



**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 SO<sub>2</sub>, NO<sub>x</sub>, CO
- concentration measurements of CO<sub>2</sub>, O<sub>2</sub>
- 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, December 23<sup>rd</sup> 2025  
Our ref. No.: PW/91/12/25

### **Report No PW/91/12/25**

**on concentration measurements of heavy metals (As; Cd; Cr; Co; Cu; Mn; Ni; Pb; Sb; Tl; V) 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**

Paneriškių g. 25,

LT-02300 Vilnius

Developed by:

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**Test Report No PW/91/12/25****4. MEASUREMENT RESULTS SUMMARY**

Below are presented measurement results summary, full measurement results are presented in chapter No 6, at page 7 and 8

Stationary emission source No. 001 (waste incineration boiler stack)	Concentration of the substance in the gas in the reference conditions O2 ref. 11%	Cd*+Tl*	mg/m3 ref.	<b>0,004</b>
		Sb*+As*+Cr*+Co*+Mn*+Cu*+Ni*+Pb*+V*	mg/m3 ref.	<b>0,084</b>
	Emission limits	Cd+Tl	mg/m3 ref.	<b>0,02</b>
		Sb+As+Cr+Co+Mn+Cu+Ni+Pb+V	mg/m3 ref.	<b>0,3</b>
	Transgresssion	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" and/or PN-EN 13284-1:2018 "Stationary source emissions – Determination of low range mass concentration of dust – Part 1: Manual gravimetric method" 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: > 5 Pa

**Measurement O<sub>2</sub> content**

The concentration of O<sub>2</sub> was determined using gas analyzer HORIBA PG-350E-EU equipped with testing probes 1500 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<sub>2</sub> - Reference method - Paramagnetism". Measurement is accredited.

Accreditation range: O<sub>2</sub> content: 1,5-21%

**Measurement CO<sub>2</sub> content**

The concentration of CO<sub>2</sub> was determined using gas analyzer HORIBA PG-350E-EU equipped with testing probes 1500 mm long. The measurements were taken according to the procedure described in measurement unit as well as ISO Standard ISO 12039:2019 "Stationary source emissions — Determination of the mass concentration of carbon monoxide, carbon dioxide and oxygen in flue gas — Performance characteristics of automated measuring systems".

Accreditation range: CO<sub>2</sub> 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 Czeladź Sp. z o.o. , accredited in this regard by the Polish Centre of Accreditation No. AB 719

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**6. MEASUREMENT RESULTS**

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- 1) Plant or unit name<sup>1)</sup>: **Stationary emission source No. 001 (waste incineration boiler stack)**
- 2) Flue gases cleaning unit<sup>1)</sup>: **Evaporative cooler, hydrated lime and active carbon reactor, bag filters unit (2x4)**
- 3) Emission source load during measurements<sup>1)</sup>: **Boiler load ~70,0 MW**
- 4) Fuel type or material mass flow in process<sup>1)</sup>: **Waste ~23,5 t/h**
- 5) Location of sampling and measurements: **in duct, after flue gases cleaning unit**

Measurement reference number			18-11-01			X	X	X	
Date of measurement			18.11.2025						
Measurement time range			10:06-11:07	11:13-12:14	12:19-13:20				
Scope of test		Unit	Results			Average	Uncertainty +/-	Method	
Meteorological conditions	Atmospheric pressure	hPa	987,3	988,2	989,0	<b>988,2</b>	0,9	PN-Z-04030-7:1994	
	Air temperature	oC	3	4	4	<b>4</b>			
Measurement plane	Diameter	m	2,10						
	Area	m2	3,4619						
Stack gas parameters	Temperature	oC	31,0	31,4	31,8	<b>31,4</b>	0,6		
	Static pressure	Pa	-83,8	-90,2	-83,1	<b>-85,7</b>	-1,2		
	Dynamic pressure	Pa	109,0	105,6	103,7	<b>106,1</b>	1,2		
	Gas moistness grade X	kg/kg	0,036	0,036	0,037	<b>0,036</b>	0,0009		PN-EN 14790:2017
	Average velocity	m/s	10,5	10,3	10,2	<b>10,3</b>	0,3		PN-Z-04030-7:1994
	Chemical composition	O2	%	7,40	7,40	7,30	<b>7,37</b>		0,41
		CO2	%	11,70	11,80	12,00	<b>11,83</b>	0,48	ISO 12039:2019
	Wet gas density during testing	kg/m3	1,151	1,151	1,151	<b>1,151</b>		PN-Z-04030-7:1994	
	Gas density in normal conditions	kg/m3 N	1,316	1,317	1,317	<b>1,317</b>		PN-Z-04030-7:1994	
	Gas density in standard conditions	kg/m3 U	1,347	1,348	1,349	<b>1,348</b>		PN-Z-04030-7:1994	
Concentration of the substance in the gas in reference conditions O2 ref. 11%	As gaseus*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,004043	< 0,002682	< 0,002823	< <b>0,003183</b>	0,000689	PN-EN 14385:2005	
	As dust*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,000485	< 0,000491	< 0,000490	< <b>0,000489</b>	0,000105	PN-EN 14385:2005	
	As*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,004528	< 0,003173	< 0,003313	< <b>0,003671</b>	0,000697	PN-EN 14385:2005	
	Sb gaseus*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,004043	< 0,002682	< 0,002823	< <b>0,003183</b>	0,000689	PN-EN 14385:2005	
	Sb dust*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,000485	< 0,000491	< 0,000490	< <b>0,000489</b>	0,000105	PN-EN 14385:2005	
	Sb*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,004528	< 0,003173	< 0,003313	< <b>0,003671</b>	0,000697	PN-EN 14385:2005	
	Cd gaseus*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,000809	< 0,000536	< 0,000565	< <b>0,000637</b>	0,000083	PN-EN 14385:2005	
	Cd dust*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,000097	< 0,000098	< 0,000098	< <b>0,000098</b>	0,000012	PN-EN 14385:2005	
	Cd*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,000906	< 0,000634	< 0,000663	< <b>0,000734</b>	0,000084	PN-EN 14385:2005	
	Co gaseus*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,002022	< 0,001341	< 0,001412	< <b>0,001592</b>	0,000232	PN-EN 14385:2005	
	Co dust*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,000242	< 0,000245	< 0,000245	< <b>0,000244</b>	0,000035	PN-EN 14385:2005	
	Co*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,002264	< 0,001586	< 0,001657	< <b>0,001836</b>	0,000235	PN-EN 14385:2005	
	Mn gaseus*	mg/m <sup>3</sup> <sub>ref</sub>	0,078844	0,050415	0,057026	<b>0,062095</b>	0,008270	PN-EN 14385:2005	
	Mn dust*	mg/m <sup>3</sup> <sub>ref</sub>	0,000053	< 0,000049	0,000059	<b>0,000054</b>	0,000007	PN-EN 14385:2005	
	Mn*	mg/m <sup>3</sup> <sub>ref</sub>	0,078897	0,050464	0,057085	<b>0,062149</b>	0,008270	PN-EN 14385:2005	
	Cu gaseus*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,002022	< 0,001341	< 0,001412	< <b>0,001592</b>	0,000232	PN-EN 14385:2005	
	Cu dust*	mg/m <sup>3</sup> <sub>ref</sub>	0,000407	0,000422	0,000378	<b>0,000402</b>	0,000056	PN-EN 14385:2005	
	Cu*	mg/m <sup>3</sup> <sub>ref</sub>	0,002429	0,001763	0,001790	<b>0,001994</b>	0,000239	PN-EN 14385:2005	
	Ni gaseus*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,002022	< 0,001341	< 0,001412	< <b>0,001592</b>	0,000232	PN-EN 14385:2005	
	Ni dust*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,000242	< 0,000245	< 0,000245	< <b>0,000244</b>	0,000035	PN-EN 14385:2005	
	Ni*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,002264	< 0,001586	< 0,001657	< <b>0,001836</b>	0,000235	PN-EN 14385:2005	
	Pb gaseus*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,002022	< 0,001341	< 0,001412	< <b>0,001592</b>	0,000374	PN-EN 14385:2005	
	Pb dust*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,000242	< 0,000245	< 0,000245	< <b>0,000244</b>	0,000057	PN-EN 14385:2005	
	Pb*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,002264	< 0,001586	< 0,001657	< <b>0,001836</b>	0,000378	PN-EN 14385:2005	

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	V gaseus*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,004043	< 0,002682	< 0,002823	< <b>0,003183</b>	0,000689	PN-EN 14385:2005
	V dust*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,000485	< 0,000491	< 0,000490	< <b>0,000489</b>	0,000105	PN-EN 14385:2005
	V*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,004528	< 0,003173	< 0,003313	< <b>0,003671</b>	0,000697	PN-EN 14385:2005
	Cr gaseus*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,003235	< 0,002145	< 0,002258	< <b>0,002546</b>	0,000522	PN-EN 14385:2005
	Cr dust*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,000338	< 0,000393	< 0,000392	< <b>0,000391</b>	0,000080	PN-EN 14385:2005
	Cr*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,003623	< 0,002538	< 0,002650	< <b>0,002937</b>	0,000528	PN-EN 14385:2005
	Tl gaseus*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,004043	< 0,002682	< 0,002823	< <b>0,003183</b>	0,000991	PN-EN 14385:2005
	Tl dust*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,000485	< 0,000491	< 0,000490	< <b>0,000489</b>	0,000152	PN-EN 14385:2005
	Tl*	mg/m <sup>3</sup> <sub>ref</sub>	< 0,004528	< 0,003173	< 0,003313	< <b>0,003671</b>	0,001003	PN-EN 14385:2005
Gas volume flow	measurement conditions	m <sup>3</sup> /h	130361	128367	127121	<b>128617</b>	3819	PN-Z-04030-7:1994
	normal conditions	m <sup>3</sup> <sub>n</sub> /h	113997	112203	111068	<b>112423</b>	3338	
	standard conditions	m <sup>3</sup> <sub>u</sub> /h	107496	105818	104543	<b>105952</b>	3146	
	reference conditions O2 ref. 11%	m <sup>3</sup> <sub>ref</sub> /h	146194	143912	143224	<b>144443</b>	7253	
Emission limits	Cd*+Tl*	mg/m <sup>3</sup> <sub>ref</sub>	0,02					
	Sb*+As*+Cr*+Co*+Mn*+Cu*+Ni*+Pb*+V*	mg/m <sup>3</sup> <sub>ref</sub>	0,3					
Concentration of the substance in the gas in reference conditions O2 ref. 11%	Cd*+Tl*	mg/m <sup>3</sup> <sub>ref</sub>	0,004					
	Sb*+As*+Cr*+Co*+Mn*+Cu*+Ni*+Pb*+V*	mg/m <sup>3</sup> <sub>ref</sub>	0,084					

\* - the results obtained from the subcontractor ( accredited )

<sup>1)</sup>-information obtained from the client

The notation "< or > y" where y=the value of the mesurand corresponding to the lower/upper limit of the measurement range of the method) means - a test result/result below or above the measurement range of the method. The lower/upper limit of the method's measurement range is assumed for the calculation, respectively. The expanded uncertainty shown is the measurement uncertainty for the value of the lower/upper limit of the measurement range of the method. In the case of converted test results/results obtained from a third-party provider of laboratory services, the measurement range limit of that provider's method is assumed for the calculation.

The measurement range limit for: Cr<0,80 ug/sample / As<1,00 ug/sample / Cd<0,20 ug/sample / Co<0,50 ug/sample / Mn<0,10 ug/sample /Cu<0,50 ug/sample / Ni<0,50 ug/sample / Pb<0,50 ug/sample / Tl<1,00 ug/sample / V<0,10 ug/sample / Sb<1,00 ug/sample

**Notes:**

Normal conditions designate the temperature of 273 K and pressure of 101,3kPa, defining normal cubic meter m<sup>3</sup>N. 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, m<sup>3</sup>U

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/359/11/25 - P/368/11/25

Date of delivery to the laboratory: 21.11.2025

Date of analysis: 21.11.2025 - 03.12.2025

**Field blanks:**

ID/ number of sample	Type of substance	The criterion of the blank [mg/m <sup>3</sup> ] 11%O <sub>2</sub>	The value of the blank [mg/m <sup>3</sup> ] 11% O <sub>2</sub>	Result [+/-]
P/365/11/25	Cd+Tl	0,002	p.o.	+
P/365/11/25	Sb+As+Pb+Cr+Co+Cu+Mn+Ni+V	0,03	p.o.	+

p.o. – below the limit of quantification.

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

Sampling plane: 2 measurement axis  
Sampling: isokinetic [x]  
nonisokinetic [ ]  
Isokinetic ratio: 96,6 % / 97,0 % / 97,5 %  
Sampling time: 60,1 min / 60,1 min / 60,1 min  
Sampled volume: 0,146 / 0,223 / 0,208 m<sup>3</sup>  
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<sub>3</sub>/H<sub>2</sub>O<sub>2</sub>

**H<sub>2</sub>O (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<sub>2</sub>O content set No 1  
Sampling No: 1  
Sampling time: ~60 min  
Sampled volume: 0,146 / 0,223 / 0,208 m<sup>3</sup>  
H<sub>2</sub>O maas: 5,7 g / 8,8 g / 8,4 g  
absrobtion efficiency: 99,0 %



**Test Report No PW/91/12/25****7. MEASUREMENT DEVICES**

Name of measuring device		X1- Apis
Type of measuring device		Isokinetic sampler S/N 0142
Certificate	Calibration No	G-355/22-208/22 239/1/T/22 818/302/LA/P/2022
Issued by		ZAP BESTWINKA LABOSERWIS SP. Z O.O. KATOWICE PLUM SP. Z O.O. KLEOSIN
Date of issue the certificate of calibration		29.08.2022 R. 14.09.2022 R. 22.09.2022 R.
Expiration date of the certificate of calibration		-

Name of measuring device		HORIBA
Type of measuring device		PG-350E-EU
Certificate	Calibration No	106/1/AW/25
Issued by		Laboserwis Sp. z o.o. Katowice
Date of issue the certificate of calibration		10.04.2025
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		-

**Test Report No PW/91/12/25****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**

Powierdza 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 9 grudnia 2019 roku

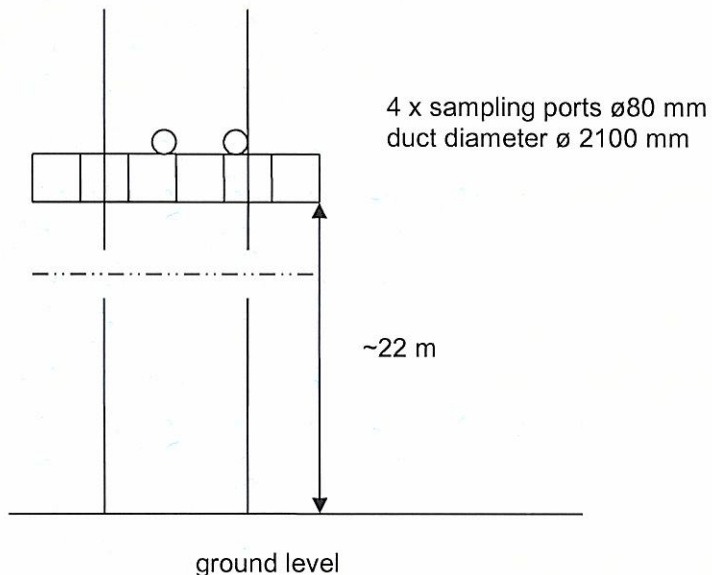
Scope of accreditation issued 08.01.2025, No 24

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**9. MEASUREMENT PLANE SCHEME**



Approved by



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Name and Signature

**END OF REPORT**

