3.7.8-PCDD	18	11	15	n.d.	9,4
total 2.3.7.8-PCDF	19	15	27	n.d.	15
total 2.3.7.8-PCDD/PCDF	37	26	42	n.d.	24
total I-TEQ 2.3.7.8-PCDD (n.d.=0)	0,84	0,79	1,2	---	0,50
total I-TEQ 2.3.7.8-PCDF (n.d.=0)	1,5	1,3	2,8	---	1,2
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=0)	2,4	2,1	4,0	---	1,7
total I-TEQ 2.3.7.8-PCDD (n.d.=n.d.)	0,84	0,79	1,2	0,46	0,64
total I-TEQ 2.3.7.8-PCDF (n.d.=n.d.)	1,5	1,3	2,8	0,16	1,2
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=n.d.)	2,4	2,1	4,0	0,61	1,9
3,3',4,4'-Tetra-CB 77	17	16	95	n.d.(8)	35
3,4,4',5-Tetra-CB 81	1,5	1,3	6,3	n.d.(0,3)	3,4
3,3',4,4',5-Penta-CB 126	n.d.(2)	2,2	3,8	n.d.(2)	n.d.(2)
3,3',4,4',5,5'-Hexa-CB 169	0,42	0,67	1,3	n.d.(0,3)	0,73
Total non-ortho PCB	19	20	106	n.d.	39
Total WHO-TEQ non-ortho PCB (n.d.=0)	0,0061	0,23	0,40	0,0	0,011
Total WHO-TEQ non-ortho PCB (n.d.=n.d.)	0,19	0,23	0,40	0,22	0,25
2,3,3',4,4'-Penta-CB 105	44	27	157	11	72
2,3,4,4',5-Penta-CB 114	2,6	2,3	15	n.d.(2)	6,8
2,3',4,4',5-Penta-CB 118	235	145	562	n.d.(31)	304
2',3,4,4',5-Penta-CB 123	1,6	1,5	8,2	n.d.(2)	2,8
2,3,3',4,4',5,-Hexa-CB 156	16	16	31	16	19
2,3,3',4,4',5'-Hexa-CB 157	2,9	3,4	3,7	4,0	4,5
2,3',4,4',5,5'-Hexa-CB 167	9,2	8,3	14	n.d.(3)	8,0
2,3,3',4,4',5,5'-Hepta-CB 189	2,4	2,8	6,6	n.d.(2)	2,3
Total mono-ortho PCB	313	206	797	31	419
Total WHO-TEQ mono-ortho PCB (n.d.=0)	0,039	0,029	0,098	0,011	0,053
Total WHO-TEQ mono-ortho PCB (n.d.=n.d.)	0,039	0,029	0,098	0,016	0,053
PCB #28	1218	774	5630	n.d.(73)	2322
PCB #52	644	429	2745	n.d.(28)	1358
PCB #101	739	457	870	n.d.(38)	721
PCB #1381)	189	133	263	n.d.(49)	196
PCB #153	397	308	531	n.d.(58)	400
PCB #180	79	87	130	n.d.(24)	40
total	3264	2188	10169	n.d.	5038
total * 5	16322	10940	50847	n.d.	25189
Hexachlorbenzene	7047	7526	24670	23	25089

The sample volumes in Nm³ were given by the costumer

Analysis No.	H-07-07-0072	H-07-07-0073	H-07-07-0074	H-07-07-0075	H-07-07-0076
Matrix:	flue gas samples	flue gas samples	flue gas samples	flue gas samples	flue gas samples
Sample Code:	Force sags nr.: 107-28412 22/6-07 Sample 3A Filter F173, XAD 6285 Sample for: CEN	Force sags nr.: 107-28412 22/6-07 Sample 3B Filter F174, XAD 6286 Sample for: CEN	Force sags nr.: 107-28412 23/6-07 Sample 4A Filter F175, XAD 6287 Sample for: CEN	Force sags nr.: 107-28412 23/6-07 Sample 4B Filter F176, XAD 6288 Sample for: CEN	Force sags nr.: 107-28412 23/6-07 Sample 4B XAD 6298 Sample for: CEN
Nm³	8,2	7,6	5,8	5,5	5,5
pg/Nm³					
2.3.7.8-Tetra-CDD	n.d.(0,1)	0,21	0,34	n.d.(0,1)	n.d.(0,4)
1.2.3.7.8-Penta-CDD	0,58	0,72	0,48	0,66	n.d.(0,4)
1.2.3.4.7.8-Hexa-CDD	0,55	0,74	n.d.(0,1)	0,74	n.d.(0,4)
1.2.3.6.7.8-Hexa-CDD	0,56	1,0	0,55	1,1	n.d.(0,3)
1.2.3.7.8.9-Hexa-CDD	0,37	0,72	0,40	0,76	n.d.(0,3)
1.2.3.4.6.7.8-Hepta-CDD	2,3	3,5	2,0	4,7	1,7
OCDD	2,5	4,1	3,8	7,1	2,1
2.3.7.8-Tetra-CDF	2,1	1,6	1,6	1,2	n.d.(0,3)
1.2.3.7.8-Penta-CDF	3,0	2,5	2,5	2,0	n.d.(0,3)
2.3.4.7.8-Penta-CDF	2,4	3,8	1,1	1,8	n.d.(0,2)
1.2.3.4.7.8-Hexa-CDF	2,5	4,6	1,9	3,0	n.d.(0,3)
1.2.3.6.7.8-Hexa-CDF	2,1	2,8	1,2	2,3	n.d.(0,2)
1.2.3.7.8.9-Hexa-CDF #	0,86	1,9	1,1	1,6	n.d.(0,3)
2.3.4.6.7.8-Hexa-CDF	1,8	3,6	0,85	2,6	n.d.(0,2)
1.2.3.4.6.7.8-Hepta-CDF	3,4	5,5	2,0	5,5	n.d.(0,3)
1.2.3.4.7.8.9-Hepta-CDF	0,76	1,2	0,70	1,5	n.d.(0,4)
OCDF	1,3	3,0	1,5	2,5	n.d.(0,6)
total 2.3.7.8-PCDD	7,0	11	7,6	15	3,8
total 2.3.7.8-PCDF	20	31	14	24	n.d.
total 2.3.7.8-PCDD/PCDF	27	41	22	39	3,8
total I-TEQ 2.3.7.8-PCDD (n.d.=0)	0,47	0,86	0,70	0,65	0,019
total I-TEQ 2.3.7.8-PCDF (n.d.=0)	2,3	3,5	1,4	2,1	---
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=0)	2,8	4,4	2,1	2,8	0,019
total I-TEQ 2.3.7.8-PCDD (n.d.=n.d.)	0,60	0,86	0,71	0,75	0,72
total I-TEQ 2.3.7.8-PCDF (n.d.=n.d.)	2,3	3,5	1,4	2,1	0,27
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=n.d.)	2,9	4,4	2,1	2,9	0,99
3,3',4,4'-Tetra-CB 77	11	33	131	181	n.d.(10)
3,4,4',5-Tetra-CB 81	1,3	2,6	8,4	11	n.d.(0,4)
3,3',4,4',5-Penta-CB 126	n.d.(2)	2,8	4,7	4,6	n.d.(3)
3,3',4,4',5,5'-Hexa-CB 169	0,67	0,99	0,57	1,1	n.d.(0,5)
Total non-ortho PCB	13	40	145	198	0,
Total WHO-TEQ non-ortho PCB (n.d.=0)	0,0080	0,29	0,49	0,49	0,0
Total WHO-TEQ non-ortho PCB (n.d.=n.d.)	0,20	0,29	0,49	0,49	0,31
2,3,3',4,4'-Penta-CB 105	42	145	434	198	n.d.(13)
2,3,4,4',5-Penta-CB 114	3,4	11	43	20	n.d.(2)
2,3',4,4',5-Penta-CB 118	171	599	3092	718	n.d.(44)
2',3,4,4',5-Penta-CB 123	1,5	5,4	15	12	n.d.(2)
2,3,3',4,4',5,-Hexa-CB 156	8,1	35	177	37	n.d.(9)
2,3,3',4,4',5'-Hexa-CB 157	2,8	7,4	20	6,9	n.d.(2)
2,3',4,4',5,5'-Hexa-CB 167	3,0	18	110	16	n.d.(4)
2,3,3',4,4',5,5'-Hepta-CB 189	1,6	3,4	5,4	5,1	n.d.(3)
Total mono-ortho PCB	234	824	3896	1013	n.d.
Total WHO-TEQ mono-ortho PCB (n.d.=0)	0,029	0,10	0,48	0,13	0,0
Total WHO-TEQ mono-ortho PCB (n.d.=n.d.)	0,029	0,10	0,48	0,13	0,013
PCB #28	650	1631	2664	7675	n.d.(65)
PCB #52	396	1415	2936	2953	n.d.(29)
PCB #101	284	1444	12922	1400	n.d.(38)
PCB #1381)	78	372	4512	341	n.d.(36)
PCB #153	134	752	9150	637	n.d.(59)
PCB #180	30	86	603	149	n.d.(24)
total	1573	5698	32788	13155	n.d.
total * 5	7863	28489	163938	65776	n.d.
Hexachlorbenzene	3221	3325	48190	52828	n.d.(32)

The sample volumes in Nm³ were given by the costumer

Analysis No.	H-07-07-0077	H-07-07-0078	H-07-07-0079	H-07-07-0080	H-07-07-0081
Matrix:	flue gas samples	flue gas samples	flue gas samples	flue gas samples	flue gas samples
Sample Code:	Force sags nr.: 107-28412 25/6-07 Sample 5A Filter F177, XAD 6289 Sample for: CEN	Force sags nr.: 107-28412 25/6-07 Sample 5B Filter F178, XAD 6290 Sample for: CEN	Force sags nr.: 107-28412 26/6-07 Sample 6A Filter F179, XAD 6291 Sample for: CEN	Force sags nr.: 107-28412 26/6-07 Sample 6A XAD 6295 Sample for: CEN	Force sags nr.: 107-28412 26/6-07 Sample 6B Filter F180, XAD 6292 Sample for: CEN
Nm³	5,2	5,4	6,2	6,2	5,4
pg/Nm³					
2.3.7.8-Tetra-CDD	2,0	0,28	n.d.(0,2)	n.d.(0,3)	n.d.(0,2)
1.2.3.7.8-Penta-CDD	6,8	0,97	n.d.(0,2)	n.d.(0,4)	0,68
1.2.3.4.7.8-Hexa-CDD	5,4	1,2	1,1	n.d.(0,4)	1,5
1.2.3.6.7.8-Hexa-CDD	8,3	1,5	1,00	n.d.(0,3)	2,0
1.2.3.7.8.9-Hexa-CDD	5,1	1,0	0,42	n.d.(0,2)	1,2
1.2.3.4.6.7.8-Hepta-CDD	26	6,0	8,0	n.d.(0,4)	11
OCDD	19	8,5	19	n.d.(0,8)	9,4
2.3.7.8-Tetra-CDF	9,5	2,9	1,1	n.d.(0,3)	2,2
1.2.3.7.8-Penta-CDF	15	9,3	0,98	n.d.(0,3)	6,8
2.3.4.7.8-Penta-CDF	16	3,4	0,92	n.d.(0,2)	3,2
1.2.3.4.7.8-Hexa-CDF	17	7,6	1,8	n.d.(0,3)	7,0
1.2.3.6.7.8-Hexa-CDF	14	5,8	1,0	n.d.(0,2)	5,3
1.2.3.7.8.9-Hexa-CDF #	5,3	3,7	0,56	n.d.(0,3)	4,1
2.3.4.6.7.8-Hexa-CDF	16	3,4	1,1	n.d.(0,2)	4,4
1.2.3.4.6.7.8-Hepta-CDF	29	8,4	3,5	n.d.(0,3)	9,3
1.2.3.4.7.8.9-Hepta-CDF	5,1	5,6	0,45	n.d.(0,4)	4,6
OCDF	9,5	4,2	2,2	n.d.(0,7)	4,1
total 2.3.7.8-PCDD	72	19	29	n.d.	26
total 2.3.7.8-PCDF	137	54	14	n.d.	51
total 2.3.7.8-PCDD/PCDF	209	74	43	n.d.	77
total I-TEQ 2.3.7.8-PCDD (n.d.=0)	7,6	1,2	0,35	---	0,92
total I-TEQ 2.3.7.8-PCDF (n.d.=0)	15	4,6	1,1	---	4,4
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=0)	23	5,9	1,5	---	5,3
total I-TEQ 2.3.7.8-PCDD (n.d.=n.d.)	7,6	1,2	0,62	0,59	1,1
total I-TEQ 2.3.7.8-PCDF (n.d.=n.d.)	15	4,6	1,1	0,23	4,4
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=n.d.)	23	5,9	1,7	0,82	5,5
3,3',4,4'-Tetra-CB 77	69	43	40	n.d.(9)	15
3,4,4',5-Tetra-CB 81	5,8	2,8	2,3	n.d.(0,4)	0,94
3,3',4,4',5-Penta-CB 126	8,3	3,6	2,8	2,8	n.d.(3)
3,3',4,4',5,5'-Hexa-CB 169	4,2	0,62	0,67	n.d.(0,4)	0,47
Total non-ortho PCB	87	50	45	2,8	17
Total WHO-TEQ non-ortho PCB (n.d.=0)	0,88	0,37	0,29	0,28	0,0064
Total WHO-TEQ non-ortho PCB (n.d.=n.d.)	0,88	0,37	0,29	0,29	0,32
2,3,3',4,4'-Penta-CB 105	105	104	89	n.d.(12)	41
2,3,4,4',5-Penta-CB 114	12	8,4	9,8	n.d.(2)	5,5
2,3',4,4',5-Penta-CB 118	465	624	427	n.d.(46)	168
2',3,4,4',5-Penta-CB 123	6,5	5,0	4,2	n.d.(2)	1,7
2,3,3',4,4',5,-Hexa-CB 156	37	158	31	n.d.(8)	10
2,3,3',4,4',5'-Hexa-CB 157	7,2	13	2,7	n.d.(2)	n.d.(2)
2,3',4,4',5,5'-Hexa-CB 167	17	69	18	n.d.(6)	n.d.(6)
2,3,3',4,4',5,5'-Hepta-CB 189	6,4	19	3,7	n.d.(2)	2,8
Total mono-ortho PCB	656	1001	585	0,	229
Total WHO-TEQ mono-ortho PCB (n.d.=0)	0,087	0,17	0,074	0,0	0,029
Total WHO-TEQ mono-ortho PCB (n.d.=n.d.)	0,087	0,17	0,074	0,012	0,030
PCB #28	3308	1887	3868	n.d.(144)	1331
PCB #52	2218	1676	2628	n.d.(50)	1179
PCB #101	1247	1268	1047	n.d.(82)	511
PCB #1381)	354	1074	336	n.d.(67)	132
PCB #153	682	1700	699	n.d.(108)	294
PCB #180	118	595	112	n.d.(28)	n.d.(50)
total	7927	8201	8690	0,	3449
total * 5	39635	41004	43451	0,0	17243
Hexachlorbenzene	4987	6342	4619	31	4050

The sample volumes in Nm³ were given by the costumer

Analysis No.	H-07-07-0082	H-07-07-0083	H-07-07-0084
Matrix:	flue gas samples	flue gas samples	flue gas samples
Sample Code:	Force sags nr.: 107-28412 19/6-07 Blank 1 Filter F181, XAD 6296 Sample for: CEN	Force sags nr.: 107-28412 Blank 2 Filter F182, XAD 6297 Sample for: CEN	Force sags nr.: 107-28412 25/6-07 Blank 3 Filter F183, XAD 6294 Sample for: CEN
Nm ³	8,2	7,9	5,3
pg/Nm ³			
2.3.7.8-Tetra-CDD	n.d.(0,1)	n.d.(0,2)	n.d.(0,2)
1.2.3.7.8-Penta-CDD	n.d.(0,2)	n.d.(0,3)	n.d.(0,4)
1.2.3.4.7.8-Hexa-CDD	n.d.(0,1)	n.d.(0,3)	n.d.(0,4)
1.2.3.6.7.8-Hexa-CDD	n.d.(0,1)	n.d.(0,2)	n.d.(0,3)
1.2.3.7.8.9-Hexa-CDD	n.d.(0,1)	n.d.(0,2)	n.d.(0,2)
1.2.3.4.6.7.8-Hepta-CDD	0,41	n.d.(0,4)	0,85
OCDD	1,1	n.d.(0,9)	2,6
2.3.7.8-Tetra-CDF	n.d.(0,10)	n.d.(0,2)	n.d.(1)
1.2.3.7.8-Penta-CDF	n.d.(0,10)	n.d.(0,1)	0,61
2.3.4.7.8-Penta-CDF	n.d.(0,07)	n.d.(0,1)	0,40
1.2.3.4.7.8-Hexa-CDF	n.d.(0,10)	n.d.(0,2)	0,37
1.2.3.6.7.8-Hexa-CDF	n.d.(0,07)	n.d.(0,1)	n.d.(0,2)
1.2.3.7.8.9-Hexa-CDF #	n.d.(0,1)	n.d.(0,2)	n.d.(0,3)
2.3.4.6.7.8-Hexa-CDF	n.d.(0,07)	n.d.(0,2)	n.d.(0,2)
1.2.3.4.6.7.8-Hepta-CDF	0,43	0,46	1,1
1.2.3.4.7.8.9-Hepta-CDF	n.d.(0,1)	n.d.(0,4)	n.d.(0,4)
OCDF	0,82	n.d.(0,5)	0,87
total 2.3.7.8-PCDD	1,5	n.d.	3,4
total 2.3.7.8-PCDF	1,2	0,46	3,3
total 2.3.7.8-PCDD/PCDF	2,8	0,46	6,7
total I-TEQ 2.3.7.8-PCDD (n.d.=0)	0,0053	---	0,011
total I-TEQ 2.3.7.8-PCDF (n.d.=0)	0,0051	0,0046	0,28
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=0)	0,010	0,0046	0,29
total I-TEQ 2.3.7.8-PCDD (n.d.=n.d.)	0,28	0,41	0,50
total I-TEQ 2.3.7.8-PCDF (n.d.=n.d.)	0,090	0,16	0,50
total I-TEQ 2.3.7.8-PCDD/PCDF (n.d.=n.d.)	0,37	0,56	0,99
3,3',4,4'-Tetra-CB 77	n.d.(7)	12	26
3,4,4',5-Tetra-CB 81	0,20	n.d.(0,7)	0,88
3,3',4,4',5-Penta-CB 126	n.d.(2)	n.d.(2)	n.d.(3)
3,3',4,4',5,5'-Hexa-CB 169	0,98	n.d.(0,5)	n.d.(0,6)
Total non-ortho PCB	1,2	12	27
Total WHO-TEQ non-ortho PCB (n.d.=0)	0,0098	0,0012	0,0027
Total WHO-TEQ non-ortho PCB (n.d.=n.d.)	0,22	0,22	0,33
2,3,3',4,4'-Penta-CB 105	n.d.(9)	12	35
2,3,4,4',5-Penta-CB 114	1,7	2,4	6,5
2,3',4,4',5-Penta-CB 118	n.d.(35)	59	160
2',3,4,4',5-Penta-CB 123	n.d.(1)	n.d.(1)	n.d.(2)
2,3,3',4,4',5-Hexa-CB 156	n.d.(6)	n.d.(6)	n.d.(9)
2,3,3',4,4',5'-Hexa-CB 157	n.d.(1)	n.d.(1)	n.d.(2)
2,3',4,4',5,5'-Hexa-CB 167	n.d.(4)	n.d.(4)	n.d.(6)
2,3,3',4,4',5,5'-Hepta-CB 189	n.d.(1)	n.d.(1)	n.d.(2)
Total mono-ortho PCB	1,7	74	202
Total WHO-TEQ mono-ortho PCB (n.d.=0)	0,00083	0,0083	0,023
Total WHO-TEQ mono-ortho PCB (n.d.=n.d.)	0,0090	0,012	0,029
PCB #28	504	466	1036
PCB #52	313	332	388
PCB #101	n.d.(66)	212	182
PCB #1381)	n.d.(66)	n.d.(68)	n.d.(102)
PCB #153	n.d.(105)	n.d.(108)	n.d.(161)
PCB #180	n.d.(33)	n.d.(34)	n.d.(51)
total	816	1009	1606
total * 5	4081	5046	8030
Hexachlorbenzene	97	54	51

The Sample Volumes in Nm³ were by from the costumer

- End of Report 0675-07-400_01 -