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PCA
POLSKIE CENTRUM AKREDYTACJI
BADANIA
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 SO_2, NO_x, CO*
- *concentration measurements of CO_2, O_2*
- *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, July 25th 2023
Our ref. No.: PW/53/07/23

Report No PW/53/07/23

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
DYREKTOR
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Copy number: 1/3

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1. PURPOSE AND SCOPE OF THE REPORT

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

Measurements range:

- PCDD/DF concentration,
- Heavy metals (As; Cd; Cr; Co; Cu; Mn; Ni; Pb; Sb; Tl; V and Hg) concentration,

The measurements were carried out in accordance with the sampling plan and the described sampling methods.
Operating parameters of the technological installation was obtained from the customer's representative.

2. BASIS OF MEASUREMENTS EXECUTION

The measurements were taken according to the contract No VKJ_S_2020-263 dated December 16th 2020.

3. MEASUREMENT TEAM

The measurements taken on June 27th 2023 were executed by the following team:

- Grzegorz Bortel — specialist - measurement team leader,
- Bartłomiej Glik — specialist,

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.	**0,0026**
	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.	**0,005**
		Hg*	mg/m3 ref.	**0,000408**
		Sb*+As*+Cr*+Co*+Mn*+ Cu*+Ni*+Pb*+V*	mg/m3 ref.	**0,024**
	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)

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 O_2 content

The concentration of O_2 was determined using gas analyzers HORIBA PG-350E-HR and HORIBA PG-350E-EU equipped with testing probes 1750 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 O_2 - Reference method - Paramagnetism". Measurement is accredited.

Accreditation range: O_2 content: 3-21%

Measurement CO_2 content

The concentration of CO_2 was determined using gas analyzers HORIBA PG-350E-HR and HORIBA PG-350E-EU equipped with testing probes 1750 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: CO_2 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 ŚCOP Sp. z o.o. in Czeladź , accredited in this regard by the Polish Centre of Accreditation No. AB 719

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 Eurofins ŚCOP Sp. z o.o. in Czeladź , accredited in this regard by the Polish Centre of Accreditation No. AB 719

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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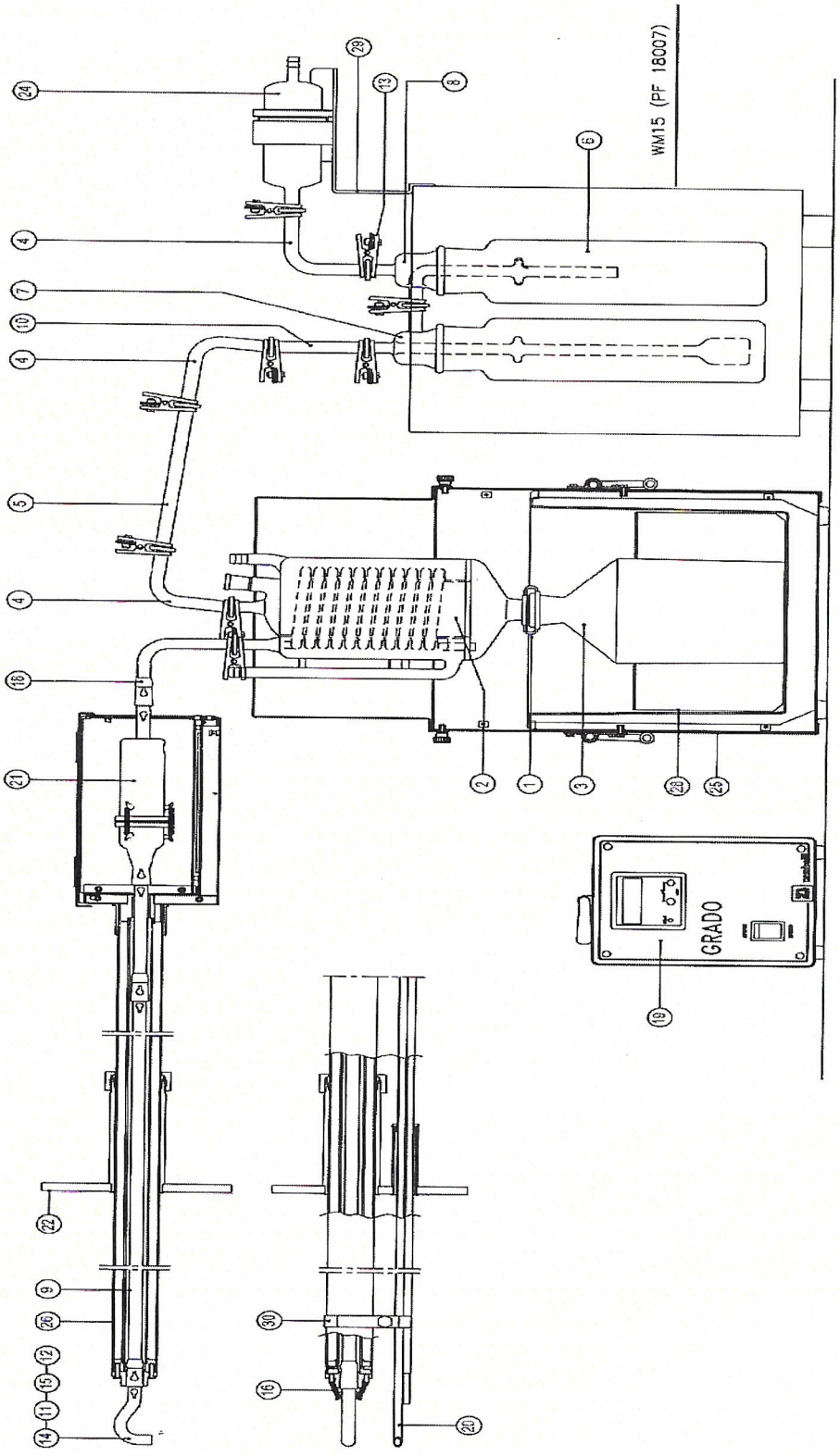

Opis:

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

6. MEASUREMENT RESULTS

Test Report No PW/53/07/23

1) Plant or unit name[1)]: **Stationary emission source No. 001 (waste incineration boiler stack)**

2) Flue gases cleaning unit[1)]: **Evaporative cooler, hydrated lime and active carbon reactor, bag filters unit (2x4)**

3) Emission source load during measurements[1)]: **Boiler load ~67,8 MW,**

4) Fuel type or material mass flow in process[1)]: **Waste ~18,8 t/h**

5) Location of sampling and measurements: **in duct, after flue gases cleaning unit**

Measurement reference number				27-06-01		
Date of measurement				27.06.2023		
Measurement time range				13:00-19:00		
Scope of test			Unit	Results	Uncertainty +/-	Method
Meteorological conditions	Atmospheric pressure		hPa	**988,5**		PN-Z-04030-7:1994
	Ambient temperature		oC	**25**		
Measurement plane	Diameter		m	**2,10**		
	Area		m2	**3,4619**		
The parameters of gas in line	Temperature		oC	**37**		
	Static pressure		Pa	**-75**		
	Differential pressure		Pa	**110**		
	Gas moistness grade X		kg/kg	**0,070**		PN-EN 14790:2017
	Average velocity		m/s	**10,7**	0,1	PN-Z-04030-7:1994
	Chemical composition	O2	%	**7,0**	0,2	PN-EN 14789:2017
		CO2	%	**12,1**	0,5	PN-ISO 10396:2001
	Wet gas density during testing		kg/m3	**1,109**		PN-EN 14790:2017
	Gas density in normal conditions		kg/m3 N	**1,292**		PN-EN 14790:2017
	Gas density in conventional conditions		kg/m3 U	**1,349**		PN-EN 14790:2017
Concentration of the substance in the gas in reference conditions O2 ref. 11%	PCDDF*		ng/m3 ref.	**0,0026**	0,0008	PN-EN 1948:2006
Gas volume flow	measurement conditions		m3/h	**133352**	2235	PN-Z-04030-7:1994
	normal conditions		m3N/h	**114511**	1997	
	standard conditions		m3U/h	**102459**	4377	
	reference conditions O2 ref. 11%		m3ref./h	**143443**	6668	
Emission limits	PCDDF*		ng/m3 U	**0,10**		
Transgerssion	PCDDF*		ng/m3 U	**-**		

*- the results obtained from the subcontractor (accredited)

[1)]-information obtained from the client

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Notes:
Normal conditions designate the temperature of 273 K and pressure of 101,3kPa, defining normal cubic meter m^3N. 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/01/07/23, P/02/07/23

Date of delivery to the laboratory: 04.07.2023
Date of analysis: 04.07.2023 - 24.07.2023

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/02/07/23	PCDD/DF	0,01	0,0021	+

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

sampling method:	condensation - adsorption method		
filter paramethers:	19 x 90 mm, filter efficiency: 99,998 %		
sampling plane:	2 measurement axis		
oxygen reference :	11 %		
time of dioxins and furans measerument:	13:00 – 19:00 (360 min)		
nozzle diameter:	6	mm	
probe temperature:	121	°C	
scrubbers temperature	6	°C	
aspired gas volume	5,54	m^3	
average sampling flow	15,4	l/min	
izokinetic ratio:	96,5	%	
leak test:	+ / +		
gas meter temperature	29	°C	
gas meter pressure	0	bar	
spiking pattern:	filter surface		
absorption solution:	100 ml H_2O dest. + 50 ml 2-etoksyetanol		
recovery:	95 %	$^{13}C_{12}$-2,3,4,7,8-PECDF,	/>50%/
	93 %	$^{13}C_{12}$-1,2,3,6,7,8-HxCDF,	/>50%/
	54 %	$^{13}C_{12}$-1,2,3,4,6,7,8 HpCDF.	/>50%/
TEQ sample mass:	0,018	ng	

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1) Plant or unit name[1)]: **Stationary emission source No. 001 (waste incineration boiler stack)**
2) Flue gases cleaning unit[1)]: **Evaporative cooler, hydrated lime and active carbon reactor, bag filters unit (2x4)**
3) Emission source load during measurements[1)]: **Boiler load ~67,8 MW,**
4) Fuel type or material mass flow in process[1)]: **Waste ~18,8 t/h**
5) Location of sampling and measurements: **in duct, after flue gases cleaning unit**

Measurement reference number			27-06-01				
Date of measurement			27.06.2023				
Measurement time range			13:25-14:26	14:31-15:32			
Scope of test		Unit	Results		**Average**	Uncertainty +/-	Method
Meteorological conditions	Atmospheric pressure	hPa	990,2	989,8	**990,0**		PN-Z-04030-7:1994
	Air temperature	oC	25	25	**25**		
Measurement plane	Diameter	m	2,10				
	Area	m2	3,4619				
Stack gas parameters	Temperature	oC	40,5	39,7	**40,1**		
	Static pressure	Pa	-39,2	-36,6	**-37,9**		
	Dynamic pressure	Pa	91,5	89,4	**90,5**		
	Gas moistness grade X	kg/kg	0,066	0,074	**0,070**		PN-EN 14790:2017
	Average velocity	m/s	10,2	10,1	**10,1**	0,2	PN-Z-04030-7:1994
	Chemical composition O2	%	6,60	7,20	**6,90**	0,18	PN-EN 14789:2017
	Chemical composition CO2	%	12,60	12,00	**12,30**	0,47	PN-ISO 10396:2001
	Wet gas density during testing	kg/m3	1,104	1,099	**1,101**		PN-Z-04030-7:1994
	Gas density in normal conditions	kg/m3 N	1,297	1,289	**1,293**		PN-Z-04030-7:1994
	Gas density in standard conditions	kg/m3 U	1,352	1,349	**1,350**		PN-Z-04030-7:1994
Concentration of the substance in the gas in reference conditions O2 ref. 11%	As gaseus*	mg/m^3_{ref}	< 0,003294	< 0,003887	< **0,003591**	0,000760	PN-EN 14385:2005
	As dust*	mg/m^3_{ref}	< 0,000424	< 0,000468	< **0,000446**	0,000095	PN-EN 14385:2005
	As*	mg/m^3_{ref}	< 0,003718	< 0,004355	< **0,004037**	0,000766	PN-EN 14385:2005
	Sb gaseus*	mg/m^3_{ref}	< 0,003294	< 0,003887	< **0,003591**	0,000760	PN-EN 14385:2005
	Sb dust*	mg/m^3_{ref}	< 0,000424	< 0,000468	< **0,000446**	0,000095	PN-EN 14385:2005
	Sb*	mg/m^3_{ref}	< 0,003718	< 0,004355	< **0,004037**	0,000766	PN-EN 14385:2005
	Cd gaseus*	mg/m^3_{ref}	< 0,000659	< 0,000777	< **0,000718**	0,000087	PN-EN 14385:2005
	Cd dust*	mg/m^3_{ref}	< 0,000085	< 0,000094	< **0,000090**	0,000011	PN-EN 14385:2005
	Cd*	mg/m^3_{ref}	< 0,000744	< 0,000871	< **0,000808**	0,000088	PN-EN 14385:2005
	Co gaseus*	mg/m^3_{ref}	< 0,001647	< 0,001944	< **0,001796**	0,000219	PN-EN 14385:2005
	Co dust*	mg/m^3_{ref}	< 0,000212	< 0,000234	< **0,000223**	0,000028	PN-EN 14385:2005
	Co*	mg/m^3_{ref}	< 0,001859	< 0,002178	< **0,002019**	0,000221	PN-EN 14385:2005
	Mn gaseus*	mg/m^3_{ref}	< 0,000329	< 0,000389	< **0,000359**	0,000146	PN-EN 14385:2005
	Mn dust*	mg/m^3_{ref}	< 0,000042	< 0,000047	< **0,000045**	0,000006	PN-EN 14385:2005
	Mn*	mg/m^3_{ref}	< 0,000371	< 0,000436	< **0,000404**	0,000146	PN-EN 14385:2005
	Cu gaseus*	mg/m^3_{ref}	< 0,001647	< 0,001944	< **0,001796**	0,000249	PN-EN 14385:2005
	Cu dust*	mg/m^3_{ref}	0,000538	0,000473	**0,000506**	0,000067	PN-EN 14385:2005
	Cu*	mg/m^3_{ref}	0,002185	0,002417	**0,002301**	0,000258	PN-EN 14385:2005
	Ni gaseus*	mg/m^3_{ref}	< 0,001647	< 0,001944	< **0,001796**	0,000249	PN-EN 14385:2005
	Ni dust*	mg/m^3_{ref}	< 0,000212	< 0,000234	< **0,000223**	0,000031	PN-EN 14385:2005
	Ni*	mg/m^3_{ref}	< 0,001859	< 0,002178	< **0,002019**	0,000251	PN-EN 14385:2005
	Pb gaseus*	mg/m^3_{ref}	< 0,001647	< 0,001944	< **0,001796**	0,000414	PN-EN 14385:2005
	Pb dust*	mg/m^3_{ref}	0,000419	0,000552	**0,000486**	0,000115	PN-EN 14385:2005
	Pb*	mg/m^3_{ref}	0,002066	0,002496	**0,002281**	0,000430	PN-EN 14385:2005

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	V gaseus*	mg/m^3_{ref}	< 0,003294	< 0,003887	< **0,003591**	0,000760	PN-EN 14385:2005
	V dust*	mg/m^3_{ref}	< 0,000424	< 0,000468	< **0,000446**	0,000095	PN-EN 14385:2005
	V*	mg/m^3_{ref}	< 0,003718	< 0,004355	< **0,004037**	0,000766	PN-EN 14385:2005
	Cr gaseus*	mg/m^3_{ref}	< 0,002635	< 0,003110	< **0,002873**	0,000575	PN-EN 14385:2005
	Cr dust*	mg/m^3_{ref}	< 0,000339	< 0,000374	< **0,000357**	0,000072	PN-EN 14385:2005
	Cr*	mg/m^3_{ref}	< 0,002974	< 0,003484	< **0,003229**	0,000579	PN-EN 14385:2005
	Tl gaseus*	mg/m^3_{ref}	< 0,003294	< 0,003887	< **0,003591**	0,001106	PN-EN 14385:2005
	Tl dust*	mg/m^3_{ref}	< 0,000424	< 0,000468	< **0,000446**	0,000138	PN-EN 14385:2005
	Tl*	mg/m^3_{ref}	< 0,003718	< 0,004355	< **0,004037**	0,001115	PN-EN 14385:2005
Gas volume flow	measurement conditions	m^3/h	126747	125625	**126186**	2115	PN-Z-04030-7:1994
	normal conditions	m^3_n/h	107846	107125	**107485**	1874	
	standard conditions	m^3_u/h	97014	95338	**96176**	4109	
	reference conditions O2 ref. 11%	m^3_{ref}/h	139701	131566	**135634**	6305	
Emission limits	Cd*+Tl*	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*+Tl*	mg/m^3_{ref}	0,005				
	Sb*+As*+Cr*+Co*+Mn*+ Cu*+Ni*+Pb*+V*	mg/m^3_{ref}	0,024				

*- 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 m^3N. 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/03/07/23, P/04/07/23, P/05/07/23, P/06/07/23, P/07/07/23, P/08/07/23, P/09/07/23,

Date of delivery to the laboratory: 04.07.2023

Date of analysis: 04.07.2023 - 14.07.2023

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/07/07/23	Cd+Tl	0,005	p.o.	+
P/07/07/23	Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V	0,05	p.o.	+

p.o. – below the limit of quantification.

Test Report No PW/53/07/23

1) Plant or unit name[1)]: **Stationary emission source No. 001 (waste incineration boiler stack)**
2) Flue gases cleaning unit[1)]: **Evaporative cooler, hydrated lime and active carbon reactor, bag filters unit (2x4)**
3) Emission source load during measurements[1)]: **Boiler load ~67,8 MW,**
4) Fuel type or material mass flow in process[1)]: **Waste ~18,8 t/h**
5) Location of sampling and measurements: **in duct, after flue gases cleaning unit**

Measurement reference number				27-06-01				
Date of measurement				27.06.2023				
Measurement time range				15:39-16:40	16:48-17:49			
Scope of test			Unit	Results		**Average**	Uncertainty +/-	Method
Meteorological conditions	Atmospheric pressure		hPa	989,3	989,3	**989,3**		PN-Z-04030-7:1994
	Air temperature		oC	24	23	**24**		
Measurement plane	Diameter		m	2,10				
	Area		m2	3,4619				
Stack gas parameters	Temperature		oC	39,1	38,7	**38,9**		
	Static pressure		Pa	-39,9	-50,3	**-45,1**		
	Dynamic pressure		Pa	88,2	89,9	**89,1**		
	Gas moistness grade X		kg/kg	0,075	0,071	**0,073**		PN-EN 14790:2017
	Average velocity		m/s	10,0	10,1	**10,0**	0,2	PN-Z-04030-7:1994
	Chemical composition	O2	%	7,00	7,20	**7,10**	0,18	PN-EN 14789:2017
		CO2	%	12,10	11,80	**11,95**	0,46	PN-ISO 10396:2001
	Wet gas density during testing		kg/m3	1,100	1,103	**1,101**		PN-Z-04030-7:1994
	Gas density in normal conditions		kg/m3 N	1,288	1,290	**1,289**		PN-Z-04030-7:1994
	Gas density in standard conditions		kg/m3 U	1,349	1,347	**1,348**		PN-Z-04030-7:1994
Concentration of the substance in the gas in reference conditions O2 ref. 11%	Hg gaseus*		mg/m^3_{ref}	0,000496	0,000262	**0,000379**	0,000100	PN-EN 13211+AC:2006
	Hg dust*		mg/m^3_{ref}	0,000039	0,000019	**0,000029**	0,000008	PN-EN 13211+AC:2006
	Hg*		mg/m^3_{ref}	0,000535	0,000281	**0,000408**	0,000100	PN-EN 13211+AC:2006
Gas volume flow	measurement conditions		m^3/h	124628	125750	**125189**	2098	PN-Z-04030-7:1994
	normal conditions		m^3_n/h	106424	107509	**106966**	1865	
	standard conditions		m^3_u/h	94570	96135	**95352**	4073	
	reference conditions O2 ref. 11%		m^3_{ref}/h	132398	132666	**132532**	6174	
Emission limits	Hg*		mg/m^3_{ref}	0,05				
Concentration of the substance in the gas in reference conditions O2 ref. 11%	Hg*		mg/m^3_{ref}	**0,000408**				

*- 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 m^3N. 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.

Test Report No PW/53/07/23

Registry of samples delivered to the laboratory: P/10/07/23, P/11/07/23, P/12/07/23, P/13/07/23, P/14/07/23

Date of delivery to the laboratory: 04.07.2023

Date of analysis: 04.07.2023 - 14.07.2023

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/12/07/23	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:	114,4 / 109,8 %
Sampling time:	60,8 / 60,9 min
Sampled volume:	0,157/ 0,143 m^3
Filter parameters:	FT-50: Ø 0,50 mm, efficiency: 99,990 %, quartz (QMA)
Impingers:	impingers set No. 1 (absorption efficiency 98,5 %)
Absorption solution:	HNO_3/H_2O_2

Hg (PN-EN 13211 + AC:2006)

Sampling plane:	2 measurement axis
Sampling:	isokinetic [x]
	nonisokinetic [ ]
Isokinetic ratio:	106,3 % / 113,2 %
Sampling time:	60,9 min / 60,8 min
Sampled volume:	0,131 m^3 / 0,169 m^3
Impingers:	impingers set No. 3 (absorption efficiency 97,2 %)
Absorption solution:	No. I (manganese (VII) potassium / sulfuric acid (VI))

H_2O (PN-EN 14790:2017)

Sampling plane:	2 measurement axis
Sampling equipment:	titanium sampling line
	heated probe 2,0 m
	sampling pump: PT-01
Cartridge No:	H_2O content set No 1
Sampling No:	1 - 4
Sampling time:	~61 min
Sampling speed:	~3,0 l/min
H_2O maas:	9,5 – 12,0 g
absrobtion efficiency:	98,7 %

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O_2 paramagnetic (PN-EN 14789:2017):

Range :	0 – 5 %	[ ]	
	0 – 10 %	[X]	
	0 – 25 %	[ ]	
Calibration gas:	O_2 – 9,012%	[X]	R/07/W
	O_2 – 20,018%	[ ]	R/12/W
	N_2 – 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		%	0,09	± 0,1 [%]*	+
„0" after adjustment, with sampling train	before measurement	%	0,08	± 0,2 [%]**	+
	after measurement	%	0,10	± 0,2 [%]**	+
„Span" after adjustment with sampling train /standard 9,012 % **R/07/W** analyser range 10%/	before measurement	%	9,05	± 0,2 [%]**	+
	after measurement	%	9,00	± 0,2 [%]**	+
	before measurement time T90	%	8,2	> 8,12 [%]	-----
		sec.	30	< 200 sec.	+

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

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7. MEASUREMENT DEVICES

Name of measuring device		X1- Apis
Type of measuring device		Isokinetic sampler S/N 0185
Certificate	Calibration No	94/54/LA/P/2023 G-73/23-46/23 65/1/T/23
Issued by		ZAP BESTWINKA LABOSERWIS SP. Z O.O. KATOWICE PLUM SP. Z O.O. KLEOSIN
Date of issue the certificate of calibration		27.02.2023 r. 23.02.2023 r. 02.03.2023 r.
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	G-354/22-208/22 1189/436/LA/T/2022 786/281/LA/P/2022
Issued by		ZAP BESTWINKA PLUM SP. Z O.O. KLEOSIN
Date of issue the certificate of calibration		30.08.2022 06.09.2022 09.09.2022
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		-

8. CERTIFICATE OF ACCREDITATION

POLSKIE CENTRUM AKREDYTACJI
POLISH CENTRE FOR ACCREDITATION

Sygnatariusz 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 Chorzów

spełnia wymagania normy PN-EN ISO/IEC 17025:2018-02
meets requirements of the PN-EN ISO/IEC 17025:2018-02 standard

Akredytowana działalność jest określona w Zakresie Akredytacji Nr AB 994
Accredited activity is defined in the Scope of Accreditation No AB 994

Akredytacja 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 994

Akredytacji udzielono dnia 30.01.2009 r.
Accreditation was granted on 30.01.2009

POLSKIE CENTRUM AKREDYTACJI

DYREKTOR
POLSKIEGO CENTRUM AKREDYTACJI
LUCYNA OLBORSKA

Warszawa, dnia 9 grudnia 2019 roku

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9. DIOXINS AND FURANS ANALYSIS RESULTS

Attachment no. 1 to the Certificate of Analysis for work order PR2375399

Sample: P/01/07/23

Measurement results PCDD/Fs:

Sample:	P/01/07/23		Final extract [µl]:		60
			Injection volume [µl]:		4
			Acquisition date [d.m.y h:m]:		15.7.23 20:42
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	< 0.0052	0.0052	0.01	1	0.0052
1,2,3,7,8-PeCDD	< 0.0059	0.0059	0.012	0.5	0.003
1,2,3,4,7,8-HxCDD	< 0.0086	0.0086	0.017	0.1	0.00086
1,2,3,6,7,8-HxCDD	< 0.0086	0.0086	0.017	0.1	0.00086
1,2,3,7,8,9-HxCDD	< 0.0086	0.0086	0.017	0.1	0.00086
1,2,3,4,6,7,8-HpCDD	< 0.0093	0.0093	0.019	0.01	0.000093
OCDD	< 0.016	0.016	0.032	0.001	0.000016
2,3,7,8-TCDF	< 0.006	0.006	0.012	0.1	0.0006
1,2,3,7,8-PeCDF	< 0.0058	0.0058	0.012	0.05	0.00029
2,3,4,7,8-PeCDF	< 0.0058	0.0058	0.012	0.5	0.0029
1,2,3,4,7,8-HxCDF	< 0.0087	0.0087	0.017	0.1	0.00087
1,2,3,6,7,8-HxCDF	< 0.0087	0.0087	0.017	0.1	0.00087
1,2,3,7,8,9-HxCDF	< 0.0087	0.0087	0.017	0.1	0.00087
2,3,4,6,7,8-HxCDF	< 0.0087	0.0087	0.017	0.1	0.00087
1,2,3,4,6,7,8-HpCDF	< 0.0098	0.0098	0.02	0.01	0.000098
1,2,3,4,7,8,9-HpCDF	< 0.0098	0.0098	0.02	0.01	0.000098
OCDF	< 0.015	0.015	0.031	0.001	0.000015
I-TEQ from quantified 2,3,7,8-PCDD/Fs -"Lowerbound"					0
I-TEQ from 2,3,7,8-PCDD/Fs -„Mediumbound"					0.0092
Maximum possible I-TEQ -"Upperbound"					0.018

PCDDs	Result [ng/sample]	PCDFs	Result [ng/sample]
Tetra-CDDs	< 0.11	Tetra-CDFs	< 0.23
Penta-CDDs	< 0.083	Penta-CDFs	< 0.16
Hexa-CDDs	< 0.086	Hexa-CDFs	< 0.14
Hepta-CDDs	< 0.019	Hepta-CDFs	< 0.039
OCDD	< 0.016	OCDF	< 0.015

^{1}I-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 bellow 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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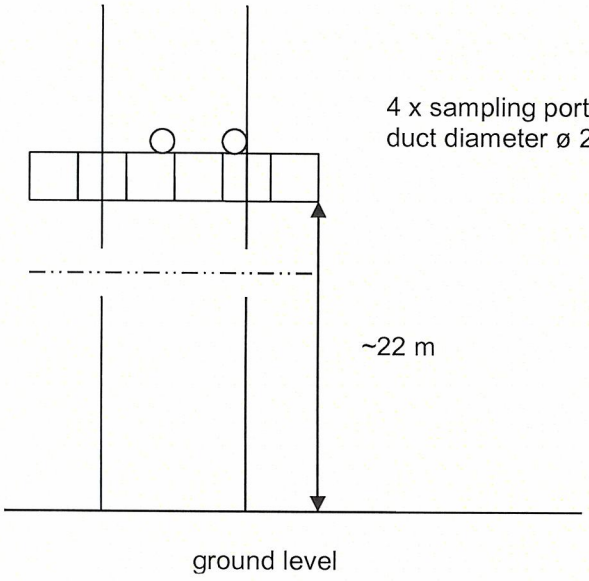
Attachment no. 1 to the Certificate of Analysis for work order PR2375399

Sample: P/01/07/23

Standards recovery:

Sample:	P/01/07/23			
		Final extract [µl]:	60	
		Injection volume [µl]:	4	
		Acquisition date [d.m.y h:m]:	15.7.23 20:42	
Extraction standard	Recovery	Acceptable range [%]		Accept. rec. with respect to
PCDDs	[%]	Basic	Extended	basic range / extended range
13C12 - 2,3,7,8-TCDD	69	50 - 130	30 - 150	YES / -
13C12 - 1,2,3,7,8-PeCDD	95	50 - 130	30 - 150	YES / -
13C12 - 1,2,3,4,7,8-HxCDD	100	50 - 130	30 - 150	YES / -
13C12 - 1,2,3,6,7,8-HxCDD	97	50 - 130	30 - 150	YES / -
13C12 - 1,2,3,4,6,7,8-HpCDD	78	40 - 130	20 - 150	YES / -
13C12 - OCDD	63	40 - 130	20 - 150	YES / -
PCDFs				
13C12 - 2,3,7,8-TCDF	59	50 - 130	30 - 150	YES / -
13C12 - 2,3,4,7,8-PeCDF	61	50 - 130	30 - 150	YES / -
13C12 -1,2,3,4,7,8-HxCDF	110	50 - 130	30 - 150	YES / -
13C12 -1,2,3,6,7,8-HxCDF	110	50 - 130	30 - 150	YES / -
13C12 -2,3,4,6,7,8-HxCDF	64	50 - 130	30 - 150	YES / -
13C12 -1,2,3,4,6,7,8-HpCDF	110	40 - 130	20 - 150	YES / -
13C12 - OCDF	53	40 - 130	20 - 150	YES / -
Sampling standard	Recovery	Acceptable range		Rec. in range?
	[%]	[%]		
13C12-1,2,3,7,8-PeCDF	95	> 50		YES
13C12-1,2,3,7,8,9-HxCDF	93	> 50		YES
13C12-1,2,3,4,7,8,9-HpCDF	54	> 50		YES

10. MEASUREMENT PLANE SCHEME



Approved by

DYREKTOR

Name and Signature

inż. Dariusz Guja

END OF REPORT