



PROFTECH
SPÓŁKA Z O.O.



AB 994

Research laboratory
accredited by PCA,
Nr AB 994

Scopes of accreditation:

- concentration and mass measurements of flow of fine particles
- measurements of concentration and mass flow of SO₂, NO_x, CO
- concentration measurements of CO₂, O₂
- concentration and mass flow measurements of OWO
- sampling for mass concentration determination of PCDD/PDF and dioxin type PCB
- sampling for concentration determination of (As; Cd; Cr; Co; Cu; Mn; Ni; Pb; Sb; Tl; V)
- sampling for concentration determination of Hg
- sampling and determination of concentration and mass flow of HCl
- sampling and determination of concentration and mass flow of HF
- sampling for determining the concentration of individual gaseous organic compounds
- calibration of Automated Monitoring systems,
- QAL2 procedure
- annual performance test of Automated Monitoring Systems, AST procedure
- noise measurement from machinery, installations and industrial plants

Chorzów, August 8th 2022
Our ref. No.: PW/10/08/22

Report No PW/10/08/22

on concentration measurements of dioxins, furans, heavy metals (As; Cd; Cr; Co; Cu; Mn; Ni; Pb; Sb; Tl; V and Hg) emitted into environment from stationary emission source No. 001 (waste incineration boiler stack), located at UAB Vilniaus Kogeneracinė Jėgainė, Jočionių g. 13, 02300 Vilnius

Client name and address:

UAB Vilniaus Kogeneracinė Jėgainė
Žvejų St. 14,
LT-09310 Vilnius

Developed by:

mgr Grzegorz Bortel

Calculation and data transfer checked by:

inż. Dariusz Guja

Verified by:

Company manager - inż. Dariusz Guja

Copy number: 1/3

DYREKTOR

inż. Dariusz Guja

ul. Kurta Aldera 44
41-506 Chorzów
tel/fax: 0 32 247 37 24

www.proftech.com.pl
e-mail: proftech@proftech.com.pl

NIP: 627 252 46 31
KRS: 0000773369

bank account : PKO BANK POLSKI S.A. O/Katowice : IBAN PL62 1440 1172 0000 0000 0353 4332

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4. MEASUREMENT RESULTS SUMMARY

Below are presented measurement results summary, full measurement results are presented in chapter No 6, at page 9, 12 and 13.

Stationary emission source No. 001 (waste incineration boiler stack)	Concentration of the substance in the gas in the reference conditions O2 ref. 11%	PCDDF*	ng/m3 ref.	0,0016
	Emission limits	PCDDF	ng/m3 ref.	0,10
	Transgerssion	PCDDF	ng/m3 ref.	-
	Concentration of the substance in the gas in the reference conditions O2 ref. 11%	Cd*+Tl*	mg/m3 ref.	0,010
		Hg*	mg/m3 ref.	0,00154
		Sb*+As*+Cr*+Co*+Mn*+Cu*+Ni*+Pb*+V*	mg/m3 ref.	0,071
	Emission limits	Cd+Tl	mg/m3 ref.	0,05
		Hg	mg/m3 ref.	0,05
		Sb+As+Cr+Co+Mn+Cu+Ni+Pb+V	mg/m3 ref.	0,50
	Transgerssion	Cd+Tl	mg/m3 ref.	-
		Hg	mg/m3 ref.	-
		Sb+As+Cr+Co+Mn+Cu+Ni+Pb+V	mg/m3 ref.	-

*- the results obtained from the subcontractor (accredited)

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5. DESCRIPTION OF THE MEASUREMENT METHOD**Measurement of the gas volumetric flow**

The flow rate and density of flue gases were determined according to Polish Standard PN-Z-04030-7:1994 „Testing of particulate content. The gravimetric method measurement of concentration and particulate mass flow in flue gases" Gravimetric dust monitor type MEGASYSTEM X-1 APIS and type "S" Pitot tube were used for the measurements. Measurement is accredited.

Accreditation range: differential pressure: > 10 Pa

Measurement O₂ content

The concentration of O₂ was determined using gas analyzers HORIBA PG-350E-HR and HORIBA PG-350E-EU equipped with testing probes 1000 mm long. The measurements were taken according to the procedure described in measurement unit as well as to EN Standard PN-EN 14789:2017 "Stationary source emissions - Determination of volume concentration of oxygen O₂ - Reference method - Paramagnetism". Measurement is accredited.

Accreditation range: O₂ content: 3-21%

Measurement CO₂ content

The concentration of CO₂ was determined using gas analyzers HORIBA PG-350E-HR and HORIBA PG-350E-EU equipped with testing probes 1000 mm long. The measurements were taken according to the procedure described in measurement unit as well as to ISO Standard PN-ISO 10396:2001 "Stationary Source Emissions - Sampling For The Automated Determination Of Gas Concentrations ". Measurement is accredited.

Accreditation range: CO₂ content: 0,1-20%

Measurement of heavy metals content

Sampling for the determination of concentrations and emissions of heavy metals (Cd, Tl, Sb , As, Cr, Co, Cu , Mn , Ni , Pb, V) was performed according to PN -EN 14385 : 2005. Analysis of metals (Cd , Tl , Sb , As, Cr, Co, Cu , Mn , Ni , Pb, V) was performed in the laboratory of OBiKŚ Sp. z o.o. in Katowice , accredited in this regard by the Polish Centre of Accreditation No. AB 213

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Measurement of mercury (Hg) content

Sampling for the determination of concentrations and emissions of mercury (Hg) was made according to PN -EN 13211 + AC : 2006. Analysis of mercury (Hg) was made in a laboratory OBiKŚ Sp. z o.o. in Katowice , accredited in this regard by the Polish Centre of Accreditation No. AB 213

PCDD+PCDF sampling and determination

PCDD/DF samples were taken according to the requirements of Polish Standard PN-EN 1948-1:2006 „ Stationary source emissions - Determination of mass concentration of PCDDs/PCDFs and dioxin-type PCBs - Part 1: Sampling of PCDDs/PCDFs”.

The three stages of PCDD/DF concentration and emission determination:

Stage I - sampling

For the determination of mass concentration of PCDD/DF proper sampling plays important role that affects following stages of the testing. The sampling were performed by means of the filtration and condensation method using PCDD/DF sampling conformed to European Standard PN-EN 1948-1:2006.

The following page shows the schematic diagram of the sampling system.

Stage II - laboratory analysis

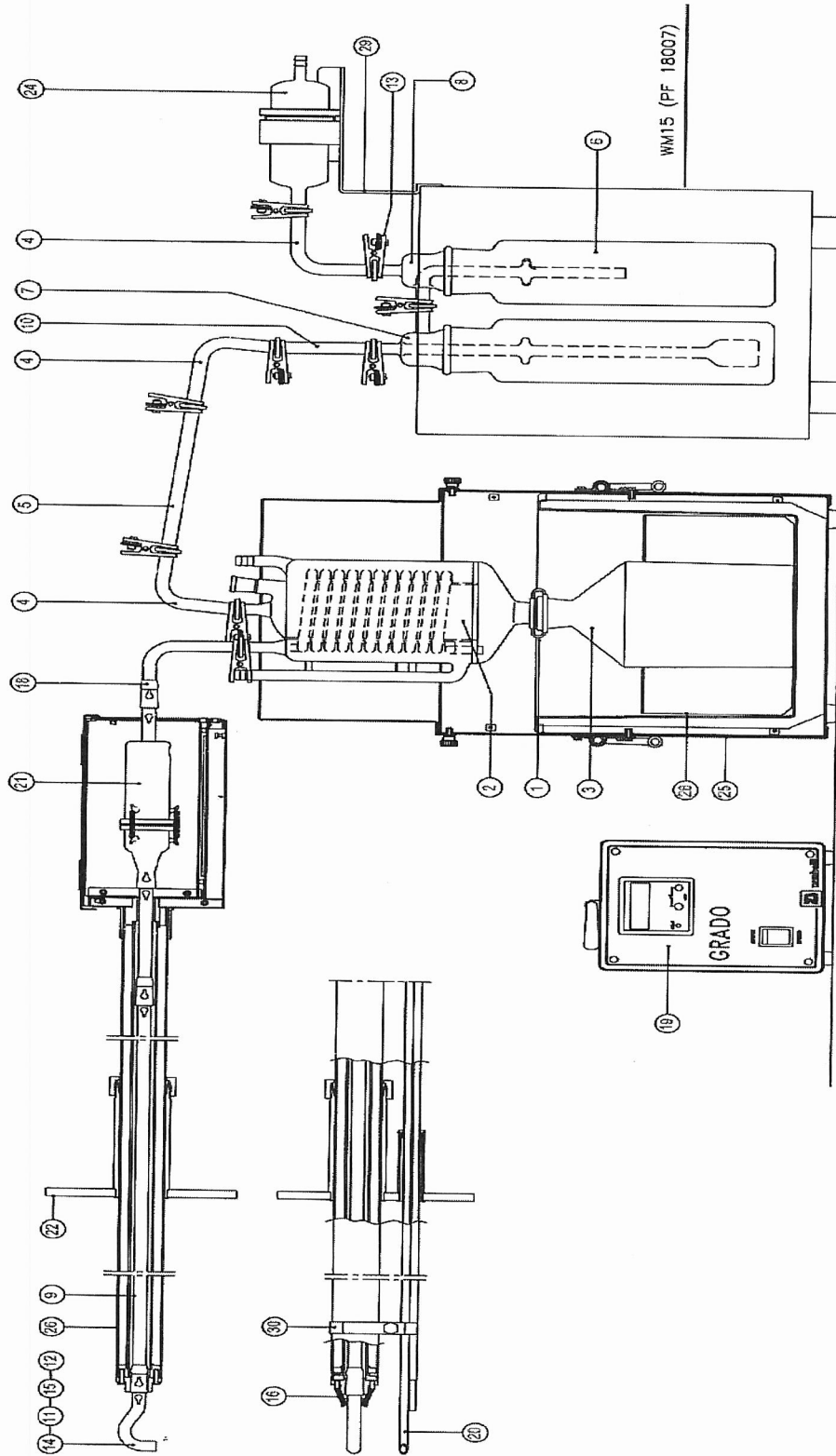
The samples were analysed at the ALS Czech Republic, s.r.o accredited laboratory following the CSN EN 1948-2,3 methodology: The determination of polychlorinated dibenzo-p-dioxine, dibenzofurans in emission samples with the method of isotop dillution using HRGC/HRMS.

The dioxin and furans analyses were conducted at the ALS Czech Republic, s.r.o. Laboratory, specifically accredited for the test by the Český Institut Pro Akreditaci, o.p.s. , No L1163.

Stage III - development and the results and discussion

The last stage includes results collection from the previous stages, emission calculation and PCDD/DF concentration as well as comparison to the standards in force.

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- Opis:
- 1. ferrule
 - 2. cooler
 - 5,10. aspiration path - tubes
 - 13. clamp
 - 20. Pitot tube „S” - type
 - 25. cooler casing
 - 3. condensation pot
 - 6-8. scrubbers
 - 16. holding springs
 - 21. filter casing
 - 26. heated probe
 - 4,18. aspiration path - elbows
 - 9. aspiration path - probe tube
 - 17. aspiration controller
 - 22. yoke
 - 28. cooler coil
 - 11,12,14,15. - aspiration endings
 - 19. temperature controller
 - 24. gas dryer
 - 29,30. support

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6. MEASUREMENT RESULTS

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- 1) Plant or unit name¹⁾: **Stationary emission source No. 001 (waste incineration boiler stack)**
 2) Flue gases cleaning unit¹⁾: **Evaporative cooler, hydrated lime and active carbon reactor, bag filters unit (2x4)**
 3) Emission source load during measurements¹⁾: **Boiler load ~56,9 MW,**
 4) Fuel type or material mass flow in process¹⁾: **Waste ~19,8 t/h**
 5) Location of sampling and measurements: **in duct, after flue gases cleaning unit**

Measurement reference number		05-07-01		X	X	
Date of measurement		05.07.2022				
Measurement time range		11:28-17:30				
Scope of test		Unit	Results	Uncertainty +/-	Method	
Meteorological conditions	Atmospheric pressure	hPa	1003,6	X	PN-Z-04030-7:1994	
	Ambient temperature	oC	24			
Measurement plane	Diameter	m	2,10			
	Area	m ²	3,4619			
The parameters of gas in line	Temperature	oC	49	X		
	Static pressure	Pa	-76			
	Differential pressure	Pa	87			
	Gas moistness grade X	kg/kg	0,047	PN-EN 14790:2017		
	Average velocity	m/s	10,2	0,1		PN-Z-04030-7:1994
	Chemical composition	O ₂	%	7,1		0,2
		CO ₂	%	11,9	0,5	PN-ISO 10396:2001
	Wet gas density during testing	kg/m ³	1,099	X	PN-EN 14790:2017	
Gas density in normal conditions	kg/m ³ N	1,308	PN-EN 14790:2017			
Gas density in conventional conditions	kg/m ³ U	1,348	PN-EN 14790:2017			
Concentration of the substance in the gas in reference conditions O ₂ ref. 11%	PCDDF*	ng/m ³ ref.	0,0016	0,0005	PN-EN 1948:2006	
Gas volume flow	measurement conditions	m ³ /h	127370	3630	PN-Z-04030-7:1994	
	normal conditions	m ³ N/h	106971	3091		
	standard conditions	m ³ U/h	99158	3881		
	reference conditions O ₂ ref. 11%	m ³ ref./h	137830	5980		
Emission limits	PCDDF*	ng/m ³ U	0,10	X	X	
Transgerssion	PCDDF*	ng/m ³ U	-			

*- the results obtained from the subcontractor (accredited)

¹⁾-information obtained from the client

Test Report No PW/10/08/22**Notes:**

Normal conditions designate the temperature of 273 K and pressure of 101,3kPa, defining normal cubic meter m³N. The standard conditions designate the temperature of 273K, pressure of 101,3 kPa and dry gases (steam contents less than 5 g/kg of flue gas), defining standard cubic meter, m³U

The specified expanded uncertainty comes from standard uncertainty multiplied by expansion coefficient k = 2, which provides 95% level of confidence for normal distribution. Uncertainty takes into account the sampling and analysis.

Registry of samples delivered to the laboratory: P/01/07/22, P/02/07/22

Date of delivery to the laboratory: 11.07.2022

Date of analysis: 11.07.2022 - 29.07.2022

Field blanks:

ID/ number of sample	Type of substance	The criterion of the blank [ng/m ³] 11%O ₂	The value of the blank [ng/m ³] 11% O ₂	Result [+/-]
P/02/07/22	PCDD/DF	0,01	0,0008	+

PCDD/DF (PN-EN 1948:2006):

sampling method: condensation - adsorption method

filter parameters: 19 x 90 mm, filter efficiency: 99,998 %

sampling plane: 2 measurement axis

oxygen reference : 11 %

time of dioxins and furans measurement: 11:28 – 17:30 (362 min)

nozzle diameter: 10 mm

probe temperature: 120 °C

scrubbers temperature 4 °C

aspired gas volume 15,12 m³

average sampling flow 41,8 l/min

isokinetic ratio: 95,1 %

leak test: + / +

gas meter temperature 42 °C

gas meter pressure 0 bar

spiking pattern: filter surface

absorption solution: 100 ml H₂O dest. + 50 ml 2-etoksyetanol

recovery: 55 % ¹³C₁₂-2,3,4,7,8-PECDF, />50%/

52 % ¹³C₁₂-1,2,3,6,7,8-HxCDF, />50%/

52 % ¹³C₁₂-1,2,3,4,6,7,8 HpCDF. />50%/

TEQ sample mass: 0,029 ng

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- 1) Plant or unit name¹⁾: **Stationary emission source No. 001 (waste incineration boiler stack)**
- 2) Flue gases cleaning unit¹⁾: **Evaporative cooler, hydrated lime and active carbon reactor, bag filters unit (2x4)**
- 3) Emission source load during measurements¹⁾: **Boiler load ~58,1 MW,**
- 4) Fuel type or material mass flow in process¹⁾: **Waste ~20,6 t/h**
- 5) Location of sampling and measurements: **in duct, after flue gases cleaning unit**

Measurement reference number			05-07-01		X	X	X	
Date of measurement			05.07.2022					
Measurement time range			10:28 - 11:28	11:32 - 12:32				
Scope of test		Unit	Results		Average	Uncertainty +/-	Method	
Meteorological conditions	Atmospheric pressure	hPa	999,0	999,0	999,0		PN-Z-04030-7:1994	
	Air temperature	oC	22	23	23			
Measurement plane	Diameter	m	2,10					
	Area	m2	3,4619					
Stack gas parameters	Temperature	oC	45,0	46,0	45,5			
	Static pressure	Pa	-50,0	-86,7	-68,4			
	Dynamic pressure	Pa	75,2	97,3	86,3			
	Gas moistness grade X	kg/kg	0,045	0,045	0,045			PN-EN 14790:2017
	Average velocity	m/s	8,9	10,1	9,5	0,3		PN-Z-04030-7:1994
	Chemical composition	O2	%	7,20	7,20	7,20		0,19
		CO2	%	12,00	11,90	11,95	0,46	PN-ISO 10396:2001
	Wet gas density during testing	kg/m3	1,109	1,105	1,107		PN-Z-04030-7:1994	
	Gas density in normal conditions	kg/m3 N	1,311	1,310	1,310		PN-Z-04030-7:1994	
	Gas density in standard conditions	kg/m3 U	1,349	1,348	1,348		PN-Z-04030-7:1994	
Concentration of the substance in the gas in reference conditions O2 ref. 11%	As gaseus*	mg/m ³ _{ref}	< 0,005834	< 0,005794	< 0,005814	0,001462	PN-EN 14385:2005	
	As dust*	mg/m ³ _{ref}	< 0,001189	< 0,001078	< 0,001134	0,000303	PN-EN 14385:2005	
	As*	mg/m ³ _{ref}	< 0,007023	< 0,006872	< 0,006948	0,001493	PN-EN 14385:2005	
	Sb gaseus*	mg/m ³ _{ref}	< 0,011667	< 0,011589	< 0,011628	0,002923	PN-EN 14385:2005	
	Sb dust*	mg/m ³ _{ref}	< 0,002378	< 0,002156	< 0,002267	0,000606	PN-EN 14385:2005	
	Sb*	mg/m ³ _{ref}	< 0,014045	< 0,013745	< 0,013895	0,002985	PN-EN 14385:2005	
	Cd gaseus*	mg/m ³ _{ref}	< 0,002334	< 0,002318	< 0,002326	0,000566	PN-EN 14385:2005	
	Cd dust*	mg/m ³ _{ref}	< 0,000476	< 0,000431	< 0,000454	0,000118	PN-EN 14385:2005	
	Cd*	mg/m ³ _{ref}	< 0,002810	< 0,002749	< 0,002780	0,000578	PN-EN 14385:2005	
	Co gaseus*	mg/m ³ _{ref}	< 0,000467	< 0,000464	< 0,000466	0,000095	PN-EN 14385:2005	
	Co dust*	mg/m ³ _{ref}	< 0,000095	< 0,000086	< 0,000091	0,000020	PN-EN 14385:2005	
	Co*	mg/m ³ _{ref}	< 0,000562	< 0,000550	< 0,000556	0,000097	PN-EN 14385:2005	
	Mn gaseus*	mg/m ³ _{ref}	0,029309	0,012516	0,020913	0,005318	PN-EN 14385:2005	
	Mn dust*	mg/m ³ _{ref}	< 0,000238	< 0,000216	< 0,000227	0,000059	PN-EN 14385:2005	
	Mn*	mg/m ³ _{ref}	0,029547	0,012732	0,021140	0,005318	PN-EN 14385:2005	
	Cu gaseus*	mg/m ³ _{ref}	0,016288	0,010291	0,013290	0,003377	PN-EN 14385:2005	
	Cu dust*	mg/m ³ _{ref}	0,001008	0,000845	0,000927	0,000249	PN-EN 14385:2005	
	Cu*	mg/m ³ _{ref}	0,017296	0,011136	0,014216	0,003386	PN-EN 14385:2005	
	Ni gaseus*	mg/m ³ _{ref}	< 0,000933	< 0,000927	< 0,000930	0,000236	PN-EN 14385:2005	
	Ni dust*	mg/m ³ _{ref}	< 0,000190	< 0,000172	< 0,000181	0,000049	PN-EN 14385:2005	
	Ni*	mg/m ³ _{ref}	< 0,001123	< 0,001099	< 0,001111	0,000241	PN-EN 14385:2005	
	Pb gaseus*	mg/m ³ _{ref}	< 0,002940	< 0,002920	< 0,002930	0,000754	PN-EN 14385:2005	
	Pb dust*	mg/m ³ _{ref}	< 0,000599	< 0,000543	< 0,000571	0,000156	PN-EN 14385:2005	
	Pb*	mg/m ³ _{ref}	< 0,003539	< 0,003463	< 0,003501	0,000770	PN-EN 14385:2005	

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	V gaseus*	mg/m ³ _{ref}	< 0,000583	< 0,000579	< 0,000581	0,000146	PN-EN 14385:2005
	V dust*	mg/m ³ _{ref}	< 0,000119	< 0,000108	< 0,000114	0,000030	PN-EN 14385:2005
	V*	mg/m ³ _{ref}	< 0,000702	< 0,000687	< 0,000695	0,000149	PN-EN 14385:2005
	Cr gaseus*	mg/m ³ _{ref}	0,004947	0,011681	0,008314	0,002087	PN-EN 14385:2005
	Cr dust*	mg/m ³ _{ref}	< 0,000285	< 0,000259	< 0,000272	0,000077	PN-EN 14385:2005
	Cr*	mg/m ³ _{ref}	0,005232	0,011940	0,008586	0,002088	PN-EN 14385:2005
	TI gaseus*	mg/m ³ _{ref}	< 0,005834	< 0,005794	< 0,005814	0,001462	PN-EN 14385:2005
	TI dust*	mg/m ³ _{ref}	< 0,001189	< 0,001078	< 0,001134	0,000303	PN-EN 14385:2005
	TI*	mg/m ³ _{ref}	< 0,007023	< 0,006872	< 0,006948	0,001493	PN-EN 14385:2005
Gas volume flow	measurement conditions	m ³ /h	110296	125750	118023	3363	PN-Z-04030-7:1994
	normal conditions	m ³ _n /h	93331	106043	99687	2881	
	standard conditions	m ³ _u /h	86808	98634	92721	3629	
	reference conditions O2 ref. 11%	m ³ _{ref} /h	119795	136115	127955	5552	
Emission limits	Cd*+TI*	mg/m ³ _{ref}	0,05				
	Sb*+As*+Cr*+Co*+Mn*+Cu*+Ni*+Pb*+V*	mg/m ³ _{ref}	0,50				
Concentration of the substance in the gas in reference conditions O2 ref. 11%	Cd*+TI*	mg/m ³ _{ref}	0,010				
	Sb*+As*+Cr*+Co*+Mn*+Cu*+Ni*+Pb*+V*	mg/m ³ _{ref}	0,071				

*- the results obtained from the subcontractor (accredited)

1)-information obtained from the client

Notes:

Normal conditions designate the temperature of 273 K and pressure of 101,3kPa, defining normal cubic meter m³N. The standard conditions designate the temperature of 273K, pressure of 101,3 kPa and dry gases (steam contents less than 5 g/kg of flue gas), defining standard cubic meter, m³U

The specified expanded uncertainty comes from standard uncertainty multiplied by expansion coefficient k = 2, which provides 95% level of confidence for normal distribution. Uncertainty takes into account the sampling and analysis.

Registry of samples delivered to the laboratory:P/03/07/22, P/04/07/22, P/05/07/22, P/06/07/22, P/07/07/22,
P/08/07/22, P/09/07/22,**Date of delivery to the laboratory:**

11.07.2022

Date of analysis:

11.07.2022 - 15.07.2022

Field blanks:

ID/ number of sample	Type of substance	The criterion of the blank [mg/m ³] 11%O ₂	The value of the blank [mg/m ³] 11% O ₂	Result [+/-]
P/07/07/22	Cd+TI	0,005	p.o.	+
P/07/07/22	Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V	0,05	p.o.	+

p.o. – below the limit of quantification.

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- 1) Plant or unit name¹⁾: **Stationary emission source No. 001 (waste incineration boiler stack)**
 2) Flue gases cleaning unit¹⁾: **Evaporative cooler, hydrated lime and active carbon reactor, bag filters unit (2x4)**
 3) Emission source load during measurements¹⁾: **Boiler load ~56,7 MW,**
 4) Fuel type or material mass flow in process¹⁾: **Waste ~21,1 t/h**
 5) Location of sampling and measurements: **in duct, after flue gases cleaning unit**

Measurement reference number		05-07-01		X	X	X		
Date of measurement		05.07.2022						
Measurement time range		12:43-13:43	13:51-14:51					
Scope of test		Unit	Results		Average	Uncertainty +/-	Method	
Meteorological conditions	Atmospheric pressure	hPa	1000,0	1001,0	1000,5		PN-Z-04030-7:1994	
	Air temperature	oC	24	24	24			
Measurement plane	Diameter	m	2,10					
	Area	m ²	3,4619					
Stack gas parameters	Temperature	oC	46,0	47,0	46,5			
	Static pressure	Pa	-68,7	-66,7	-67,7			
	Dynamic pressure	Pa	69,8	90,8	80,3			
	Gas moistness grade X	kg/kg	0,043	0,043	0,043			PN-EN 14790:2017
	Average velocity	m/s	8,5	9,7	9,1	0,3		PN-Z-04030-7:1994
	Chemical composition	O ₂	%	7,30	7,20	7,25		0,19
		CO ₂	%	11,90	12,00	11,95	0,46	PN-ISO 10396:2001
	Wet gas density during testing	kg/m ³	1,107	1,106	1,106		PN-Z-04030-7:1994	
	Gas density in normal conditions	kg/m ³ N	1,312	1,312	1,312		PN-Z-04030-7:1994	
Gas density in standard conditions	kg/m ³ U	1,348	1,349	1,348		PN-Z-04030-7:1994		
Concentration of the substance in the gas in reference conditions O ₂ ref. 11%	Hg gaseus*	mg/m ³ _{ref}	< 0,00120	0,00139	0,00129	0,00033	PN-EN 13211+AC:2006	
	Hg dust*	mg/m ³ _{ref}	< 0,00026	< 0,00023	< 0,00025	0,00006	PN-EN 13211+AC:2006	
	Hg*	mg/m ³ _{ref}	< 0,00145	0,00162	0,00154	0,00034	PN-EN 13211+AC:2006	
Gas volume flow	measurement conditions	m ³ /h	106308	121388	113848	3244	PN-Z-04030-7:1994	
	normal conditions	m ³ _n /h	89750	102267	96009	2775		
	standard conditions	m ³ _s /h	83740	95416	89578	3506		
	reference conditions O ₂ ref. 11%	m ³ _{ref} /h	114724	131674	123199	5349		
Emission limits	Hg*	mg/m ³ _{ref}	0,05					
Concentration of the substance in the gas in reference conditions O ₂ ref. 11%	Hg*	mg/m ³ _{ref}	0,00154					

*- the results obtained from the subcontractor (accredited)

¹⁾-information obtained from the client

Notes:

Normal conditions designate the temperature of 273 K and pressure of 101,3kPa, defining normal cubic meter m³N. The standard conditions designate the temperature of 273K, pressure of 101,3 kPa and dry gases (steam contents less than 5 g/kg of flue gas), defining standard cubic meter, m³U

The specified expanded uncertainty comes from standard uncertainty multiplied by expansion coefficient k = 2, which provides 95% level of confidence for normal distribution. Uncertainty takes into account the sampling and analysis.

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Registry of samples delivered to the laboratory: P/10/07/22, P/11/07/22, P/12/07/22, P/13/07/22, P/14/07/22

Date of delivery to the laboratory: 11.07.2022

Date of analysis: 11.07.2022 - 18.07.2022

Field blanks:

ID/ number of sample	Type of substance	The criterion of the blank [mg/m ³] 11%O ₂	The value of the blank [mg/m ³] 11% O ₂	Result [+/-]
P/12/07/22	Hg	0,005	p.o.	+

p.o. – below the limit of quantification.

Work parameters of measurement system:**Heavy metals (PN-EN 14385:2005)**

Sampling plane: 2 measurement axis
 Sampling: isokinetic [x]
 nonisokinetic []
 Isokinetic ratio: 106,8 / 103,7 %
 Sampling time: 60,1 / 60,1 min
 Sampled volume: 0,121 / 0,120 m³
 Filter parameters: FT-50: Ø 0,50 mm, efficiency: 99,990 %, quartz (QMA)
 Impingers: impingers set No. 2 (absorption efficiency 98,1 %)
 Absorption solution: HNO₃/H₂O₂

Hg (PN-EN 13211 + AC:2006)

Sampling plane: 2 measurement axis
 Sampling: isokinetic [x]
 nonisokinetic []
 Isokinetic ratio: 103,0 % / 99,8 %
 Sampling time: 60,1 min / 60,1 min
 Sampled volume: 0,120 m³ / 0,121 m³
 Impingers: impingers set No. 1 (absorption efficiency 97,5 %)
 Absorption solution: No. I (manganese (VII) potassium / sulfuric acid (VI))

H₂O (PN-EN 14790:2017)

Sampling plane: 2 measurement axis
 Sampling equipment: titanium sampling line
 heated probe 2,0 m
 sampling pump: SKC
 Cartridge No: H₂O content set No 1
 Sampling No: 1
 Sampling time: 60,1 min
 Sampling speed: ~2,0 l/min
 H₂O maas: 5,45 g
 absorption efficiency: 98,0 %

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O₂ paramagnetic (PN-EN 14789:2017):

Range : 0 – 5 % []
 0 – 10 % [X]
 0 – 25 % []
 Calibration gas: O₂ – 9,012% [X] R/07/W
 O₂ – 20,018% [] R/12/W
 N₂ – 99,99% [X] R/17/
 Sampling train: 2 measurement axis
 Sampling time/ average time: 360 min / 1 min

O ₂ concentration measurement (paramagnetic):		HORIBA PG-350E-EU (130/1/AW/21)			
check operation		unit	result	criterion	result +/-
„0” after adjustment, without sampling train		%	0,02	± 0,1 [%]*	+
„0” after adjustment, with sampling train	before measurement	%	0,02	± 0,2 [%]**	+
	after measurement	%	0,05	± 0,2 [%]**	+
„Span” after adjustment with sampling train /standard 9,012 % R/07/W analyser range 25%/	before measurement	%	9,00	± 0,2 [%]**	+
	after measurement	%	9,10	± 0,2 [%]**	+
	before measurement time T90	%	18,1	> 8,12 [%]	-----
		sec.	29	< 200 sec.	+

*2 x repeatability „0”; **2% measurement range

Test Report No PW/10/08/22**7. MEASUREMENT DEVICES**

Name of measuring device		X1- Apis
Type of measuring device		Isokinetic sampler S/N 0081
Certificate	Calibration No	515/226/LA/P/2020 15.09.2020 1038/PWT/2020 06.10.2020 G-384/20-225/20 14.09.2020
Issued by		PLUM Sp. z o.o. KLEOSIN CZAH-POMIAR Sp. z o.o. KATOWICE ZAP J.FIRGANEK BESTWINKA
Date of issue the certificate of calibration		15.09.2020 06.10.2020 14.09.2020
Expiration date of the certificate of calibration		-

Name of measuring device		HORIBA
Type of measuring device		PG-350E-EU
Certificate	Calibration No	130/1/AW/21
Issued by		Laboserwis Sp. z o.o. Katowice
Date of issue the certificate of calibration		28.05.2021
Expiration date of the certificate of calibration		-

Name of measuring device		Sampler
Type of measuring device		PT-01
Certificate	Calibration No	851-2463/19 786-2245/19 G-360/19-224/19 R-286/16-186/16
Issued by		INTROL Sp. z o.o. KATOWICE ZAP BESTWINKA
Date of issue the certificate of calibration		29.08.2019 12.08.2019 08.08.2019
Expiration date of the certificate of calibration		-

Name of measuring device		Sampler
Type of measuring device		LIFETEK 55 XP-R nr 55381 + ISOCHECK-SRB nr ISO0571
Certificate	Calibration No	174/87/LA/P/2021 02.04.2021 T146/PMT/2021 12.05.2021 G-103/21-72/21 19.03.2021
Issued by		PLUM Sp. z o.o. KLEOSIN CZAH-POMIAR Sp. z o.o. KATOWICE ZAP J.FIRGANEK BESTWINKA
Date of issue the certificate of calibration		02.04.2021 12.05.2021 19.03.2021
Expiration date of the certificate of calibration		-

Name of measuring device		GASMETER TEMPERATURE AND PRESSURE
Type of measuring device		-
Certificate	Calibration No	T271/PMT/2021 212/1/C/21
Issued by		INTROL Sp. z o.o. KATOWICE ZAP BESTWINKA
Date of issue the certificate of calibration		21.09.2021 r. 01.09.2021 r.
Expiration date of the certificate of calibration		-

Test Report No PW/10/08/22**8. CERTIFICATE OF ACCREDITATION****POLSKIE CENTRUM AKREDYTACJI**
POLISH CENTRE FOR ACCREDITATIONSygnatariusz EA MLA
EA MLA Signatory**CERTYFIKAT AKREDYTACJI**
LABORATORIUM BADAWCZEGO
ACCREDITATION CERTIFICATE OF TESTING LABORATORY**Nr AB 994**

Potwierdza się, że. / This is to confirm that:

„PROFTECH” Sp. z o.o.
ul. Kurta Aldera 44, 41-506 Chorzówspełnia wymagania normy PN-EN ISO/IEC 17025:2018-02
meets requirements of the PN-EN ISO/IEC 17025:2018-02 standardAkredytowana działalność jest określona w Zakresie Akredytacji Nr AB 994
Accredited activity is defined in the Scope of Accreditation No AB 994Akredytacja pozostaje w mocy pod warunkiem przestrzegania
wymagań jednostki akredytującej określonych w kontrakcie Nr AB 994
This accreditation remains in force provided the Laboratory observes
the requirements of Accreditation Body defined in the Contract No AB 994Akredytacji udzielono dnia 30.01.2009 r.
Accreditation was granted on 30.01.2009DYREKTOR
POLSKIEGO CENTRUM AKREDYTACJI

LUCYNA OLBORSKA

Warszawa, dnia 8 grudnia 2019 roku

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9. DIOXINS AND FURANS ANALYSIS RESULTS



Attachment no. 1 to the Certificate of Analysis for work order PR2270688

Sample: P/01/07/22

Measurement results PCDD/Fs:

Sample: P/01/07/22		Final extract [µl]: 60			
		Injection volume [µl]: 4			
		Acquisition date [d.m.y h:m]: 20.7.22 21:02			
2,3,7,8-PCDD/Fs	Result [ng/sample]	Limit of Detection [ng/sample]	Limit of Quantification [ng/sample]	¹ I-TEFs	I-TEQ Upperbound [ng/sample]
2,3,7,8-TCDD	< 0.0022	0.0022	0.0043	1	0.0022
1,2,3,7,8-PeCDD	< 0.0033	0.0033	0.0065	0.5	0.0016
1,2,3,4,7,8-HxCDD	< 0.0061	0.0061	0.012	0.1	0.00061
1,2,3,6,7,8-HxCDD	< 0.012	0.0061	0.012	0.1	0.0012
1,2,3,7,8,9-HxCDD	< 0.0061	0.0061	0.012	0.1	0.00061
1,2,3,4,6,7,8-HpCDD	< 0.0072	0.0072	0.014	0.01	0.00072
OCDD	< 0.011	0.011	0.021	0.001	0.00011
2,3,7,8-TCDF	0.028	0.0028	0.0056	0.1	0.0028
1,2,3,7,8-PeCDF	< 0.004	0.004	0.008	0.05	0.0002
2,3,4,7,8-PeCDF	0.021	0.004	0.008	0.5	0.011
1,2,3,4,7,8-HxCDF	0.036	0.0066	0.013	0.1	0.0036
1,2,3,6,7,8-HxCDF	0.02	0.0066	0.013	0.1	0.002
1,2,3,7,8,9-HxCDF	< 0.0066	0.0066	0.013	0.1	0.00066
2,3,4,6,7,8-HxCDF	0.025	0.0066	0.013	0.1	0.0025
1,2,3,4,6,7,8-HpCDF	0.028	0.0088	0.018	0.01	0.00028
1,2,3,4,7,8,9-HpCDF	< 0.0088	0.0088	0.018	0.01	0.00088
OCDF	< 0.0098	0.0098	0.02	0.001	0.000098
I-TEQ from quantified 2,3,7,8-PCDD/Fs - "Lowerbound"					0.022
I-TEQ from 2,3,7,8-PCDD/Fs - "Mediumbound"					0.025
Maximum possible I-TEQ - "Upperbound"					0.029
PCDDs	Result [ng/sample]	PCDFs	Result [ng/sample]		
Tetra-CDDs	< 0.048	Tetra-CDFs	0.53		
Penta-CDDs	< 0.046	Penta-CDFs	0.46		
Hexa-CDDs	< 0.061	Hexa-CDFs	0.33		
Hepta-CDDs	< 0.014	Hepta-CDFs	0.028		
OCDD	< 0.011	OCDF	< 0.0098		

¹I-TEF according to NATO.

Limits of quantification are defined as double of the detection limits.

The limit of detection is defined as the amount of analyte producing a signal with S/N ≥ 3.

The value of the detection limit is mentioned as the actual value at the acquisition date.

Measurement uncertainty is expressed as a double (k=2) relative standard deviation (RSD%), and corresponds to 95% confidence interval.

Estimation of uncertainty of each 2,3,7,8-PCDD/F congener is 30% and total I-TEQ is 20%.

These values were ensured by analyses of certified reference material under conditions of internal reproducibility.

Results marked with "<" are below limit of detection or quantification.

"Lowerbound" and "Upperbound" are levels defined in Regulation 2017/644 and EN 1948-4.

"Mediumbound" is levels defined in Regulation 2017/644.

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Attachment no. 1 to the Certificate of Analysis for work order PR2270688

Sample:

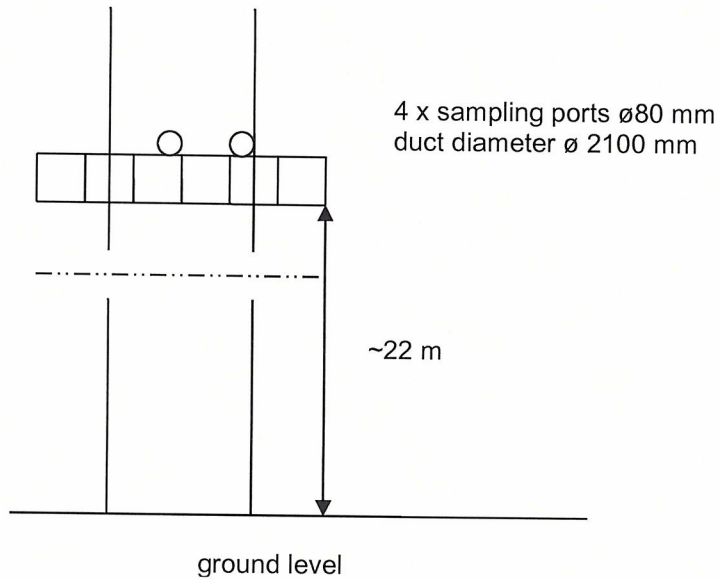
P/01/07/22


Standards recovery:

Sample:		P/01/07/22			
		Final extract [μ l]:		60	
		Injection volume [μ l]:		4	
		Acquisition date [d.m.y h:m]:		20.7.22 21:02	
Extraction standard	Recovery [%]	Acceptable range [%]		Accept. rec. with respect to	
PCDDs		Basic	Extended	basic range	extended range
13C12 - 2,3,7,8-TCDD	65	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,7,8-PeCDD	60	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,7,8-HxCDD	50	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,6,7,8-HxCDD	81	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,6,7,8-HpCDD	48	40 - 130	20 - 150	YES	-
13C12 - OCDD	61	40 - 130	20 - 150	YES	-
PCDFs					
13C12 - 2,3,7,8-TCDF	51	50 - 130	30 - 150	YES	-
13C12 - 2,3,4,7,8-PeCDF	52	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,7,8-HxCDF	51	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,6,7,8-HxCDF	57	50 - 130	30 - 150	YES	-
13C12 - 2,3,4,6,7,8-HxCDF	57	50 - 130	30 - 150	YES	-
13C12 - 1,2,3,4,6,7,8-HpCDF	46	40 - 130	20 - 150	YES	-
13C12 - OCDF	43	40 - 130	20 - 150	YES	-
Sampling standard	Recovery [%]	Acceptable range [%]		Rec. in range?	
13C12-1,2,3,7,8-PeCDF	55	> 50		YES	
13C12-1,2,3,7,8,9-HxCDF	52	> 50		YES	
13C12-1,2,3,4,7,8,9-HpCDF	52	> 50		YES	

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10. MEASUREMENT PLANE SCHEME



Approved by

DYREKTOR
.....
Name and Signature
inż. Dariusz Guja

END OF REPORT