2499

EMISSIONS MONITORING SURVEY

Prepared for:

Selibon N.V.
ACL Lagun Waste Disposal Site
Kaminda Lagun
Bonaire
C.N.

Permit Number	**: …**
Variation Number	**: …**
Installation	**: Incinerator Exhaust**
Visit Details	**: Emissions Survey – February 2024**
Job Number	**: P5632**
Report Number	**: R001**
Report Issue Date	**: 20th December 2024**
Survey Dates	**: 12th – 16th February 2024**

Prepared by:

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Report Issue:		**FINAL**	
Report Prepared by:		**Report Reviewed & Approved by** **MCERTS Level Two** **Technical Endorsements TE1, TE2, TE3 & TE4**	
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		Signature:	
Date:	06/11/2024	***Date:***	20/12/2024

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MCERTS requirements mean that comparison of results with emissions limit values is not permitted within this report.

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PART 1 - EXECUTIVE SUMMARY

1 Monitoring Objectives

Environmental Compliance Ltd (ECL) was commissioned by **Selibon N.V.** to undertake an emission monitoring survey at their **ACL Lagun site, Bonaire**. This report presents the findings of the study.

The monitoring at this installation was carried out in accordance with our quotation reference **DHFB/P5632/Q002,** for compliance check monitoring of emissions to air. The substances requested for monitoring at each emissions point are listed below:

Substances to be monitored	Emission Point Identification
	Incinerator Exhaust
Velocity / Flowrate	● U
Particulates	● U
Oxides of Nitrogen (as NO_2)	● U
Sulphur Dioxide	● U
Carbon Monoxide	● U
Carbon Dioxide	● U
Oxygen	● U
Hydrogen Chloride	● U
Hydrogen Fluoride	● U
Dioxins / Furans (PCDDs & PCDFs)	● U
Heavy Metals (Cd, Tl, Sb, As, Pb, Cr, Co, Cu, Mn, Ni & V)	● U
Mercury	● U

● Denotes the substances to be monitored.

U **Denotes UKAS accreditation is held for monitoring that substance, but does not mean that it has been claimed which will depend on whether the testing could be completed in accordance with the Standard Reference Method.**

Special Requirements: *"During normal operation – with various waste types."*

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1.1 Monitoring Results

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission **NOTE UNITS**	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
Incinerator Exhaust	Volumetric Flowrate	...	1.15933	m^3/sec	...	5	Stack	13/02/2024	09:30 – 09:54	BS EN 16911-1:2013 & MID	UKAS / MCERTS		Light Medical Waste
	Volumetric Flowrate	...	0.10289	m^3/sec	...	23	Dry & 3% O_2			BS EN 16911-1:2013 & MID	UKAS / MCERTS		
	Particulates $	3.6	778.40	mg/m^3	343.88 **g/hr**	5	Dry & 3% O_2	13/02/2024	10:15 – 11:15	BS EN 13284-1:2017 & MID	NU	✓	
	Hydrogen Chloride $	30	648.46	mg/m^3	286.48 **g/hr**	14	Dry & 3% O_2			BS EN 1911:2010	NU	✓	
	Hydrogen Fluoride $	10	3.64	mg/m^3	1.61 **g/hr**	14	Dry & 3% O_2			PD CEN/TS 17340:2020	NU	✓	
	Sulphur Dioxide $	20.7	54.85	mg/m^3	19.44 **g/hr**	14	Dry & 3% O_2	13/02/2024	12:25 – 13:25	BS EN 14791:2017	NU	✓	
	Heavy Metals* $	0.15	0.93	mg/m^3	0.43 **g/hr**	6	Dry & 3% O_2	13/02/2024	13:55 – 15:55	BS EN 14385:2004 & MID	NU	✓	
	Cadmium / Thallium $	0.015	0.0052	mg/m^3	0.0025 **g/hr**	5	Dry & 3% O_2			BS EN 14385:2004 & MID	NU	✓	
	Mercury $	0.02	0.00083	mg/m^3	0.00039 **g/hr**	7	Dry & 3% O_2			BS EN 13211:2001	NU	✓	
	Oxides of Nitrogen (as NO_2)	241.2	281.36	mg/m^3	0.1042 **Kg/hr**	2	Dry & 3% O_2	13/02/2024	09:45 – 15:44	BS EN 14792: 2017	UKAS / MCERTS		
	Carbon Monoxide	3.6	8084.20	mg/m^3	2.9944 **Kg/hr**	2	Dry & 3% O_2			BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Dioxide	214.1	249.37	g/m^3	92.37 **Kg/hr**	4	Dry & 3% O_2			PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	2.80	%	...	4	& Dry Gas			PD CEN/TS 17405:2020	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	17.03	%	...	4	& Dry Gas			BS EN 14789: 2017	UKAS / MCERTS		

(* Sum of Sb, As, Pb, Cr, Co, Cu, Mn, Ni & V)

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Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission **(Kg/hr)**	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
Incinerator Exhaust	Oxides of Nitrogen (as NO_2)	241.2	243.87	mg/m^3	0.0903	2	Dry & 3% O_2	13/02/2024	09:45 – 10:14	BS EN 14792: 2017	UKAS / MCERTS		Light Medical Waste
	Oxides of Nitrogen (as NO_2)	241.2	249.17	mg/m^3	0.0923	2	Dry & 3% O_2		10:15 – 10:44	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	426.76	mg/m^3	0.1581	2	Dry & 3% O_2		10:45 – 11:14	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	287.67	mg/m^3	0.1066	2	Dry & 3% O_2		11:15 – 11:44	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	111.16	mg/m^3	0.0412	2	Dry & 3% O_2		11:45 – 12:14	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	238.78	mg/m^3	0.0884	2	Dry & 3% O_2		12:15 – 12:44	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	175.14	mg/m^3	0.0649	2	Dry & 3% O_2		12:45 – 13:14	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	318.26	mg/m^3	0.1179	2	Dry & 3% O_2		13:15 – 13:44	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	522.31	mg/m^3	0.1935	2	Dry & 3% O_2		13:45 – 14:14	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	184.70	mg/m^3	0.0684	2	Dry & 3% O_2		14:15 – 14:44	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	349.72	mg/m^3	0.1295	2	Dry & 3% O_2		14:45 – 15:14	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	323.22	mg/m^3	0.1197	2	Dry & 3% O_2		15:15 – 15:44	BS EN 14792: 2017	UKAS / MCERTS		

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Incinerator Exhaust	Carbon Monoxide	1.6	11732.38	mg/m^3	4.3457	2	Dry & 3% O_2	13/02/2024	09:45 – 10:14	BS EN 15058: 2017	UKAS / MCERTS	✓	Light Medical Waste
	Carbon Monoxide	1.6	9992.12	mg/m^3	3.7011	2	Dry & 3% O_2		10:15 – 10:44	BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Monoxide	1.6	5219.24	mg/m^3	1.9332	2	Dry & 3% O_2		10:45 – 11:14	BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Monoxide	1.6	8676.88	mg/m^3	3.2140	2	Dry & 3% O_2		11:15 – 11:44	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	6174.06	mg/m^3	2.2869	2	Dry & 3% O_2		11:45 – 12:14	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	9186.91	mg/m^3	3.4029	2	Dry & 3% O_2		12:15 – 12:44	BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Monoxide	1.6	6525.19	mg/m^3	2.4170	2	Dry & 3% O_2		12:45 – 13:14	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	9316.88	mg/m^3	3.4510	2	Dry & 3% O_2		13:15 – 13:44	BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Monoxide	1.6	5254.88	mg/m^3	1.9464	2	Dry & 3% O_2		13:45 – 14:14	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	7743.34	mg/m^3	2.8682	2	Dry & 3% O_2		14:15 – 14:44	BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Monoxide	1.6	2277.23	mg/m^3	0.8435	2	Dry & 3% O_2		14:45 – 15:14	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	6611.16	mg/m^3	2.4488	2	Dry & 3% O_2		15:15 – 15:44	BS EN 15058: 2017	UKAS / MCERTS		

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Incinerator Exhaust	Carbon Dioxide	214.1	333.98	g/m³	123.71	4	Dry & 3% O_2	13/02/2024	09:45 – 10:14	PD CEN/TS 17405:2020	UKAS / MCERTS		Light Medical Waste
	Carbon Dioxide	214.1	357.13	g/m³	132.28	4	Dry & 3% O_2		10:15 – 10:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	219.98	g/m³	81.48	4	Dry & 3% O_2		10:45 – 11:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	45.42	g/m³	16.82	4	Dry & 3% O_2		11:15 – 11:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	19.59	g/m³	7.26	4	Dry & 3% O_2		11:45 – 12:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	257.39	g/m³	95.34	4	Dry & 3% O_2		12:15 – 12:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	31.17	g/m³	11.55	4	Dry & 3% O_2		12:45 – 13:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	545.94	g/m³	202.22	4	Dry & 3% O_2		13:15 – 13:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	163.87	g/m³	60.70	4	Dry & 3% O_2		13:45 – 14:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	694.67	g/m³	257.31	4	Dry & 3% O_2		14:15 – 14:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	236.01	g/m³	87.42	4	Dry & 3% O_2		14:45 – 15:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	86.39	g/m³	32.00	4	Dry & 3% O_2		15:15 – 15:44	PD CEN/TS 17405:2020	UKAS / MCERTS		

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Incinerator Exhaust	Carbon Dioxide	...	3.75	%	4	& Dry Gas	13/02/2024	09:45 – 10:14	PD CEN/TS 17405:2020	UKAS / MCERTS		Light Medical Waste
	Carbon Dioxide	...	4.01	%	4	& Dry Gas		10:15 – 10:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	2.47	%	4	& Dry Gas		10:45 – 11:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	0.51	%	4	& Dry Gas		11:15 – 11:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	0.22	%	4	& Dry Gas		11:45 – 12:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	2.89	%	4	& Dry Gas		12:15 – 12:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	0.35	%	4	& Dry Gas		12:45 – 13:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	6.13	%	4	& Dry Gas		13:15 – 13:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	1.84	%	4	& Dry Gas		13:45 – 14:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	7.80	%	4	& Dry Gas		14:15 – 14:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	2.65	%	4	& Dry Gas		14:45 – 15:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	0.97	%	4	& Dry Gas		15:15 – 15:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	15.72	%	4	& Dry Gas		09:45 – 10:14	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	15.26	%	4	& Dry Gas		10:15 – 10:44	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	17.71	%	4	& Dry Gas		10:45 – 11:14	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	19.99	%	4	& Dry Gas		11:15 – 11:44	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	20.35	%	4	& Dry Gas		11:45 – 12:14	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	16.87	%	4	& Dry Gas		12:15 – 12:44	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	20.16	%	4	& Dry Gas		12:45 – 13:14	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	12.59	%	4	& Dry Gas		13:15 – 13:44	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	18.28	%	4	& Dry Gas		13:45 – 14:14	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	10.64	%	4	& Dry Gas		14:15 – 14:44	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	17.38	%	4	& Dry Gas		14:45 – 15:14	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	19.42	%	4	& Dry Gas		15:15 – 15:44	BS EN 14789: 2017	UKAS / MCERTS		

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Incinerator Exhaust	Volumetric Flowrate	...	3.01701	m^3/sec	...	9	Stack Conditions	14/02/2024	09:11 – 09:21	BS EN 16911-1:2013 & MID	UKAS / MCERTS		Medium (Bins) Medical Waste
	Volumetric Flowrate	...	0.19765	m^3/sec	...	19	Dry & 3% O_2			BS EN 16911-1:2013 & MID	UKAS / MCERTS		
	Particulates $	3.6	436.00	mg/m^3	391.09 **g/hr**	5	Dry & 3% O_2	14/02/2024	09:25 – 10:25	BS EN 13284-1:2017 & MID	NU	✓	
	Hydrogen Chloride $	30	315.64	mg/m^3	283.13 **g/hr**	14	Dry & 3% O_2			BS EN 1911:2010	NU	✓	
	Hydrogen Fluoride $	10	5.91	mg/m^3	5.30 **g/hr**	14	Dry & 3% O_2			PD CEN/TS 17340:2020	NU	✓	
	Sulphur Dioxide $	20.7	31.04	mg/m^3	27.93 **g/hr**	14	Dry & 3% O_2	14/02/2024	11:20 – 12:20	BS EN 14791:2017	NU	✓	
	Heavy Metals* $	0.15	0.65	mg/m^3	0.50 **g/hr**	4	Dry & 3% O_2	14/02/2024	13:33 – 15:43	BS EN 14385:2004 & MID	NU	✓	
	Cadmium / Thallium $	0.015	0.0063	mg/m^3	0.0049 **g/hr**	4	Dry & 3% O_2			BS EN 14385:2004 & MID	NU	✓	
	Mercury $	0.02	0.0016	mg/m^3	0.0012 **g/hr**	7	Dry & 3% O_2			BS EN 13211:2001	NU	✓	
	PCDDs & PCDFs $	0.1	20.86	ng/m^3	28.19 **µg/hr**	15	Dry & 3% O_2	15/02/2024	09:40 – 14:50	BS EN 1948-1:2006 & MID	NU	✓	
	Oxides of Nitrogen (as NO_2)	241.2	283.59	mg/m^3	0.2016 **Kg/hr**	2	Dry & 3% O_2	14/02/2024	09:15 – 15:44	BS EN 14792: 2017	UKAS / MCERTS		
	Carbon Monoxide	3.6	3414.59	mg/m^3	2.4296 **Kg/hr**	2	Dry & 3% O_2			BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Dioxide	214.1	251.25	g/m^3	178.77 **Kg/hr**	5	Dry & 3% O_2			PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	2.75	%	...	5	& Dry Gas			PD CEN/TS 17405:2020	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	17.13	%	...	2	& Dry Gas			BS EN 14789: 2017	UKAS / MCERTS		

(* Sum of Sb, As, Pb, Cr, Co, Cu, Mn, Ni & V)

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Incinerator Exhaust	Oxides of Nitrogen (as NO_2)	241.2	203.19	mg/m^3	0.1446	2	Dry & 3% O_2	14/02/2024	09:15 – 09:44	BS EN 14792: 2017	UKAS / MCERTS		Medium (Bins) Medical Waste
	Oxides of Nitrogen (as NO_2)	241.2	299.80	mg/m^3	0.2133	2	Dry & 3% O_2		09:45 – 10:14	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	281.86	mg/m^3	0.2006	2	Dry & 3% O_2		10:15 – 10:44	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	260.49	mg/m^3	0.1854	2	Dry & 3% O_2		10:45 – 11:14	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	332.26	mg/m^3	0.2364	2	Dry & 3% O_2		11:15 – 11:44	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	247.68	mg/m^3	0.1762	2	Dry & 3% O_2		11:45 – 12:14	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	221.73	mg/m^3	0.1578	2	Dry & 3% O_2		12:15 – 12:44	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	176.70	mg/m^3	0.1257	2	Dry & 3% O_2		12:45 – 13:14	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	146.44	mg/m^3	0.1042	2	Dry & 3% O_2		13:15 – 13:44	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	218.01	mg/m^3	0.1551	2	Dry & 3% O_2		13:45 – 14:14	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	419.14	mg/m^3	0.2982	2	Dry & 3% O_2		14:15 – 14:44	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	461.92	mg/m^3	0.3287	2	Dry & 3% O_2		14:45 – 15:14	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	493.87	mg/m^3	0.3514	2	Dry & 3% O_2		15:15 – 15:44	BS EN 14792: 2017	UKAS / MCERTS		

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Incinerator Exhaust	Carbon Monoxide	1.6	4956.53	mg/m^3	3.5268	2	Dry & 3% O_2	14/02/2024	09:15 – 09:44	BS EN 15058: 2017	UKAS / MCERTS	✓	Medium (Bins) Medical Waste
	Carbon Monoxide	1.6	6416.43	mg/m^3	4.5656	2	Dry & 3% O_2		09:45 – 10:14	BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Monoxide	1.6	4614.66	mg/m^3	3.2835	2	Dry & 3% O_2		10:15 – 10:44	BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Monoxide	1.6	4179.21	mg/m^3	2.9737	2	Dry & 3% O_2		10:45 – 11:14	BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Monoxide	1.6	2757.03	mg/m^3	1.9618	2	Dry & 3% O_2		11:15 – 11:44	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	2751.77	mg/m^3	1.9580	2	Dry & 3% O_2		11:45 – 12:14	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	2357.00	mg/m^3	1.6771	2	Dry & 3% O_2		12:15 – 12:44	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	1848.96	mg/m^3	1.3156	2	Dry & 3% O_2		12:45 – 13:14	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	3694.55	mg/m^3	2.6288	2	Dry & 3% O_2		13:15 – 13:44	BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Monoxide	1.6	2458.14	mg/m^3	1.7491	2	Dry & 3% O_2		13:45 – 14:14	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	1920.76	mg/m^3	1.3667	2	Dry & 3% O_2		14:15 – 14:44	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	2747.17	mg/m^3	1.9547	2	Dry & 3% O_2		14:45 – 15:14	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	2957.75	mg/m^3	2.1046	2	Dry & 3% O_2		15:15 – 15:44	BS EN 15058: 2017	UKAS / MCERTS		

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Incinerator Exhaust	Carbon Dioxide	214.1	264.04	g/m³	187.88	5	Dry & 3% O_2	14/02/2024	09:15 – 09:44	PD CEN/TS 17405:2020	UKAS / MCERTS		Medium (Bins) Medical Waste
	Carbon Dioxide	214.1	267.69	g/m³	190.47	5	Dry & 3% O_2		09:45 – 10:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	314.29	g/m³	223.63	5	Dry & 3% O_2		10:15 – 10:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	306.98	g/m³	218.43	5	Dry & 3% O_2		10:45 – 11:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	280.48	g/m³	199.57	5	Dry & 3% O_2		11:15 – 11:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	315.20	g/m³	224.28	5	Dry & 3% O_2		11:45 – 12:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	162.62	g/m³	115.71	5	Dry & 3% O_2		12:15 – 12:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	159.88	g/m³	113.76	5	Dry & 3% O_2		12:45 – 13:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	256.73	g/m³	182.67	5	Dry & 3% O_2		13:15 – 13:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	260.38	g/m³	185.27	5	Dry & 3% O_2		13:45 – 14:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	221.10	g/m³	157.32	5	Dry & 3% O_2		14:15 – 14:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	244.85	g/m³	174.22	5	Dry & 3% O_2		14:45 – 15:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	216.53	g/m³	154.07	5	Dry & 3% O_2		15:15 – 15:44	PD CEN/TS 17405:2020	UKAS / MCERTS		

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Incinerator Exhaust	Carbon Dioxide	...	2.89	%	5	& Dry Gas	14/02/2024	09:15 – 09:44	PD CEN/TS 17405:2020	UKAS / MCERTS		Medium (Bins) Medical Waste
	Carbon Dioxide	...	2.93	%	5	& Dry Gas		09:45 – 10:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	3.44	%	5	& Dry Gas		10:15 – 10:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	3.36	%	5	& Dry Gas		10:45 – 11:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	3.07	%	5	& Dry Gas		11:15 – 11:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	3.45	%	5	& Dry Gas		11:45 – 12:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	1.78	%	5	& Dry Gas		12:15 – 12:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	1.75	%	5	& Dry Gas		12:45 – 13:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	2.81	%	5	& Dry Gas		13:15 – 13:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	2.85	%	5	& Dry Gas		13:45 – 14:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	2.42	%	5	& Dry Gas		14:15 – 14:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	2.68	%	5	& Dry Gas		14:45 – 15:14	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	2.37	%	5	& Dry Gas		15:15 – 15:44	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	16.79	%	2	& Dry Gas		09:15 – 09:44	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	16.87	%	2	& Dry Gas		09:45 – 10:14	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	16.31	%	2	& Dry Gas		10:15 – 10:44	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	16.37	%	2	& Dry Gas		10:45 – 11:14	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	16.67	%	2	& Dry Gas		11:15 – 11:44	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	16.13	%	2	& Dry Gas		11:45 – 12:14	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	18.52	%	2	& Dry Gas		12:15 – 12:44	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	18.45	%	2	& Dry Gas		12:45 – 13:14	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	16.89	%	2	& Dry Gas		13:15 – 13:44	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	16.94	%	2	& Dry Gas		13:45 – 14:14	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	17.64	%	2	& Dry Gas		14:15 – 14:44	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	17.45	%	2	& Dry Gas		14:45 – 15:14	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	17.68	%	2	& Dry Gas		15:15 – 15:44	BS EN 14789: 2017	UKAS / MCERTS		

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Incinerator Exhaust	Volumetric Flowrate	...	3.11712	m^3/sec	...	9	Stack Conditions	15/02/2024	15:38 – 15:50	BS EN 16911-1:2013 & MID	UKAS / MCERTS		Dead Animal Waste
	Volumetric Flowrate	...	0.49087	m^3/sec	...	14	Dry & 3% O_2			BS EN 16911-1:2013 & MID	UKAS / MCERTS		
	Particulates $	3.6	233.26	mg/m^3	135.67 **g/hr**	8	Dry & 3% O_2	15/02/2024	16:00 – 17:00	BS EN 13284-1:2017 & MID	NU	✓	
	Hydrogen Chloride $	30	41.82	mg/m^3	24.33 **g/hr**	15	Dry & 3% O_2			BS EN 1911:2010	NU	✓	
	Hydrogen Fluoride $	10	16.70	mg/m^3	9.71 **g/hr**	15	Dry & 3% O_2			PD CEN/TS 17340:2020	NU	✓	
	Sulphur Dioxide $	20.7	1008.11	mg/m^3	3322.07 **g/hr**	13	Dry & 3% O_2	15/02/2024	17:45 – 18:45	BS EN 14791:2017	NU	✓	
	Heavy Metals* $	0.15	0.24	mg/m^3	0.48 **g/hr**	4	Dry & 3% O_2	15/02/2024	19:45 – 20:45	BS EN 14385:2004 & MID	NU	✓	
	Cadmium / Thallium $	0.015	0.0044	mg/m^3	0.0088 **g/hr**	3	Dry & 3% O_2			BS EN 14385:2004 & MID	NU	✓	
	Mercury $	0.02	0.00085	mg/m^3	0.0017 **g/hr**	6	Dry & 3% O_2			BS EN 13211:2001	NU	✓	
	Oxides of Nitrogen (as NO_2)	241.2	423.27	mg/m^3	0.7480 **Kg/hr**	2	Dry & 3% O_2	15/02/2024	16:00 – 20:59	BS EN 14792: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	1241.74	mg/m^3	2.1943 **Kg/hr**	2	Dry & 3% O_2			BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Dioxide	214.1	264.25	g/m^3	466.96 **Kg/hr**	5	Dry & 3% O_2			PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	5.68	%	...	5	& Dry Gas			PD CEN/TS 17405:2020	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	13.40	%	...	2	& Dry Gas			BS EN 14789: 2017	UKAS / MCERTS		

(* Sum of Sb, As, Pb, Cr, Co, Cu, Mn, Ni & V)

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Incinerator Exhaust	PCDDs & PCDFs $	0.1	2.81	ng/m³	4.64 **µg/hr**	15	Dry & 3% O_2	16/02/2024	10:40 – 11:40	BS EN 1948-1:2006 & MID	NU	✓	Dead Animal Waste
	Oxides of Nitrogen (as NO_2)	241.2	304.85	mg/m³	0.5387 **Kg/hr**	2	Dry & 3% O_2		10:40 – 11:39	BS EN 14792: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	97.85	mg/m³	0.1729 **Kg/hr**	2	Dry & 3% O_2			BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Dioxide	214.1	264.77	g/m³	467.88 **Kg/hr**	4	Dry & 3% O_2			PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	8.17	%	...	4	& Dry Gas			PD CEN/TS 17405:2020	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	10.09	%	...	2	& Dry Gas			BS EN 14789: 2017	UKAS / MCERTS		

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Incinerator Exhaust	Oxides of Nitrogen (as NO_2)	241.2	347.09	mg/m^3	0.6134	2	Dry & 3% O_2	15/02/2024	16:00 – 16:29	BS EN 14792: 2017	UKAS / MCERTS		Dead Animal Waste
	Oxides of Nitrogen (as NO_2)	241.2	334.02	mg/m^3	0.5903	2	Dry & 3% O_2		16:30 – 16:59	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	342.12	mg/m^3	0.6046	2	Dry & 3% O_2		17:00 – 17:29	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	391.55	mg/m^3	0.6919	2	Dry & 3% O_2		17:30 – 17:59	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	318.54	mg/m^3	0.5629	2	Dry & 3% O_2		18:00 – 18:29	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	427.28	mg/m^3	0.7550	2	Dry & 3% O_2		18:30 – 18:59	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	740.55	mg/m^3	1.3087	2	Dry & 3% O_2		19:00 – 19:29	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	486.63	mg/m^3	0.8599	2	Dry & 3% O_2		19:30 – 19:59	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	329.60	mg/m^3	0.5824	2	Dry & 3% O_2		20:00 – 20:29	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	704.51	mg/m^3	1.2450	2	Dry & 3% O_2		20:30 – 20:59	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	262.39	mg/m^3	0.4637	2	Dry & 3% O_2	16/02/2024	10:40 – 11:09	BS EN 14792: 2017	UKAS / MCERTS		
	Oxides of Nitrogen (as NO_2)	241.2	363.66	mg/m^3	0.6426	2	Dry & 3% O_2		11:10 – 11:39	BS EN 14792: 2017	UKAS / MCERTS		

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Incinerator Exhaust	Carbon Monoxide	1.6	5317.99	mg/m^3	9.3976	2	Dry & 3% O_2	15/02/2024	16:00 – 16:29	BS EN 15058: 2017	UKAS / MCERTS		Dead Animal Waste
	Carbon Monoxide	1.6	2288.80	mg/m^3	4.0446	2	Dry & 3% O_2		16:30 – 16:59	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	1011.91	mg/m^3	1.7882	2	Dry & 3% O_2		17:00 – 17:29	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	1770.92	mg/m^3	3.1294	2	Dry & 3% O_2		17:30 – 17:59	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	181.55	mg/m^3	0.3208	2	Dry & 3% O_2		18:00 – 18:29	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	1950.34	mg/m^3	3.4465	2	Dry & 3% O_2		18:30 – 18:59	BS EN 15058: 2017	UKAS / MCERTS	✓	
	Carbon Monoxide	1.6	279.74	mg/m^3	0.4943	2	Dry & 3% O_2		19:00 – 19:29	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	1912.88	mg/m^3	3.3803	2	Dry & 3% O_2		19:30 – 19:59	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	506.42	mg/m^3	0.8949	2	Dry & 3% O_2		20:00 – 20:29	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	1353.35	mg/m^3	2.3915	2	Dry & 3% O_2		20:30 – 20:59	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	130.32	mg/m^3	0.2303	2	Dry & 3% O_2	16/02/2024	10:40 – 11:09	BS EN 15058: 2017	UKAS / MCERTS		
	Carbon Monoxide	1.6	52.88	mg/m^3	0.0934	2	Dry & 3% O_2		11:10 – 11:39	BS EN 15058: 2017	UKAS / MCERTS		

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Incinerator Exhaust	Carbon Dioxide	214.1	264.25	g/m³	466.96	5	Dry & 3% O_2	15/02/2024	16:00 – 16:29	PD CEN/TS 17405:2020	UKAS / MCERTS		Dead Animal Waste
	Carbon Dioxide	214.1	59.08	g/m³	104.40	5	Dry & 3% O_2		16:30 – 16:59	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	95.37	g/m³	168.53	5	Dry & 3% O_2		17:00 – 17:29	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	291.7	g/m³	515.47	5	Dry & 3% O_2		17:30 – 17:59	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	312.17	g/m³	551.65	5	Dry & 3% O_2		18:00 – 18:29	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	518.73	g/m³	916.66	5	Dry & 3% O_2		18:30 – 18:59	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	504.77	g/m³	892.00	5	Dry & 3% O_2		19:00 – 19:29	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	221.45	g/m³	391.33	5	Dry & 3% O_2		19:30 – 19:59	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	209.82	g/m³	370.78	5	Dry & 3% O_2		20:00 – 20:29	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	274.95	g/m³	485.87	5	Dry & 3% O_2		20:30 – 20:59	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	305.28	g/m³	539.47	4	Dry & 3% O_2	16/02/2024	10:40 – 11:09	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	214.1	224.26	g/m³	396.30	4	Dry & 3% O_2		11:10 – 11:39	PD CEN/TS 17405:2020	UKAS / MCERTS		

Selibon N.V.
Permit No : ...
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Installation Name : Incinerator Exhaust
Visit Details : Emissions Survey – February 2024
Survey Dates : 12th – 16th February 2024
Report Issue Date. : 20th December 2024

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
Incinerator Exhaust	Carbon Dioxide	...	1.27	%	5	& Dry Gas	15/02/2024	16:00 – 16:29	PD CEN/TS 17405:2020	UKAS / MCERTS		Dead Animal Waste
	Carbon Dioxide	...	2.05	%	5	& Dry Gas		16:30 – 16:59	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	6.27	%	5	& Dry Gas		17:00 – 17:29	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	6.71	%	5	& Dry Gas		17:30 – 17:59	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	11.15	%	5	& Dry Gas		18:00 – 18:29	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	10.85	%	5	& Dry Gas		18:30 – 18:59	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	4.76	%	5	& Dry Gas		19:00 – 19:29	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	4.51	%	5	& Dry Gas		19:30 – 19:59	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	5.91	%	5	& Dry Gas		20:00 – 20:29	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	3.35	%	5	& Dry Gas		20:30 – 20:59	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	9.42	%	4	& Dry Gas	16/02/2024	10:40 – 11:09	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Carbon Dioxide	...	6.92	%	4	& Dry Gas		11:10 – 11:39	PD CEN/TS 17405:2020	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	19.13	%	2	& Dry Gas	15/02/2024	16:00 – 16:29	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	18.03	%	2	& Dry Gas		16:30 – 16:59	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	12.36	%	2	& Dry Gas		17:00 – 17:29	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	12.17	%	2	& Dry Gas		17:30 – 17:59	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	6.10	%	2	& Dry Gas		18:00 – 18:29	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	6.90	%	2	& Dry Gas		18:30 – 18:59	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	14.70	%	2	& Dry Gas		19:00 – 19:29	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	14.91	%	2	& Dry Gas		19:30 – 19:59	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	13.22	%	2	& Dry Gas		20:00 – 20:29	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	16.53	%	2	& Dry Gas		20:30 – 20:59	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	8.34	%	2	& Dry Gas	16/02/2024	10:40 – 11:09	BS EN 14789: 2017	UKAS / MCERTS		
	Oxygen (Paramagnetic)	...	11.83	%	2	& Dry Gas		11:10 – 11:39	BS EN 14789: 2017	UKAS / MCERTS		

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
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The volumetric flowrate shown above is that from the initial pitot traverse.
Any other flow measurements made during isokinetic sampling and/ or repeat traverses are shown later in the tables section.

Notes

The uncertainty figures presented in Table 1.1 for NO_x, CO, CO_2 & O_2 are "measurement uncertainty" figures, which do not take into account the variability of the measured sample values.
The "uncertainty of measurement results" figures, which do include this contribution, are presented in the appendices of the report for these determinands.

Emission Limit Value	The emission limit value is that stated in the permit and will be expressed as a concentration or a mass emission.
Periodic Monitoring Result	The result given is expressed in the same terms and units as the emission limit value.
Uncertainty	The uncertainty associated with the quoted result is at the 95% confidence interval. The Uncertainty results **DO NOT** take into account the effect of the sample location limitations.
Reference Conditions	All results are expressed at 273 K and 101.3kPa. The oxygen and moisture corrections are stated.
Monitoring Method Reference	The method stated is in accordance with the Environment Agency Technical Guidance Note M2, or other method approved by the Environment Agency.
Accreditation for use of Method	**The details indicate the accreditation for the use of the complete monitoring method, e.g. MCERTs, UKAS. If use of the method is not accredited " NA" is stated.**
Operating Status	The details indicate the feedstock and the loading rate of the plant during monitoring.
$	Chemical Analysis on sample reagents was performed by an External Laboratory as detailed in Section 4
NU	UKAS Accreditation Held but UKAS Accreditation cannot be claimed for the test as sampling did not comply with the Standard Reference Method (SRM), see section 2 & 5
NA	**Method is NOT UKAS Accredited.**

1.2 Operating Information

Any operating information and CEMS data below has been supplied by the client.

Emission Point Reference	Process Type	Process Duration	Fuel	Feedstock	Abatement	Load	Comparison of Operator CEMS and Periodic Monitoring Results					
							Parameter	Date	Time	CEMS Results	Periodic Monitoring Results	Units
Incinerator Exhaust	Batch	Various	Diesel	Medical & Animal Waste **(See Table 1.1)**	None	Primary Chamber 500 -600c Secondary Chamber 650 – 850c	...	...	...	NP	...	...

Notes:

Process Type	State whether the process is a continuous or batch process.
Process Duration	If a batch process, state the duration, frequency and details of the portion of the batch sampled. If continuous state "NA"
Fuel	If applicable, state the fuel type If not applicable state "NA"
Feedstock	State the feedstock type
Abatement	State the type and whether operational during monitoring. If not applicable state "NA"
Load	State the normal load, throughput or rating of the plant
CEMS Data	Enter this data for each CEM installed if it is has been provided by operator otherwise state “NP” (NOT PROVIDED)

2 Monitoring Deviations

The objective of the survey was to measure the concentrations of pollutants from the processes / locations as detailed in Section 1.

There were modifications to the sampling procedures (TPDs) listed in section 4. These are as follows:

Due to air freight restrictions on transporting hazardous solutions, it was not possible to ship the impinger and rinse solutions for sampling Heavy Metals and Mercury (all contain Nitric Acid). DI H_2O was substituted instead as the capture and rinsing solution for the sampling of Heavy Metals & Mercury. This is likely to mean that the results for these parameters are underestimates of the true emissions concentrations.

Due to high duct gas velocity, in order to maintain isokinetic sampling, it was necessary to use a nozzle with diameter smaller than the recommended minimum of 8mm minimum stated in BS EN 13284-1:2017. Note that there is no absolute minimum nozzle size stated in the standard, as long as the uncertainty of the nozzle area is <5%. **So this does not need to be described as a non-conforming test.**

There were substance deviations from the original and agreed emissions monitoring schedule. These are as follows:

Due to high particulate loading on the filter for Dioxins & Furans during sampling on medium medical waste, the sample time was reduced from 6 hours to 5 hours.

Due to limited dead animal & meat feedstock availability during this testing phase, sample time was reduced for Heavy Metals & Mercury from 2 hours to 1 hour. Additionally, Dioxins & Furans sample time was reduced from 6 hours to 1 hour.

Non-conforming tests are as follows:

The Uncertainty of the reported concentrations for these pollutant results DOES NOT take into account the effect of non-conformities or sample location limitations.

Due to customs delays for samples returning from site and back to the UK, holding times between sampling and analysis exceeded the maximum allowed in the sampling standards for the following determinands – HF, Mercury, Heavy Metals, HCl, SO_2 and Dioxins & Furans, consequently, these tests cannot hold UKAS/MCERTS accreditation.

Due to customs holding times, and transportation of samples, the sample temperature storage requirements stated in the sampling standards for Dioxins & Furans, Heavy Metals & Mercury, HF, HCl & SO_2 could not be achieved from the time of sampling until ECL received the samples back in the UK, consequently, these tests cannot hold UKAS/MCERTS accreditation.

During the sampling of Carbon Monoxide (CO), at various operating conditions, data values recorded for CO exceeded the maximum linearised range of the sampling analyser.

Heavy Metals & Mercury were sampled into the same sampling train, this is a deviation from the sampling standards, but as DI water was used instead of the standard impinger and rinse solutions for these parameters, then it is appropriate to combine them in the same test, consequently, these tests cannot hold UKAS/MCERTS accreditation.

Due to a delay on site, resulting in temporary postponement and redeployment, the hydrogen peroxide sampling solution transported to site for sampling sulphur dioxide exceeded the 1-month expiry date before sampling took place.

Due to more samples being taken than was originally planned in Q001 (before sampling solutions were shipped), there was insufficient sampling solution for a daily blank for TPM, HCl, HF and SO_2. Consequently, the second and third samples for these parameters share a blank taken on the second day.

Due to high oxygen content in the stack, it was not possible (within the practical limitations of the sampling equipment and when using the maximum nozzle size available at which isokinetic sampling could be maintained) to achieve the minimum particulate sampling volume (Vmin) as calculated using Annex E of BS EN 13284-1:2017. This means that particulate samples must be described as non-conforming tests. Furthermore, again due to elevated oxygen content, the oxygen corrected sample volumes are much reduced and the blank values for TPM, Heavy Metals and Cadmium & Thallium have exceeded 10% of the ELV, consequently, these tests cannot hold UKAS/MCERTS accreditation.

Homogeneity tests have not been completed for pollutants at the following locations: **Incinerator Exhaust.** Such tests are not applicable to this location (as the duct area is <1m^2) and were not requested by the client.

PART 2 – SUPPORTING INFORMATION

3 SAMPLING STAFF DETAILS

Site Sampling Team

Names of Site Team	Dates on Site	MCERTS No.	LEVEL	Technical Endorsements
Scott Hackett	12th – 16th February 2024	MM 07 889	2	TE1, TE2, TE3, TE4
Llion Preskett Hughes		MM 22 1689	1	...

Report Reviewer

Name	MCERTS No.	LEVEL	Technical Endorsements
Andy Barnes	MM 03 235	2	TE1, TE2, TE3, TE4

Technical Endorsement Key:-

TE1 – **Isokinetic** Particulates, Temperature & Velocity Profiles, Oxygen.
TE2 – **Isokinetic** Extractive Pollutants:- Metals, Dioxin & Furans, PAHs, PCBs, HCl, HF.
TE3 – **Non-Isokinetic** Extractive Pollutants:- Speciated VOCs, HF, HCl, Cyanide.
TE4 – **Continuous Analysers** (Combustion Gases):- TVOC, CO, NOx, SO2.

4 SAMPLING PROTOCOLS / METHODOLOGIES

Details of the substances monitored, the standard methods used and the Environmental Compliance Limited Technical Procedures used during this survey are shown in the table below. Detailed sampling protocols are included in a separate document which will be sent with the report.

In all cases, where analysis of collected samples was required, the analysis was by a subcontract laboratory. Details of the sub-contract laboratory are shown on the analysis certificates in this report. The UKAS/MCERTs accreditation status of the analysis is also indicated on the certificates.

Any required modifications to the Technical Procedure Documents (TPDs) specified below will be detailed in section 2 of this report.

Determinand	External Reference Method	ECL Technical Procedure Number
Velocity and Flowrate	BS EN 16911-1:2013 & MID	ECL/ TPD/ 022A
Particulates (MST)	BS EN 13284-1:2017 & MID	ECL / TPD / 027
Heavy Metals	BS EN 14385:2004 & MID	ECL / TPD / 028
Mercury	BS EN 13211:2001	ECL / TPD / 030
PCDDs & PCDFs	BS EN 1948-1 to 3:2006 & MID	ECL / TPD / 031
Oxygen (PG350 E)	BS EN 14789: 2017	ECL / TPD / 033D
Carbon Monoxide (PG350E)	BS EN 15058: 2017	ECL / TPD / 033D
Oxides of Nitrogen (PG350 E)	BS EN 14792: 2017	ECL / TPD / 033D
Carbon Dioxide (PG350 E)	PD CEN/TS 17405:2020	ECL / TPD / 033D
Hydrogen Chloride	BS EN 1911:2010	ECL / TPD / 081
Sulphur Dioxide	BS EN 14791:2017	ECL / TPD / 039
Moisture	BS EN 14790: 2017	ECL / TPD / 082
Hydrogen Fluoride	PD CEN/TS 17340:2020	ECL / TPD / 081

5 SAMPLE POINT DESCRIPTIONS

The homogeneity test is applicable to combustion processes, but may also be requested by the regulator for non-combustion processes.

Homogeneity testing has not been completed at this location.

The test is not usually required for stacks with sampling plane areas of <1m^2 (below 1.13m in diameter for circular ducts).

The Uncertainty of the reported concentrations for these pollutant results DOES NOT take into account the effect of non-conformities or sample location limitations.

The sample location that was monitored is detailed below:

Incinerator Exhaust

The stack diameter is 0.30m and the sample platform width back from the sample port is 1.4m.

A single 4-inch BSP sample port is location in a straight section of duct, approximately 1.3m from the working temporary platform.

EQUIPMENT IDs
(Pre site checklist from SSP)

Selibon N.V.
Permit No : ...
Variation No : ...
Report Ref : P5632 : R001

Installation Name : Incinerator Exhaust
Visit Details : Emissions Survey – February 2024
Survey Dates : 12th – 16th February 2024
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PRE SITE EQUIPMENT CHECKLIST/ EQUIPMENT USED

(Completed before departure to site and when on site in full)

Equipment	Equip. Type	ID No:	ID No:	ID No:	ID No:	ID No:	ID No:	ID No:	ID No:
MST console/pump	E001	U010							
MST Nozzle set		402							
MST "S" Type Pitot		602							
MST Probe		1328							
MST Probe Thermocouple		1329							
MST Hot Box		978							
MST Impinger Arm		660							
Barometer		204							
Site Balance		368							
Site Check weights		598							
		599							
Horiba	E002	1264							
Heated Probe / Filter		1348							
Chiller		971							
MFC									
Heated Line		1346	1347						
FID	E003								
Heated Line									
Heated Probe / Filter									
Testo	E004								
FTIR	E005								
Heated Probe / Filter									
Heated Line									
Stackmite	E006								
"L" Type Pitot									
Digital Manometer									
Stack Thermocouple									
Thermocouple Reader									
Nozzle Set									
Workhorse Pumps	E007								
Stack Thermocouple									
Tube Thermocouple									
Meter Thermocouple									
High Vac Gauge									
Dioxin Thermocouple		938							

Quantity of Ice Required / Used for Survey	30	Bags (2kg bags)

FIGURES

Figure 1 – Combustion Gases

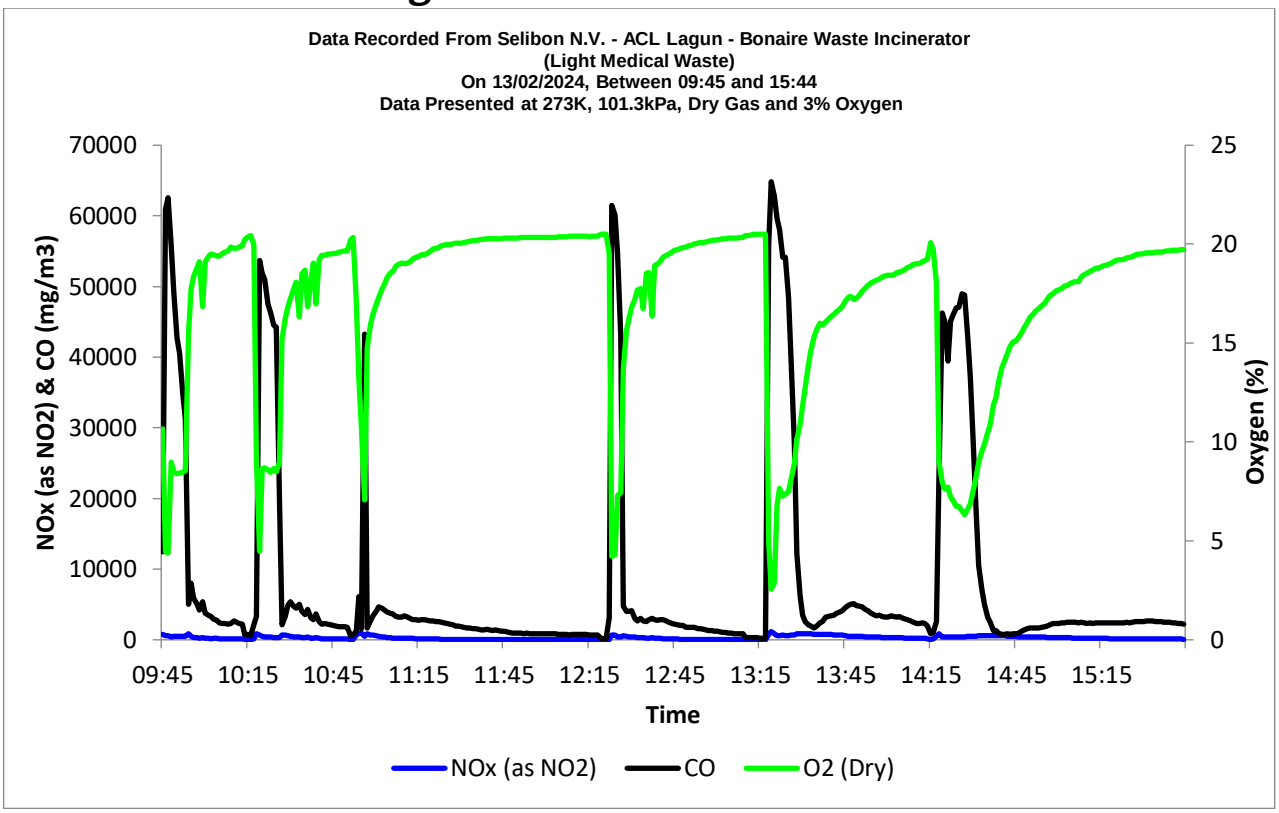


Figure 2 – Carbon Dioxide

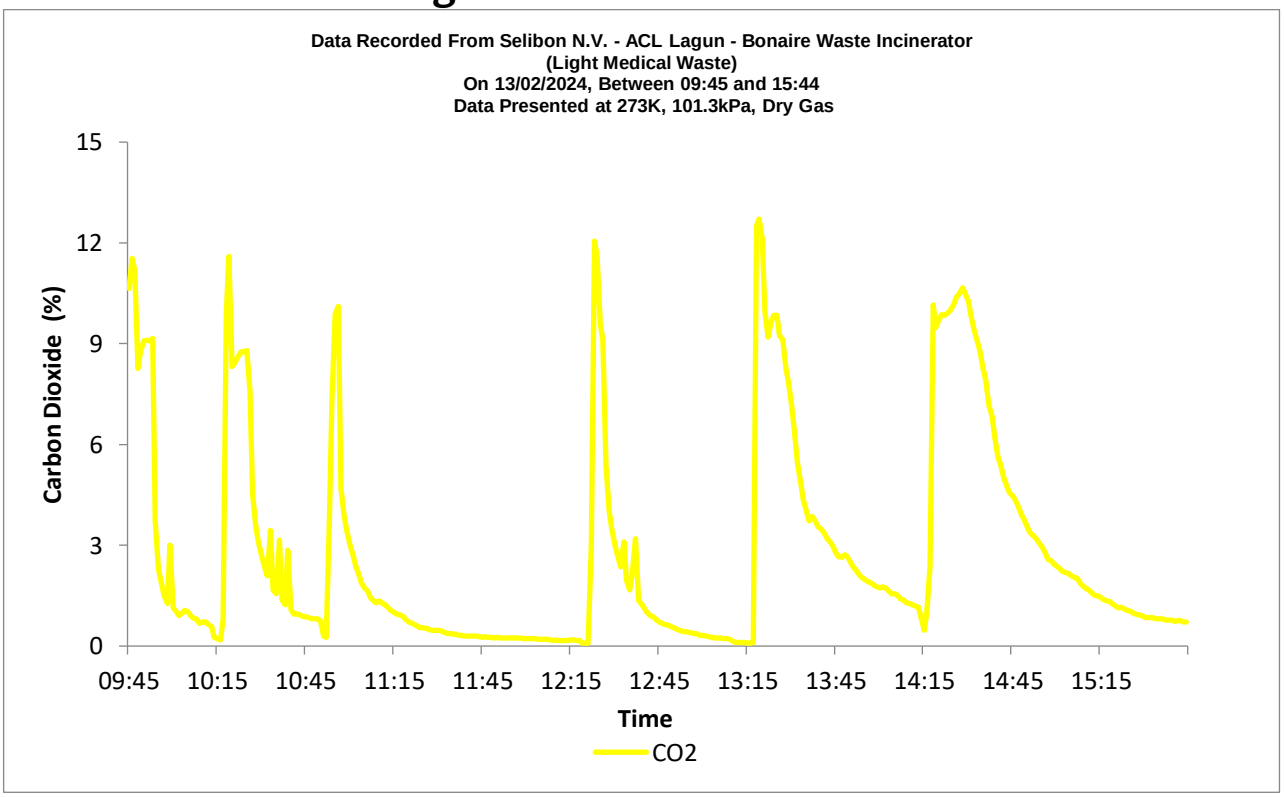


Figure 3 – Combustion Gases

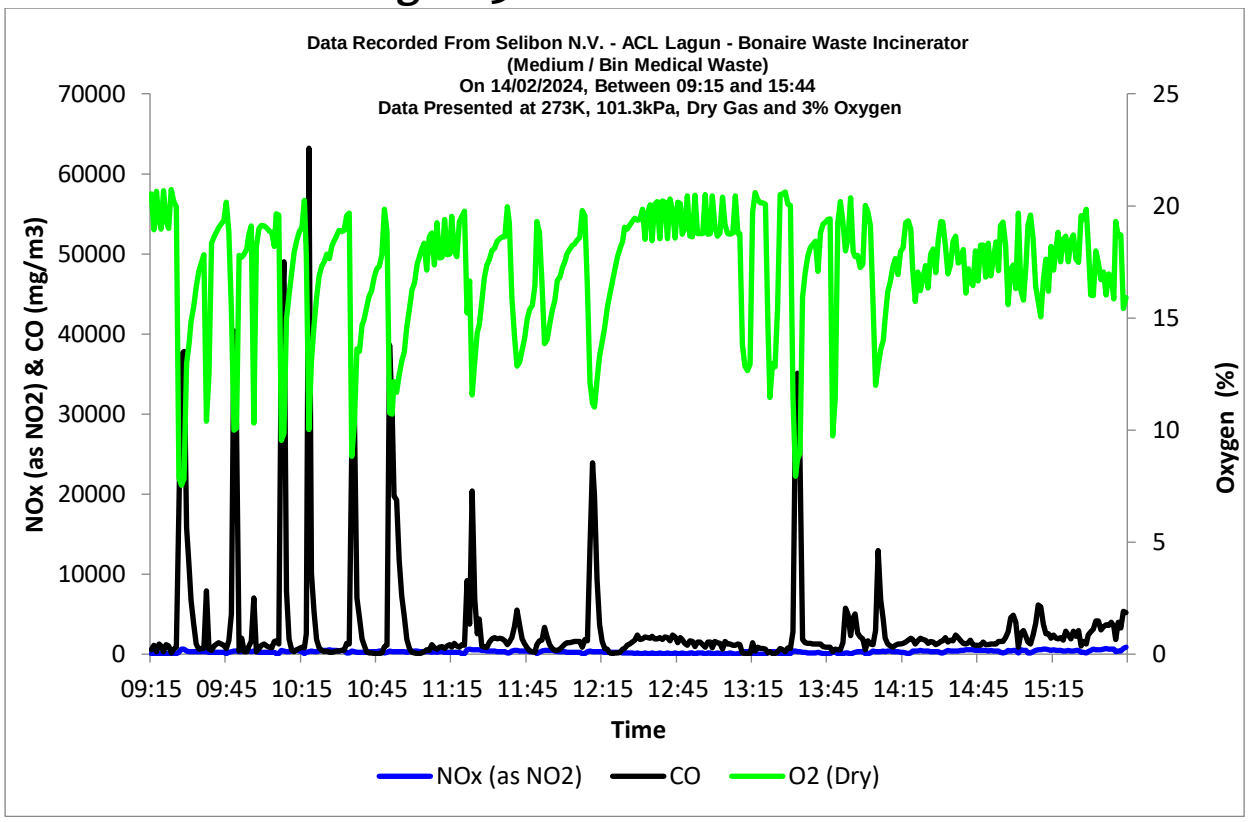


Figure 4 – Carbon Dioxide

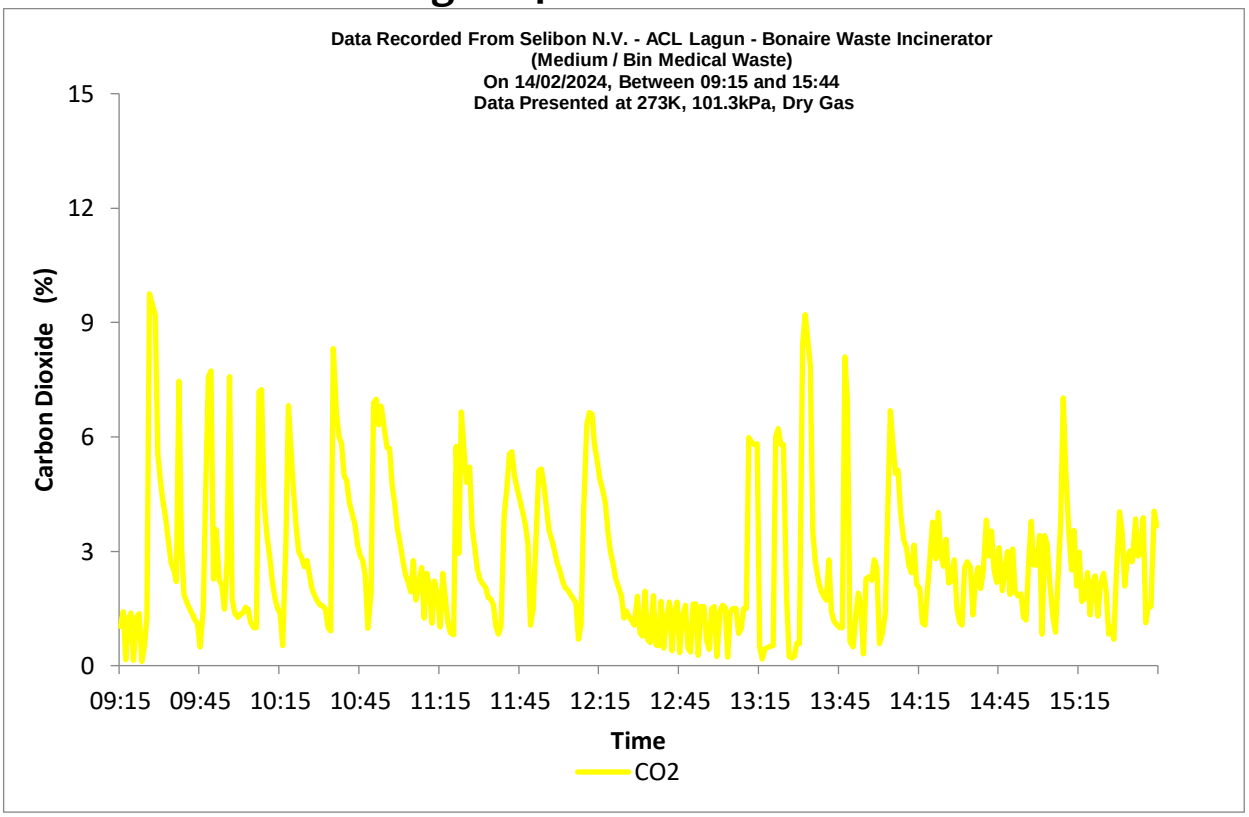


Figure 5 – Combustion Gases

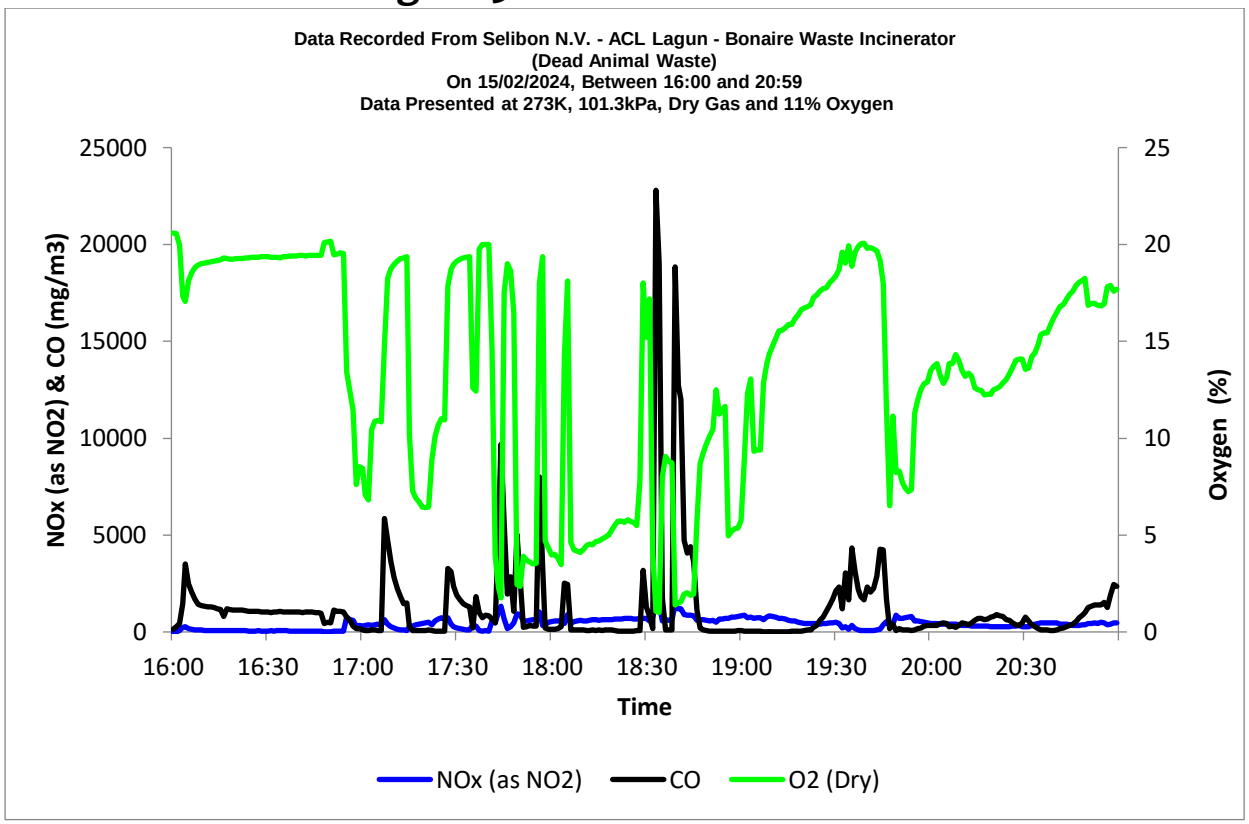


Figure 6 – Carbon Dioxide

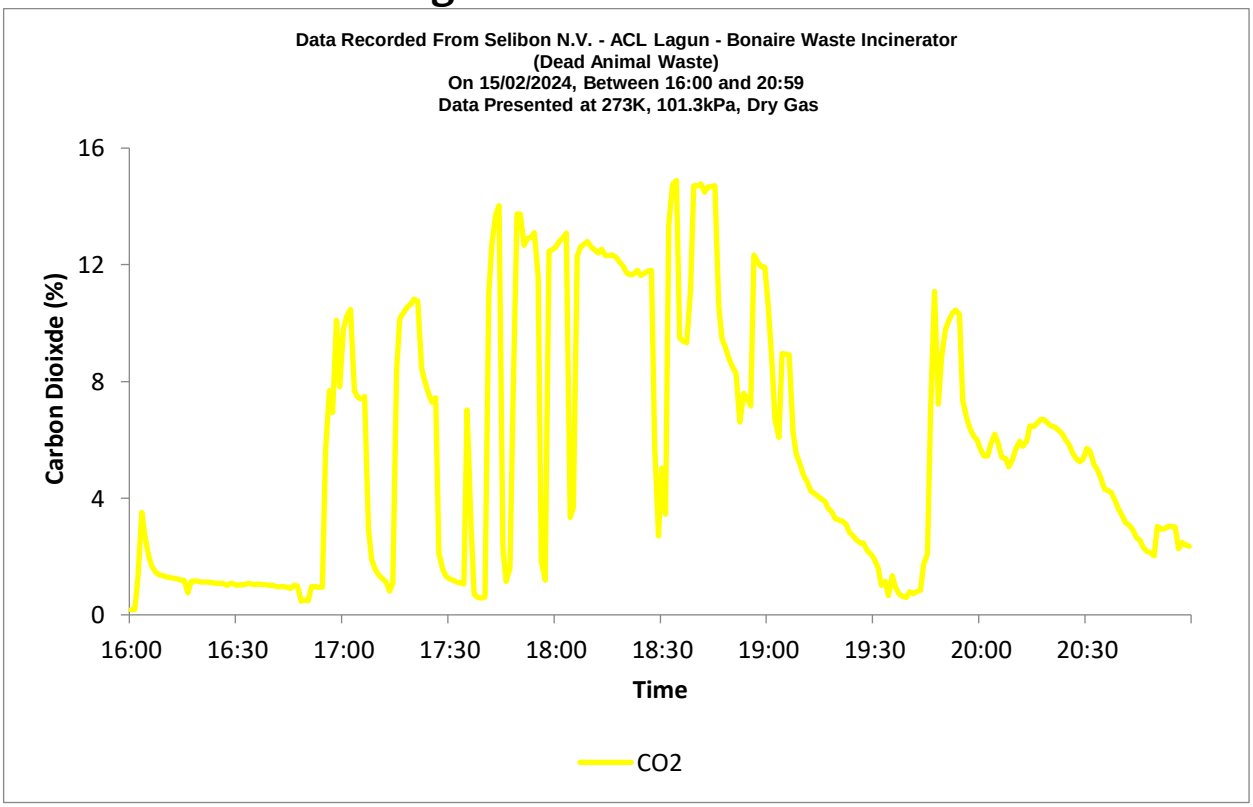


Figure 7 – Combustion Gases

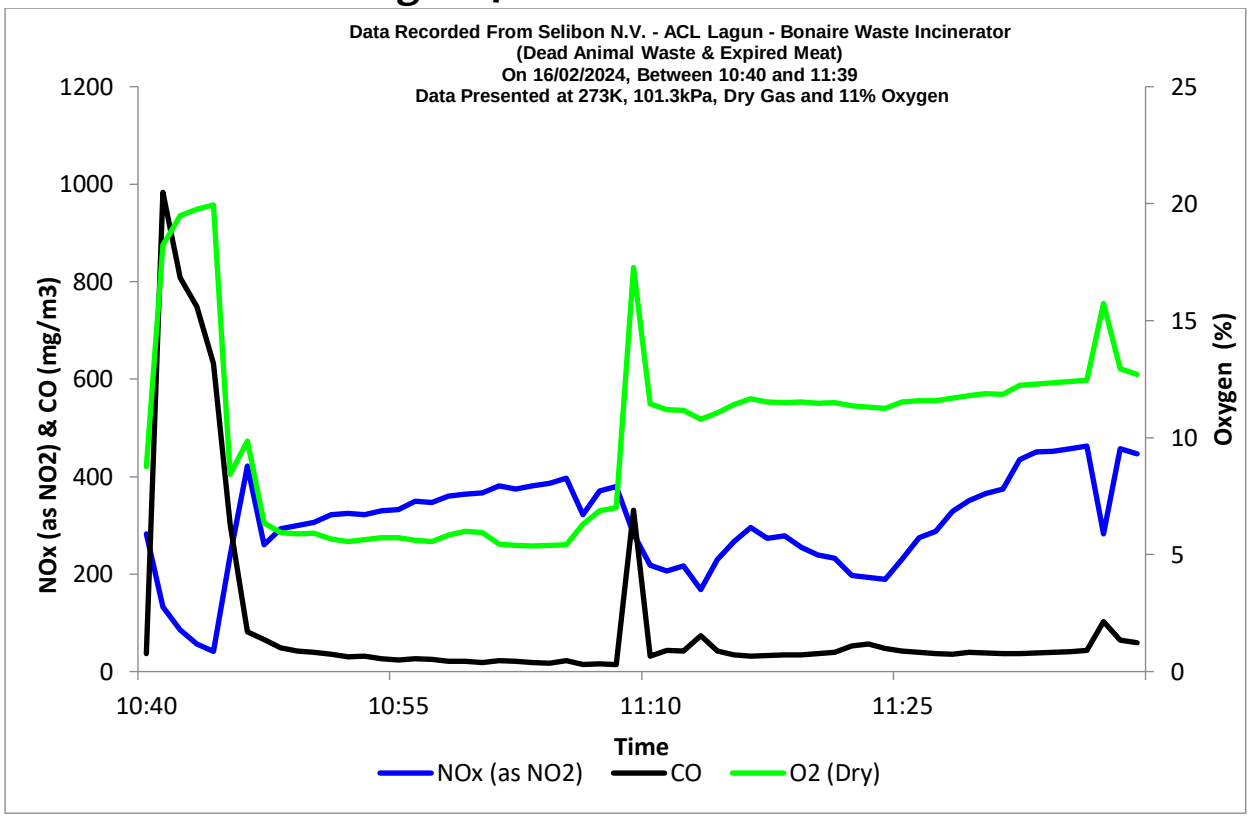
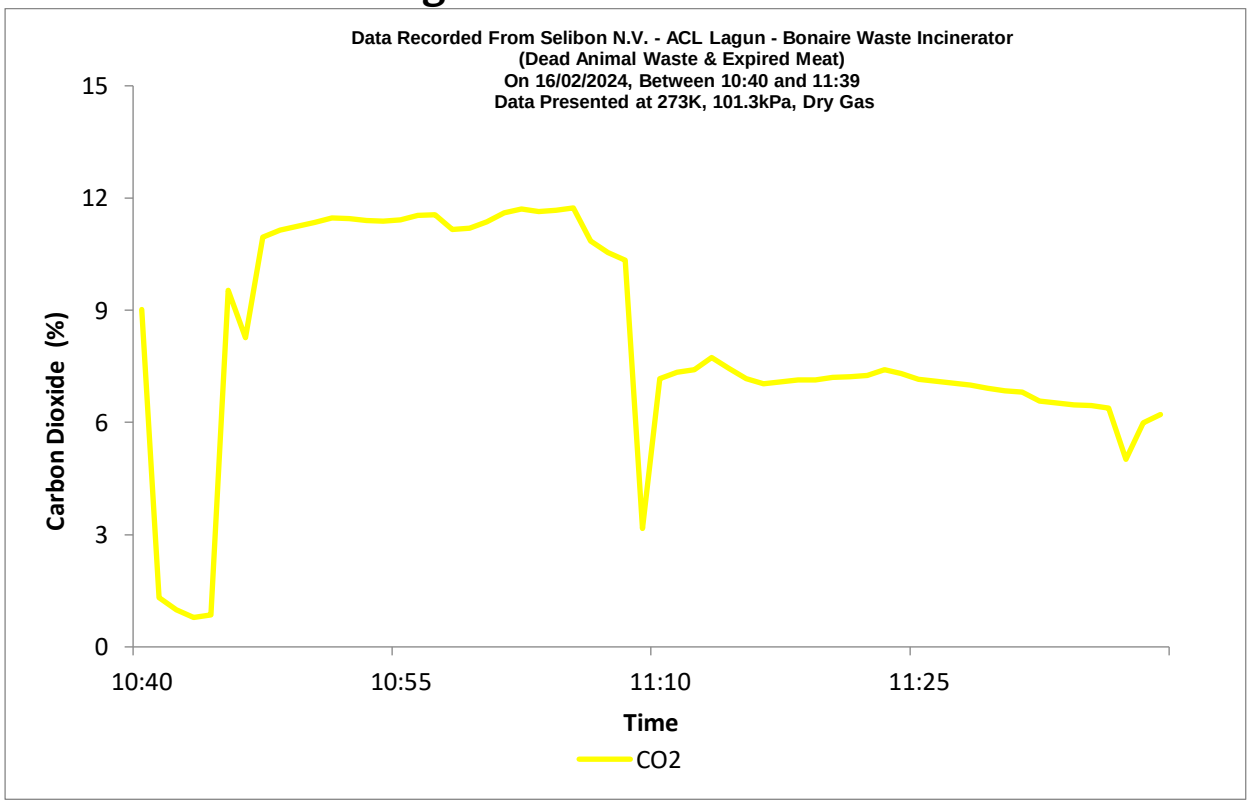


Figure 8 – Carbon Dioxide



TABLES

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Table 1 – Particulates & HCl/HF
Light Medical Waste (3% Oxygen & Dry Gas)

Data Recorded from Incinerator Exhaust - Incinerator

Emission Parameter	Units	TPM / HCL & HF 1	Blank
Stack Diameter	metres	0.30	…
Area of Sample Plane	m^2	0.071	…
Moisture Content	%	4.66	…
Oxygen Content	%	16.53	…
Stack Temperature	^oC	264	…
Gas Velocity (as Measured. Adjusted for Smooth Walls)	m/sec	14.6343	…
Gas Velocity (Reference Conditions)	m/sec*	1.7361	…
Volumetric Flowrate (as Measured)	m^3/sec	1.0344	…
Volumetric Flowrate (Reference Conditions)	m^3/sec*	0.1227	…
Dry Gas Molecular Weight	g/gmole	29.1749	
Sample Date	…	13/02/2024	…
Sample Period	…	10:15 - 11:15	…
Sample Volume (reference Conditions)	m^3*	0.249	0.249
Isokinetic Sampling Rate	%	99.13	…
Sample Reference (ECL ID)	ECL/24/	0411 & 0412	0417 & 0418
Mass of Particulate Matter Collected	mg	194.10	4.00
Concentration of Particulate Matter	mg/m^3*	**778.40**	16.04
Emission Rate of Particulate Matter	g/hr	343.88	...
Expanded Uncertainty (% Relative)	%	5	...
Emission Limit Value (ELV)	mg/m^3*	3.6	…
Blank Concentration as Percentage of ELV	%	…	445.59
Sample Reference (ECL ID)	ECL/24/	0437 & 0438	0441
Mass of Hydrogen Chloride Collected	mg	161.70	0.01
Concentration of Hydrogen Chloride	mg/m^3*	**648.46**	0.06
Emission Rate of Hydrogen Chloride	g/hr	286.48	...
Expanded Uncertainty (% Relative)	%	14	...
Emission Limit Value (ELV)	mg/m^3*	30	…
Impinger Collection Efficiency	%	100	...
Blank Concentration as Percentage of ELV	%	…	<1.00%
Sample Reference	ECL/24/	0437 & 0438	0441
Mass of Hydrogen Fluoride Collected	mg	0.91	0.01
Concentration of Hydrogen Fluoride	mg/m^3*	**3.64**	0.06
Emission Rate of Hydrogen Fluoride	g/hr	1.61	...
Expanded Uncertainty (% Relative)	%	14	...
Emission Limit Value (ELV)	mg/m^3*	10	…
Impinger Collection Efficiency	%	99	...
Blank Concentration as Percentage of ELV	%	…	<1.00%

***Reference Conditions (273K, 101.3kPa, 3% Oxygen, Dry Gas)**

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
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Table 2 – Sulphur Dioxide
Light Medical Waste (3% Oxygen & Dry Gas)

Data Recorded from Incinerator Exhaust - Incinerator

Emission Parameter	Units	Sulphur Dioxide 1	Blank
Stack Diameter	metres	0.30	
Area of Sample Plane	m^2	0.071	
Moisture Content	%	4.97	
Oxygen Content	%	17.19	
Stack Temperature	°C	250	
Gas Velocity (as Measured)	m/sec	16.40	
Gas Velocity (Reference Conditions)	m/sec*	1.39	
Volumetric Flowrate (as Measured)	m^3/sec	1.16	
Volumetric Flowrate (Reference Conditions)	m^3/sec*	0.10	
Dry Gas Molecular Weight	g/gmole	29.09543165	
Sample Date	…	13/02/2024	
Sample Period	…	12:25 - 13:25	
Sample Volume (reference Conditions)	m^3*	0.181	0.181
Sample Reference	ECL/24/	0443 & 0444	0447
Mass of Sulphur Dioxide Collected	mg	9.95	0.18
Concentration of Sulphur Dioxide	mg/m^3*	**54.85**	0.99
Emission Rate of Sulphur Dioxide	g/hr	19.44	...
Expanded Uncertainty (% Relative)	%	14	...
Emission Limit Value (ELV)	mg/m^3*	20.7	…
Impinger Collection Efficiency	%	99	...
Blank Concentration as Percentage of ELV	%	…	4.81

***Reference Conditions (273K, 101.3kPa, 3% Oxygen, Dry Gas)**

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Table 3 – Heavy Metals & Mercury
Light Medical Waste (3% Oxygen & Dry Gas)

Sampling Location: Incinerator Incinerator Exhaust

Test Heavy Metals & Hg					
Stack Profile:	Circular	Units	Gas velocity (as Measured. Adjusted for Smooth Walls):	13.7056	m/sec
Diameter:	0.30	m	Gas velocity (Reference Conditions):	1.8370	m/sec *
			Volumetric Flowrate (as Measured):	0.9688	m^3/sec
Area of sample plane:	0.071	m^2	Volumetric Flowrate (Reference Conditions):	0.1298	m^3/sec *
Moisture Content:	4.42	%	Sample Date:	13/02/2024	
Stack Temperature:	198	°C	Sample Period:	13:55 - 15:55	
Barometric Pressure:	1015	mbar	Sample Volume:	0.516	m^3
Measured Oxygen:	16.65	%	Isokinetic Rate (95% < ISOKx > 115%):	98.62	%

***Reference Conditions: (273K, 101.3kPa, 3% Oxygen, Dry Gas)**

Trace Element	Symbol	Mass (mg)			ECL/24/421 - 424 Concentration (mg/m^3)*			Emission Rate (g/hr)*	Uncertainty (%)	ECL/24/433 - 436 Blank	
		Particulate Phase	Vapour Phase	Total Element Phase	Particulate Phase	Vapour Phase	Total Element Phase		Total Element Phase	Mass (mg)	Conc. (mg/m^3)
Antimony	Sb	0.065	0.012	0.077	0.13	0.023	**0.15**	**0.069**	15	0.00070	0.0014
Arsenic	As	0.0012	0.00015	0.0014	0.0023	0.00030	**0.0026**	**0.0012**	13	0.00076	0.0015
Cadmium	Cd	0.0016	0.00010	0.0017	0.0031	0.00020	***0.0043***	**0.0020**	14	0.0022	0.0043
Chromium	Cr	0.011	0.00030	0.011	0.020	0.00059	**0.021**	**0.0098**	14	0.0015	0.0029
Cobalt	Co	0.00070	0.00010	0.00080	0.0014	0.00020	**0.0016**	**0.00073**	14	0.00060	0.0012
Copper	Cu	0.31	0.0013	0.31	0.61	0.0025	**0.61**	**0.28**	15	0.0013	0.0025
Lead	Pb	0.027	0.0019	0.029	0.052	0.0037	**0.055**	**0.026**	15	0.0039	0.0076
Manganese	Mn	0.022	0.00061	0.022	0.042	0.0012	**0.043**	**0.020**	18	0.0066	0.013
Mercury	Hg	0.00017	0.00026	0.00043	0.00034	0.00050	**0.00083**	**0.00039**	12	0.00037	0.00072
Nickel	Ni	0.023	0.00062	0.023	0.044	0.0012	**0.045**	**0.021**	14	0.00086	0.0017
Thallium	Tl	0.00040	0.00010	0.00050	0.00077	0.00020	***0.00098***	**0.00046**	14	0.00050	0.00098
Vanadium	V	0.00080	0.000085	0.00088	0.0015	0.00016	***0.0022***	**0.0010**	14	0.0012	0.0022
Mercury		0.00017	0.00026	0.00043	0.00034	0.00050	**0.00083**	**0.00039**	7	0.00037	0.00072
Cadmium & Thallium		0.0020	0.00020	0.0022	0.0039	0.00040	**0.0052**	**0.0025**	5	0.0027	0.0052
Antimony, Arsenic, Chromium, Cobalt, Copper, Lead, Manganese, Nickel & Vanadium		0.46	0.017	0.48	0.89	0.033	**0.93**	**0.43**	6	0.017	0.034

Blank<10% of ELV
Blank>10% of ELV!
Blank>10% of ELV!

Note: Uncertainty for each metals group is based on the summation in quadrature of the individual standard uncertainties (in mg/m^3) of each contributing metal. Combined standard uncertainty of each group is converted to 95% confidence (multiplication by k = 2) before being expressed as a percentage of the combined group concentration.

Selibon N.V.
Permit No : ...
Variation No : ...
Report Ref : P5632 : R001

Installation Name : Incinerator Exhaust
Visit Details : Emissions Survey – February 2024
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Report Issue Date. : 20th December 2024

Table 3b – Heavy Metals Efficiencies & Mercury Light Medical Waste (3% Oxygen & Dry Gas)

Metals groups have been selected. Efficiencies will only be displayed for individual elements if the group total concentration is greater than 30% of the associated ELV.

Recovery in the final impinger must be <10% of the total combined element mass (i.e. filter, probe rinse & impingers) to pass - ONLY if the element makes up >1% of the total mass of all metals collected

Trace Element	Symbol	Final Impinger (%)	<10%?	<1% of Total?
Antimony	Sb	N/A	N/A	NO
Arsenic	As	N/A	N/A	YES
Cadmium	Cd	N/A	N/A	NO
Chromium	Cr	N/A	N/A	NO
Cobalt	Co	N/A	N/A	YES
Copper	Cu	N/A	N/A	NO
Lead	Pb	N/A	N/A	NO
Manganese	Mn	N/A	N/A	NO
Mercury	Hg	N/A	N/A	NO
Nickel	Ni	N/A	N/A	NO
Thallium	Tl	N/A	N/A	NO
Vanadium	V	N/A	N/A	YES

Combined Groups	ELV mg/m^3	Result <30% ELV?
Mercury	0.02	YES
Cadmium & Thallium	0.015	NO
Antimony, Arsenic, Chromium, Cobalt, Copper, Lead, Manganese, Nickel & Vanadium	0.15	NO

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
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Table 4 – Particulates & HCl/HF
Medium Bin Medical Waste (3% Oxygen & Dry Gas)

Data Recorded from Incinerator Exhaust - Incinerator

Emission Parameter	Units	TPM / HCL & HF 2	Blank
Stack Diameter	metres	0.30	…
Area of Sample Plane	m^2	0.071	…
Moisture Content	%	4.39	…
Oxygen Content	%	16.26	…
Stack Temperature	^oC	480	…
Gas Velocity (as Measured. Adjusted for Smooth Walls)	m/sec	39.0171	…
Gas Velocity (Reference Conditions)	m/sec*	3.5250	…
Volumetric Flowrate (as Measured)	m^3/sec	2.7580	…
Volumetric Flowrate (Reference Conditions)	m^3/sec*	0.2492	…
Dry Gas Molecular Weight	g/gmole	29.1830	
Sample Date	…	14/02/2024	…
Sample Period	…	09:25 - 10:25	…
Sample Volume (reference Conditions)	m^3*	0.266	0.266
Isokinetic Sampling Rate	%	97.53	…
Sample Reference (ECL ID)	ECL/24/	0413 & 0414	0419 & 0420
Mass of Particulate Matter Collected	mg	116.10	4.51
Concentration of Particulate Matter	mg/m^3*	**436.00**	16.94
Emission Rate of Particulate Matter	g/hr	391.09	...
Expanded Uncertainty (% Relative)	%	5	...
Emission Limit Value (ELV)	mg/m^3*	3.6	…
Blank Concentration as Percentage of ELV	%	…	470.46
Sample Reference (ECL ID)	ECL/24/	0439	0442
Mass of Hydrogen Chloride Collected	mg	84.05	0.01
Concentration of Hydrogen Chloride	mg/m^3*	**315.64**	0.05
Emission Rate of Hydrogen Chloride	g/hr	283.13	...
Expanded Uncertainty (% Relative)	%	14	...
Emission Limit Value (ELV)	mg/m^3*	30	…
Blank Concentration as Percentage of ELV	%	…	<1.00%
Sample Reference	ECL/24/	0439	0442
Mass of Hydrogen Fluoride Collected	mg	1.57	0.01
Concentration of Hydrogen Fluoride	mg/m^3*	**5.91**	0.05
Emission Rate of Hydrogen Fluoride	g/hr	5.30	...
Expanded Uncertainty (% Relative)	%	14	...
Emission Limit Value (ELV)	mg/m^3*	10	…
Blank Concentration as Percentage of ELV	%	…	<1.00%

***Reference Conditions (273K, 101.3kPa, 3% Oxygen, Dry Gas)**

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Table 5 – Sulphur Dioxide
Medium Bin Medical Waste (3% Oxygen & Dry Gas)

Data Recorded from Incinerator Exhaust - Incinerator

Emission Parameter	Units	Sulphur Dioxide 2	Blank
Stack Diameter	metres	0.30	
Area of Sample Plane	m^2	0.071	
Moisture Content	%	4.68	
Oxygen Content	%	16.13	
Stack Temperature	^oC	508	
Gas Velocity (as Measured)	m/sec	42.68	
Gas Velocity (Reference Conditions)	m/sec*	3.54	
Volumetric Flowrate (as Measured)	m^3/sec	3.02	
Volumetric Flowrate (Reference Conditions)	m^3/sec*	0.25	
Dry Gas Molecular Weight	g/gmole	29.19861109	
Sample Date	...	14/02/2024	
Sample Period	...	11:20 - 12:20	
Sample Volume (reference Conditions)	m^3*	0.221	0.221
Sample Reference	ECL/24/	0445	0448
Mass of Sulphur Dioxide Collected	mg	6.86	0.18
Concentration of Sulphur Dioxide	mg/m^3*	**31.04**	0.82
Emission Rate of Sulphur Dioxide	g/hr	27.93	...
Expanded Uncertainty (% Relative)	%	14	...
Emission Limit Value (ELV)	mg/m^3*	20.7	...
Blank Concentration as Percentage of ELV	%	...	3.94

***Reference Conditions (273K, 101.3kPa, 3% Oxygen, Dry Gas)**

Selibon N.V.
Permit No : ...
Variation No : ...
Report Ref : P5632 : R001

Installation Name : Incinerator Exhaust
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Table 6 – Heavy Metals & Mercury
Medium Bin Medical Waste (3% Oxygen & Dry Gas)

Sampling Location: Incinerator Incinerator Exhaust

Test Heavy Metals & Hg 2					
Stack Profile:	**Circular**	**Units**	**Gas velocity (as Measured. Adjusted for Smooth Walls):**	**40.4285**	**m/sec**
Diameter:	**0.30**	**m**	**Gas velocity (Reference Conditions):**	**3.0184**	**m/sec ***
			Volumetric Flowrate (as Measured):	**2.8577**	**m^3/sec**
Area of sample plane:	**0.071**	**m^2**	**Volumetric Flowrate (Reference Conditions):**	**0.2134**	**m^3/sec ***
Moisture Content:	**4.29**	**%**	**Sample Date:**	**14/02/2024**	
Stack Temperature:	**440**	**°C**	**Sample Period:**	**13:33 - 15:43**	
Barometric Pressure:	**1016**	**mbar**	**Sample Volume:**	**0.442**	**m^3**
Measured Oxygen:	**17.35**	**%**	**Isokinetic Rate (95% < ISOKx > 115%):**	**96.00**	**%**

***Reference Conditions: (273K, 101.3kPa, 3% Oxygen, Dry Gas)**

Trace Element	Symbol	Mass (mg)			ECL/24/425 - 428 Concentration (mg/m^3)*			Emission Rate (g/hr)*	Uncertainty (%)	ECL/24/433 - 436 Blank	
		Particulate Phase	Vapour Phase	Total Element Phase	Particulate Phase	Vapour Phase	Total Element Phase		Total Element Phase	Mass (mg)	Conc. (mg/m^3)
Antimony	**Sb**	0.046	0.0015	0.047	0.10	0.0034	**0.11**	**0.083**	18	0.00070	0.0016
Arsenic	**As**	0.00090	0.00082	0.0017	0.0020	0.0019	**0.0039**	**0.0030**	13	0.00076	0.0017
Cadmium	**Cd**	0.0012	0.00019	0.0014	0.0027	0.00043	***0.0050***	**0.0038**	14	0.0022	0.0050
Chromium	**Cr**	0.099	0.00081	0.10	0.22	0.0018	**0.23**	**0.17**	15	0.0015	0.0034
Cobalt	**Co**	0.0014	0.00019	0.0016	0.0032	0.00043	**0.0036**	**0.0028**	14	0.00060	0.0014
Copper	**Cu**	0.056	0.0022	0.058	0.13	0.0049	**0.13**	**0.10**	15	0.0013	0.0030
Lead	**Pb**	0.011	0.0019	0.013	0.025	0.0043	**0.029**	**0.022**	15	0.0039	0.0088
Manganese	**Mn**	0.023	0.00096	0.024	0.052	0.0022	**0.054**	**0.042**	18	0.0066	0.015
Mercury	**Hg**	0.00022	0.00048	0.00070	0.00050	0.0011	**0.0016**	**0.0012**	13	0.00037	0.00084
Nickel	**Ni**	0.038	0.00090	0.039	0.087	0.0020	**0.089**	**0.068**	15	0.00086	0.0019
Thallium	**Tl**	0.00040	0.00019	0.00059	0.00091	0.00043	**0.0013**	**0.0010**	14	0.00050	0.0011
Vanadium	**V**	0.0029	0.00017	0.0031	0.0066	0.00039	**0.0070**	**0.0053**	15	0.0012	0.0026
Mercury		0.00022	0.00048	0.00070	0.00050	0.0011	**0.0016**	**0.0012**	7	0.00037	0.00084
Cadmium & Thallium		0.0016	0.00038	0.0020	0.0036	0.00087	**0.0063**	**0.0049**	4	0.0027	0.0061
Antimony, Arsenic, Chromium, Cobalt, Copper, Lead, Manganese, Nickel & Vanadium		0.28	0.0094	0.29	0.63	0.021	**0.65**	**0.50**	4	0.017	0.039

Blank<10% of ELV
Blank>10% of ELV!
Blank>10% of ELV!

Note: Uncertainty for each metals group is based on the summation in quadrature of the individual standard uncertainties (in mg/m^3) of each contributing metal. Combined standard uncertainty of each group is converted to 95% confidence (multiplication by k = 2) before being expressed as a percentage of the combined group concentration.

Selibon N.V.
Permit No : ...
Variation No : ...
Report Ref : P5632 : R001

Installation Name : Incinerator Exhaust
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Table 6b – Heavy Metals Efficiencies & Mercury Medium Bin Medical Waste (3% Oxygen & Dry Gas)

Metals groups have been selected. Efficiencies will only be displayed for individual elements if the group total concentration is greater than 30% of the associated ELV.

Recovery in the final impinger must be <10% of the total combined element mass (i.e. filter, probe rinse & impingers) to pass - ONLY if the element makes up >1% of the total mass of all metals collected

Trace Element	Symbol	Final Impinger (%)	<10%?	<1% of Total?
Antimony	Sb	N/A	N/A	NO
Arsenic	As	N/A	N/A	YES
Cadmium	Cd	N/A	N/A	NO
Chromium	Cr	N/A	N/A	NO
Cobalt	Co	N/A	N/A	YES
Copper	Cu	N/A	N/A	NO
Lead	Pb	N/A	N/A	NO
Manganese	Mn	N/A	N/A	NO
Mercury	Hg	N/A	N/A	NO
Nickel	Ni	N/A	N/A	NO
Thallium	Tl	N/A	N/A	NO
Vanadium	V	N/A	N/A	NO

Combined Groups	ELV mg/m^3	Result <30% ELV?
Mercury	0.02	YES
Cadmium & Thallium	0.015	NO
Antimony, Arsenic, Chromium, Cobalt, Copper, Lead, Manganese, Nickel & Vanadium	0.15	NO

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Table 7 – Chlorinated Dioxins & Furans
Medium Bin Medical Waste (3% Oxygen & Dry Gas)

Data Recorded from Incinerator - Stack Incinerator Exhaust

Emission Parameter	Units	Chlorinated D & F
Stack Diameter	**metres**	0.3
-	**-**	-
Area of sample plane	**m^2**	0.071
Moisture Content	**%**	3.26
Moisture Expanded Uncertainty	%(Relative)	5.42
Stack Temperature	**^oC**	497
Oxygen Concentration	**%**	15.19
Gas velocity (as Measured)	**m/sec**	47.8223
Gas velocity (Reference Conditions)	**m/sec***	5.3104
Volumetric Flowrate (as Measured)	**m^3/sec**	3.3804
Volumetric Flowrate (Reference	**m^3/sec***	0.3754
Sample Date	15/02/2024	
Sample Period	09:40 - 14:50	
Sample Reference	ECL/24/0402 - 0404	
Sample Volume (Reference Conditions)	**m^3 ***	1.98
Isokinetic Sampling Rate	**%**	**97.61**

Species	Sample Reference: ECL/24/0402 - 0404		Blank Reference: ECL/24/0408 - 0410	
	Conc. ng/m³*	TEQ ng/m³*	Conc. ng/m³*	TEQ ng/m³*
Chlorinated Dioxins 2,3,7,8 Isomers	**16.39**	**6.27**	**0.0016**	**0.00017**
Total Chlorinated Dioxins Non – Targeted Isomers	**0.00**	**…**	**0.00**	**…**
Chlorinated Furans 2,3,7,8 Isomers	**91.17**	**14.59**	**0.0018**	***0.00025***
Total Chlorinated Furans Non – Targeted Isomers	**0.00**	**…**	**0.00**	**…**
TOTAL	**…**	**20.86**	**…**	**0.00042**
Range	**…**	**20.86 - 20.86**	**Blank <10% of ELV?**	**YES**
% Uncertainty	**…**	**15**		

***Reference Conditions 273K, 101.3kPa, 3% Oxygen, Dry Gas. NB: For each congener, where the blank concentration exceeds or equals the measured concentration, the blank value has been substituted. Refer to the table of individual congeners for more detailed information.**

Selibon N.V.
Permit No : ...
Variation No : ...
Report Ref : P5632 : R001

Installation Name : Incinerator Exhaust
Visit Details : Emissions Survey – February 2024
Survey Dates : 12th – 16th February 2024
Report Issue Date. : 20th December 2024

Table 7b – Chlorinated Dioxins & Furans
Medium Bin Medical Waste (3% Oxygen & Dry Gas)

Data Recorded from Incinerator - Stack Incinerator Exhaust on the 15/02/24, 09:40 - 14:50

Species	Blank Reference: ECL/24/0408 - 0410 TEQ ng/m³*	EEC Toxic Equivalent Factor (TEF)	Sample Ref.: ECL/24/0402 - 0404 Concentration ng/m³*	Sample Ref.: ECL/24/0402 - 0404 TEQ ng/m³*	WHO Humans & Mammals (TEF)	Humans & Mammals TEQ ng/m³*	WHO Fish (TEF)	Fish TEQ ng/m³*	WHO Birds (TEF)	Birds TEQ ng/m³*
Chlorinated Dioxins - 2,3,7,8 Isomers										
2,3,7,8 - TCDD	0.000071	1	**3.23**	**3.23**	1	**3.23**	1	**3.23**	1	**3.23**
1,2,3,7,8 - PCDD	0.000048	0.5	**5.06**	**2.53**	1	**5.06**	1	**5.06**	1	**5.06**
1,2,3,4,7,8 - HxCDD	0.000016	0.1	**1.34**	**0.13**	0.1	**0.13**	0.5	**0.67**	0.05	**0.067**
1,2,3,6,7,8 - HxCDD	0.000018	0.1	**1.44**	**0.14**	0.1	**0.14**	0.01	**0.014**	0.01	**0.014**
1,2,3,7,8,9 - HxCDD	0.000019	0.1	**2.05**	**0.20**	0.1	**0.20**	0.01	**0.020**	0.1	**0.20**
1,2,3,4,6,7,8 - HpCDD	0.000002	0.01	**2.39**	**0.024**	0.01	**0.024**	0.001	**0.0024**	0.001	**0.0024**
OCDD	0.000001	0.001	**0.88**	**0.00088**	0.0001	**0.000088**	0	**...**	0	**...**
Total Chlorinated Dioxins - Non - Targeted Isomers										
TCDD	...	0	0.000000	...	0	...	0	...	0	...
PCDD	...	0	0.000000	...	0	...	0	...	0	...
HxCDD	...	0	0.000000	...	0	...	0	...	0	...
HpCDD	...	0	0.000000	...	0	...	0	...	0	...
Chlorinated Furans - 2,3,7,8 Isomers										
2,3,7,8 - TCDF	0.000014	0.1	**20.44**	**2.04**	0.1	**2.04**	0.05	**1.02**	1	**20.44**
1,2,3,7,8 - PCDF	0.000007	0.05	**19.23**	**0.96**	0.05	**0.96**	0.05	**0.96**	0.1	**1.92**
2,3,4,7,8 - PCDF	0.00019	0.5	**18.07**	**9.03**	0.5	**9.03**	0.5	**9.03**	1	**18.07**
1,2,3,4,7,8 - HxCDF	0.000010	0.1	**9.11**	**0.91**	0.1	**0.91**	0.1	**0.91**	0.1	**0.91**
1,2,3,6,7,8 - HxCDF	0.000008	0.1	**9.62**	**0.96**	0.1	**0.96**	0.1	**0.96**	0.1	**0.96**
2,3,4,6,7,8 - HxCDF	0.000008	0.1	**5.52**	**0.55**	0.1	**0.55**	0.1	**0.55**	0.1	**0.55**
1,2,3,7,8,9 - HxCDF	0.000009	0.1	**0.44**	**0.044**	0.1	**0.044**	0.1	**0.044**	0.1	**0.044**
1,2,3,4,6,7,8 - HpCDF	0.000002	0.01	**6.88**	**0.069**	0.01	**0.069**	0.01	**0.069**	0.01	**0.069**
1,2,3,4,7,8,9 - HpCDF	0.000003	0.01	**0.99**	**0.0099**	0.01	**0.0099**	0.01	**0.0099**	0.01	**0.0099**
OCDF	0.000000	0.001	**0.87**	**0.00087**	0.0001	**0.000087**	0.0001	**0.000087**	0.0001	**0.000087**
Total Chlorinated Furans - Non - Targeted Isomers										
TCDF	...	0	0.000000	...	0	...	0	...	0	...
PCDF	...	0	0.000000	...	0	...	0	...	0	...
HxCDF	...	0	0.000000	...	0	...	0	...	0	...
HpCDF	...	0	0.000000	...	0	...	0	...	0	...
TOTAL	**0.00042**	**...**	**...**	**20.86**	**...**	**23.39**	**...**	**22.56**	**...**	**51.56**
Range	**...**	**...**	**...**	**20.86 - 20.86**	**...**	**23.39 - 23.39**	**...**	**22.56 - 22.56**	**...**	**51.56 - 51.56**
% Uncertainty	**...**	**...**	**...**	**15**	**...**	**15**	**...**	**15**	**...**	**17**

***Reference Conditions 273K, 101.3kPa, 3% Oxygen, Dry Gas. NB: For each congener, where the blank concentration exceeds or equals the measured concentration, the blank value has been substituted.This is presented as shaded cells. Where the Limit of Detection applies, concentrations are presented in italics.**

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Table 8 – Particulates & HCl/HF
Dead Animal Waste (3% Oxygen & Dry Gas)

Data Recorded from Incinerator Exhaust - Incinerator

Emission Parameter	Units	TPM / HCL & HF 3	Blank
Stack Diameter	metres	0.30	…
Area of Sample Plane	m^2	0.071	…
Moisture Content	%	11.54	…
Oxygen Content	%	18.42	…
Stack Temperature	^oC	367	…
Gas Velocity (as Measured. Adjusted for Smooth Walls)	m/sec	43.4559	…
Gas Velocity (Reference Conditions)	m/sec*	2.2856	…
Volumetric Flowrate (as Measured)	m^3/sec	3.0717	…
Volumetric Flowrate (Reference Conditions)	m^3/sec*	0.1616	…
Dry Gas Molecular Weight	g/gmole	29.0246	
Sample Date	…	15/02/2024	…
Sample Period	…	16:00 - 17:00	…
Sample Volume (reference Conditions)	m^3*	0.198	0.198
Isokinetic Sampling Rate	%	109.86	…
Sample Reference (ECL ID)	ECL/24/	0415 & 0416	0419 & 0420
Mass of Particulate Matter Collected	mg	46.20	4.51
Concentration of Particulate Matter	mg/m^3*	**233.26**	22.77
Emission Rate of Particulate Matter	g/hr	135.67	...
Expanded Uncertainty (% Relative)	%	8	...
Emission Limit Value (ELV)	mg/m^3*	3.6	…
Blank Concentration as Percentage of ELV	%	…	632.51
Sample Reference (ECL ID)	ECL/24/	0440	0442
Mass of Hydrogen Chloride Collected	mg	8.28	0.01
Concentration of Hydrogen Chloride	mg/m^3*	**41.82**	0.07
Emission Rate of Hydrogen Chloride	g/hr	24.33	...
Expanded Uncertainty (% Relative)	%	15	...
Emission Limit Value (ELV)	mg/m^3*	30	…
Blank Concentration as Percentage of ELV	%	…	<1.00%
Sample Reference	ECL/24/	0440	0442
Mass of Hydrogen Fluoride Collected	mg	3.31	0.01
Concentration of Hydrogen Fluoride	mg/m^3*	**16.70**	0.07
Emission Rate of Hydrogen Fluoride	g/hr	9.71	...
Expanded Uncertainty (% Relative)	%	15	...
Emission Limit Value (ELV)	mg/m^3*	10	…
Blank Concentration as Percentage of ELV	%	…	<1.00%

***Reference Conditions (273K, 101.3kPa, 3% Oxygen, Dry Gas)**

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
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Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Table 9 – Sulphur Dioxide
Dead Animal Waste (3% Oxygen & Dry Gas)

Data Recorded from Incinerator Exhaust - Incinerator

Emission Parameter	Units	Sulphur Dioxide 3	Blank
Stack Diameter	metres	0.30	
Area of Sample Plane	m^2	0.071	
Moisture Content	%	13.29	
Oxygen Content	%	6.71	
Stack Temperature	^oC	766	
Gas Velocity (as Measured)	m/sec	44.10	
Gas Velocity (Reference Conditions)	m/sec*	12.95	
Volumetric Flowrate (as Measured)	m^3/sec	3.12	
Volumetric Flowrate (Reference Conditions)	m^3/sec*	0.92	
Dry Gas Molecular Weight	g/gmole	29.99809191	
Sample Date	...	15/02/2024	
Sample Period	...	17:45 - 18:45	
Sample Volume (reference Conditions)	m^3*	0.624	0.624
Sample Reference	ECL/24/	0446	0448
Mass of Sulphur Dioxide Collected	mg	629.10	0.18
Concentration of Sulphur Dioxide	mg/m^3*	**1008.11**	0.29
Emission Rate of Sulphur Dioxide	g/hr	3322.07	...
Expanded Uncertainty (% Relative)	%	13	...
Emission Limit Value (ELV)	mg/m^3*	20.7	...
Blank Concentration as Percentage of ELV	%	...	1.40

***Reference Conditions (273K, 101.3kPa, 3% Oxygen, Dry Gas)**

Selibon N.V.
Permit No : ...
Variation No : ...
Report Ref : P5632 : R001

Installation Name : Incinerator Exhaust
Visit Details : Emissions Survey – February 2024
Survey Dates : 12th – 16th February 2024
Report Issue Date. : 20th December 2024

Table 10 – Heavy Metals & Mercury
Dead Animal Waste (3% Oxygen & Dry Gas)

Sampling Location: Incinerator Incinerator Exhaust

Test Heavy Metals & Hg 3					
Stack Profile:	Circular	Units	Gas velocity (as Measured. Adjusted for Smooth Walls):	45.2755	m/sec
Diameter:	0.30	m	Gas velocity (Reference Conditions):	7.7906	m/sec *
			Volumetric Flowrate (as Measured):	3.2003	m^3/sec
Area of sample plane:	0.071	m^2	Volumetric Flowrate (Reference Conditions):	0.5507	m^3/sec *
Moisture Content:	11.29	%	Sample Date:	15/02/2024	
Stack Temperature:	343	°C	Sample Period:	19:45 - 20:45	
Barometric Pressure:	1015	mbar	Sample Volume:	0.644	m^3
Measured Oxygen:	13.16	%	Isokinetic Rate (95% < ISOKx > 115%):	108.49	%

***Reference Conditions: (273K, 101.3kPa, 3% Oxygen, Dry Gas)**

Trace Element	Symbol	Mass (mg)			ECL/24/429 - 432 Concentration (mg/m^3)*			Emission Rate (g/hr)*	Uncertainty (%)	ECL/24/433 - 436 Blank	
		Particulate Phase	Vapour Phase	Total Element Phase	Particulate Phase	Vapour Phase	Total Element Phase		Total Element Phase	Mass (mg)	Conc. (mg/m^3)
Antimony	Sb	0.0070	0.00021	0.0072	0.011	0.00032	**0.011**	**0.022**	15	0.00070	0.0011
Arsenic	As	0.0032	0.00022	0.0034	0.0050	0.00034	**0.0053**	**0.011**	12	0.00076	0.0012
Cadmium	Cd	0.0011	0.00015	0.0012	0.0017	0.00023	***0.0034***	**0.0068**	12	0.0022	0.0034
Chromium	Cr	0.020	0.00069	0.020	0.031	0.0011	**0.032**	**0.063**	13	0.0015	0.0023
Cobalt	Co	0.00050	0.00015	0.00065	0.00078	0.00023	**0.0010**	**0.0020**	11	0.00060	0.00094
Copper	Cu	0.046	0.00042	0.046	0.071	0.00065	**0.072**	**0.14**	13	0.0013	0.0020
Lead	Pb	0.061	0.0028	0.064	0.095	0.0044	**0.099**	**0.20**	13	0.0039	0.0061
Manganese	Mn	0.0063	0.00069	0.0070	0.0098	0.0011	**0.011**	**0.022**	15	0.0066	0.010
Mercury	Hg	0.00018	0.00037	0.00055	0.00027	0.00057	**0.00085**	**0.0017**	10	0.00037	0.00058
Nickel	Ni	0.0066	0.00040	0.0070	0.010	0.00062	**0.011**	**0.022**	12	0.00086	0.0013
Thallium	Tl	0.00050	0.00015	0.00065	0.00078	0.00023	**0.0010**	**0.0020**	12	0.00050	0.00078
Vanadium	V	0.00050	0.000074	0.00057	0.00078	0.00011	***0.0018***	**0.0035**	12	0.0012	0.0018
Mercury		0.00018	0.00037	0.00055	0.00027	0.00057	**0.00085**	**0.0017**	6	0.00037	0.00058
Cadmium & Thallium		0.0016	0.00030	0.0019	0.0025	0.00046	**0.0044**	**0.0088**	3	0.0027	0.0042
Antimony, Arsenic, Chromium, Cobalt, Copper, Lead, Manganese, Nickel & Vanadium		0.15	0.0057	0.16	0.23	0.0088	**0.24**	**0.48**	4	0.017	0.027

Blank<10% of ELV
Blank>10% of ELV!
Blank>10% of ELV!

Note: Uncertainty for each metals group is based on the summation in quadrature of the individual standard uncertainties (in mg/m^3) of each contributing metal. Combined standard uncertainty of each group is converted to 95% confidence (multiplication by k = 2) before being expressed as a percentage of the combined group concentration.

Selibon N.V.
Permit No : ...
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Table 10b – Heavy Metals Efficiencies & Mercury Dead Animal Waste (3% Oxygen & Dry Gas)

Metals groups have been selected. Efficiencies will only be displayed for individual elements if the group total concentration is greater than 30% of the associated ELV.

Recovery in the final impinger must be <10% of the total combined element mass (i.e. filter, probe rinse & impingers) to pass - ONLY if the element makes up >1% of the total mass of all metals collected

Trace Element	Symbol	Final Impinger (%)	<10%?	<1% of Total?
Antimony	Sb	N/A	N/A	NO
Arsenic	As	N/A	N/A	NO
Cadmium	Cd	N/A	N/A	NO
Chromium	Cr	N/A	N/A	NO
Cobalt	Co	N/A	N/A	YES
Copper	Cu	N/A	N/A	NO
Lead	Pb	N/A	N/A	NO
Manganese	Mn	N/A	N/A	NO
Mercury	Hg	N/A	N/A	NO
Nickel	Ni	N/A	N/A	NO
Thallium	Tl	N/A	N/A	NO
Vanadium	V	N/A	N/A	YES

Combined Groups	ELV mg/m^3	Result <30% ELV?
Mercury	0.02	YES
Cadmium & Thallium	0.015	YES
Antimony, Arsenic, Chromium, Cobalt, Copper, Lead, Manganese, Nickel & Vanadium	0.15	NO

Selibon N.V.			Installation Name	: Incinerator Exhaust
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Table 11 –– Chlorinated Dioxins & Furans
Dead Animal Waste (3% Oxygen & Dry Gas)

Data Recorded from Incinerator - Stack Incinerator Exhaust

Emission Parameter	Units	Chlorinated D & F T2
Stack Diameter	**metres**	0.3
-	-	-
Area of sample plane	**m^2**	0.071
Moisture Content	**%**	6.95
Moisture Expanded Uncertainty	%(Relative)	6.19
Stack Temperature	**^oC**	663
Oxygen Concentration	**%**	10.13
Gas velocity (as Measured)	**m/sec**	39.4163
Gas velocity (Reference Conditions)	**m/sec***	6.4861
Volumetric Flowrate (as Measured)	**m^3/sec**	2.7862
Volumetric Flowrate (Reference	**m^3/sec***	0.4585
Sample Date	16/02/2024	
Sample Period	10:40 - 11:40	
Sample Reference	ECL/24/0405 - 0407	
Sample Volume (Reference Conditions)	**m^3 ***	0.74
Isokinetic Sampling Rate	**%**	**108.27**

Species	Sample Reference: ECL/24/0405 - 0407		Blank Reference: ECL/24/0408 - 0410	
	Conc. ng/m³*	TEQ ng/m³*	Conc. ng/m³*	TEQ ng/m³*
Chlorinated Dioxins 2,3,7,8 Isomers	**7.64**	**0.74**	**0.0042**	**0.00047**
Total Chlorinated Dioxins Non – Targeted Isomers	**0.00**	**…**	**0.00**	**…**
Chlorinated Furans 2,3,7,8 Isomers	**17.47**	**2.07**	**0.0049**	***0.00066***
Total Chlorinated Furans Non – Targeted Isomers	**0.00**	**…**	**0.00**	**…**
TOTAL	**…**	**2.81**	**…**	**0.00113**
Range	**…**	**2.81 - 2.81**	**Blank <10% of ELV?**	**YES**
% Uncertainty	**…**	**15**		

***Reference Conditions 273K, 101.3kPa, 3% Oxygen, Dry Gas. NB: For each congener, where the blank concentration exceeds or equals the measured concentration, the blank value has been substituted. Refer to the table of individual congeners for more detailed information.**

Selibon N.V.
Permit No : ...
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Installation Name : Incinerator Exhaust
Visit Details : Emissions Survey – February 2024
Survey Dates : 12th – 16th February 2024
Report Issue Date. : 20th December 2024

Table 11b – Chlorinated Dioxins & Furans
Dead Animal Waste (3% Oxygen & Dry Gas)

Data Recorded from Incinerator - Stack Incinerator Exhaust on the 16/02/24, 10:40 - 11:40

Species	Blank Reference: ECL/24/0408 - 0410 TEQ ng/m³*	EEC Toxic Equivalent Factor (TEF)	Sample Ref.: ECL/24/0405 - 0407 Concentration ng/m³*	Sample Ref.: ECL/24/0405 - 0407 TEQ ng/m³*	WHO Humans & Mammals (TEF)	Humans & Mammals TEQ ng/m³*	WHO Fish (TEF)	Fish TEQ ng/m³*	WHO Birds (TEF)	Birds TEQ ng/m³*
Chlorinated Dioxins - 2,3,7,8 Isomers										
2,3,7,8 - TCDD	0.00019	1	**0.22**	**0.22**	1	**0.22**	1	**0.22**	1	**0.22**
1,2,3,7,8 - PCDD	0.00013	0.5	**0.69**	**0.35**	1	**0.69**	1	**0.69**	1	**0.69**
1,2,3,4,7,8 - HxCDD	0.000043	0.1	**0.38**	**0.038**	0.1	**0.038**	0.5	**0.19**	0.05	**0.019**
1,2,3,6,7,8 - HxCDD	0.000047	0.1	**0.51**	**0.051**	0.1	**0.051**	0.01	**0.0051**	0.01	**0.0051**
1,2,3,7,8,9 - HxCDD	0.000051	0.1	**0.56**	**0.056**	0.1	**0.056**	0.01	**0.0056**	0.1	**0.056**
1,2,3,4,6,7,8 - HpCDD	0.000005	0.01	**2.51**	**0.025**	0.01	**0.025**	0.001	**0.0025**	0.001	**0.0025**
OCDD	0.000002	0.001	**2.77**	**0.0028**	0.0001	**0.00028**	0	**...**	0	**...**
Total Chlorinated Dioxins - Non - Targeted Isomers										
TCDD	...	0	0.000000	...	0	...	0	...	0	...
PCDD	...	0	0.000000	...	0	...	0	...	0	...
HxCDD	...	0	0.000000	...	0	...	0	...	0	...
HpCDD	...	0	0.000000	...	0	...	0	...	0	...
Chlorinated Furans - 2,3,7,8 Isomers										
2,3,7,8 - TCDF	0.000036	0.1	**1.62**	**0.16**	0.1	**0.16**	0.05	**0.081**	1	**1.62**
1,2,3,7,8 - PCDF	0.000018	0.05	**1.57**	**0.078**	0.05	**0.078**	0.05	**0.078**	0.1	**0.16**
2,3,4,7,8 - PCDF	0.00050	0.5	**2.50**	**1.25**	0.5	**1.25**	0.5	**1.25**	1	**2.50**
1,2,3,4,7,8 - HxCDF	0.000026	0.1	**1.55**	**0.16**	0.1	**0.16**	0.1	**0.16**	0.1	**0.16**
1,2,3,6,7,8 - HxCDF	0.000022	0.1	**1.80**	**0.18**	0.1	**0.18**	0.1	**0.18**	0.1	**0.18**
2,3,4,6,7,8 - HxCDF	0.000022	0.1	**1.77**	**0.18**	0.1	**0.18**	0.1	**0.18**	0.1	**0.18**
1,2,3,7,8,9 - HxCDF	0.000024	0.1	**0.18**	**0.018**	0.1	**0.018**	0.1	**0.018**	0.1	**0.018**
1,2,3,4,6,7,8 - HpCDF	0.000006	0.01	**3.89**	**0.039**	0.01	**0.039**	0.01	**0.039**	0.01	**0.039**
1,2,3,4,7,8,9 - HpCDF	0.000009	0.01	**0.70**	**0.0070**	0.01	**0.0070**	0.01	**0.0070**	0.01	**0.0070**
OCDF	0.000001	0.001	**1.89**	**0.0019**	0.0001	**0.00019**	0.0001	**0.00019**	0.0001	**0.00019**
Total Chlorinated Furans - Non - Targeted Isomers										
TCDF	...	0	0.000000	...	0	...	0	...	0	...
PCDF	...	0	0.000000	...	0	...	0	...	0	...
HxCDF	...	0	0.000000	...	0	...	0	...	0	...
HpCDF	...	0	0.000000	...	0	...	0	...	0	...
TOTAL	**0.0011**	**...**	**...**	**2.81**	**...**	**3.15**	**...**	**3.10**	**...**	**5.85**
Range	**...**	**...**	**...**	**2.81 - 2.81**	**...**	**3.15 - 3.15**	**...**	**3.1 - 3.1**	**...**	**5.85 - 5.85**
% Uncertainty	**...**	**...**	**...**	**15**	**...**	**14**	**...**	**15**	**...**	**16**

***Reference Conditions 273K, 101.3kPa, 3% Oxygen, Dry Gas. NB: For each congener, where the blank concentration exceeds or equals the measured concentration, the blank value has been substituted.This is presented as shaded cells. Where the Limit of Detection applies, concentrations are presented in italics.**

VELOCITY TRAVERSE PROFILES

Environmental Compliance Limited

Selibon N.V.		Installation Name	: Incinerator Exhaust
Permit No	: ...	Visit Details	: Emissions Survey – February 2024
Variation No	: ...	Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632 : R001	Report Issue Date.	: 20th December 2024

Light Medical Waste (Reference Conditions -273K, 101.3kPa, Dry Gas & 3% Oxygen)

Environmental Compliance Limited	Traverse Data Profoma	Date of Measurement	13/02/2024

Company	Selibon N.V.	Stack Diameter Port A (mm)	300	Average Stack Diameter (mm)	300	Pitot tube coefficient	0.84
Site	ACL Lagun Bonaire	Stack Diameter Port B (mm)		Port Length (mm)	90	Pitot Id	602
Location	Incinerator	Duct Length Port A (mm)		Average Duct Length (mm) L		Stack Thermocouple ID	1329
Stack	Incinerator Exhaust	Duct Length Port B (mm)		Duct width (mm) B		Stack Temp Reader ID	987
Job No	P5632	Duct Length Port C (mm)		Barometric Pressure. (mb)	1015	Manometer ID	989
Operators	SH & LPH	Duct Length Port D (mm)		Ave Static Press. (mm H_20)	8.20	Barometer ID	204

Pre - Traverse Checks Carried Out	Time	Pass/ Fail
Pre - Traverse PITOT Visual Inspection	09:30:00	Pass
Pre - Traverse PITOT Leak Check	09:32:00	Pass

Smooth Walls

Static Pressure Readings (mm H_2O)			
Port A	Port B	Port C	Port D
8.20			

Port/ Point	Distance to Point (mm)	Time	Temperature Readings (^oC) 1	2	3	(ΔP) Pitot Readings (mm H_2O) 1	2	3	Average Temp. (^oC)	Average (ΔP) (mm H_2O)	Swirl Test ^{o} From Reference
A1	150	09:40:00	361.0	364.0	363.0	10.80	11.00	10.60	362.7	10.80	13
									362.7	10.8	Total
Blockage Check @ A1 (L-Type Pitot Only)			Mean			Mean			362.7	10.8	Max
			Difference <5% from Initial ?			Difference <5% from Initial ?			362.7	10.8	Min
									362.7	10.8	Average

Stagnation Check (S-type Pitot Only)	Time	Reading
Static Pressure Via Positive Leg (mm H_2O)	09:48:00	8.20
Static Pressure Via Negative Leg (mm H_2O)	09:50:00	7.80
Difference (Pa) < 1 mm H_20 ?		-0.40

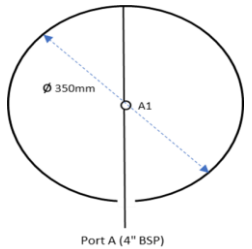
Post - Traverse Checks Carried Out	Time	Pass/ Fail
Post - Traverse PITOT Visual Inspection	09:52:00	Pass
Post - Traverse PITOT Leak Check	09:54:00	Pass

Average temp (K)	635.667

Suitability of Sampling Position	Actual Stack Conditions
Highest lowest flow pressure ratio < 9:1?	1:1
Maximum deviation of flow from axis <15^o ?	13
X-sectional area for stacks= πr2	0.07 m^2
X-sectional area for ducts = L x B	m^2
Suitability of Position for Sampling	OK

Stack Moisture	4.68	%	Gas Velocity (as Measured) Adjusted for Smooth Walls	16.40114	m/sec
Measured Oxygen	17.03	%	Gas Velocity (Reference Conditions) Adjusted for Smooth Walls	1.45557	m/sec*
Measured Carbon Dioxide	2.80	%	Volumetric Flowrate (as Measured) Adjusted for Smooth Walls	1.15933	m^3/sec
Dry Gas Molecular Weight	29.12920	g/g mole	Volumetric Flowrate (Ref Cond) Adjusted for Smooth Walls	0.10289	m^3/sec*

Diagram/ Description of Cross Section of Stack/Duct



Notes
Including expected or actual deviations from procedures / non-conformities

Compliance With Positional Requirements?

Height of sample ports from Platform	1.3m
Number of sample ports	1
Width of platform (port back to handrail)	1.4

Nearest downstream disturbance	Diameter Change	0.62m
Nearest upstream disturbance	Fan / Diameter Change	0.83m / 0.55m

Disturbances are classed as bends, fans or diameter variations

*Reference Conditions: 273K, 101.3kPa, 3% Oxygen, Dry Gas NOTE: Velocity / volume flowrate calculations exclude contributions from the measurement point(s) where swirl >15°

Environmental Compliance Limited

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
Permit No	**: ...**		**Visit Details**	**: Emissions Survey – February 2024**
Variation No	**: ...**		**Survey Dates**	**: 12th – 16th February 2024**
Report Ref	**: P5632**	**: R001**	**Report Issue Date.**	**: 20th December 2024**

Medium Bin Medical Waste (Reference Conditions -273K, 101.3kPa, Dry Gas & 3% Oxygen)

Environmental Compliance Limited	Traverse Data Profoma	Date of Measurement	14/02/2024

Company	Selibon N.V.	Stack Diameter Port A (mm)	300	Average Stack Diameter (mm)	300	Pitot tube coefficient	0.84
Site	ACL Lagun - Bonaire	Stack Diameter Port B (mm)		Port Length (mm)	90	Pitot Id	602
Location	Incinerator	Duct Length Port A (mm)		Average Duct Length (mm) L		Stack Thermocouple ID	1329
Stack	Incinerator Exhaust	Duct Length Port B (mm)		Duct width (mm) B		Stack Temp Reader ID	987
Job No	P5632	Duct Length Port C (mm)		Barometric Pressure. (mb)	1015	Manometer ID	989
Operators	SH & LPH	Duct Length Port D (mm)		Ave Static Press. (mm H_2O)	17.80	Barometer ID	204

Pre - Traverse Checks Carried Out	Time	Pass/ Fail
Pre - Traverse PITOT Visual Inspection	09:11:00	Pass
Pre - Traverse PITOT Leak Check	09:13:00	Pass

Smooth Walls

Static Pressure Readings (mm H_2O)

Port A	Port B	Port C	Port D
17.80			

Port/ Point	Distance to Point (mm)	Time	Temperature Readings (°C) 1	2	3	(ΔP) Pitot Readings (mm H_2O) 1	2	3	Average Temp. (°C)	Average (ΔP) (mm H_2O)	Swirl Test ° From Reference
A1	150	09:15:00	573.0	569.0	564.0	52.00	58.00	56.00	568.7	55.33	12
									568.7	55.3	Total
Blockage Check @ A1 (L-Type Pitot Only)			Mean			Mean			568.7	55.3	Max
			Difference <5% from Initial ?			Difference <5% from Initial ?			568.7	55.3	Min
									568.7	55.3	Average

Stagnation Check (S-type Pitot Only)	Time	Reading
Static Pressure Via Positive Leg (mm H_2O)	09:17:00	17.80
Static Pressure Via Negative Leg (mm H_2O)	09:18:00	18.00
Difference (Pa) < 1 mm H_2O ?		0.20

Post - Traverse Checks Carried Out	Time	Pass/ Fail
Post - Traverse PITOT Visual Inspection	09:19:00	Pass
Post - Traverse PITOT Leak Check	09:21:00	Pass

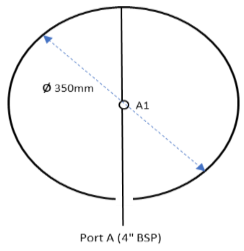
Average temp (K)	841.667

Suitability of Sampling Position	Actual Stack Conditions
Highest:lowest flow pressure ratio < 9:1?	1.06:1
Maximum deviation of flow from axis <15°?	12
X-sectional area for stacks= πr2	0.07 m^2
X-sectional area for ducts = L x B	m^2
Suitability of Position for Sampling	OK

Stack Moisture	4.45	%	Gas Velocity (as Measured) Adjusted for Smooth Walls	42.68199	m/sec
Measured Oxygen	17.13	%	Gas Velocity (Reference Conditions) Adjusted for Smooth Walls	2.79623	m/sec*
Measured Carbon Dioxide	2.75	%	Volumetric Flowrate (as Measured) Adjusted for Smooth Walls	3.01701	m^3/sec
Dry Gas Molecular Weight	29.12520	g/g mole	Volumetric Flowrate (Ref Cond) Adjusted for Smooth Walls	0.19765	m^3/sec*

*Reference Conditions: 273K, 101.3kPa, 3% Oxygen, Dry Gas NOTE: Velocity / volume flowrate calculations exclude contributions from the measurement point(s) where swirl >15°

Diagram/ Description of Cross Section of Stack/Duct



Notes

Including expected or actual deviations from procedures / non-conformities

Compliance With Positional Requirements?

Height of sample ports from Platform	1.3m
Number of sample ports	1
Width of platform (port back to handrail)	1.4

Nearest downstream disturbance	Diameter Change	0.62m
Nearest upstream disturbance	Fan / Diameter Change	0.83m / 0.55m
Disturbances are classed as bends, fans or diameter variations		

Environmental Compliance Limited

Selibon N.V.		Installation Name	: Incinerator Exhaust
Permit No	: ...	Visit Details	: Emissions Survey – February 2024
Variation No	: ...	Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632 : R001	Report Issue Date.	: 20th December 2024

Dead Animal Waste (Reference Conditions -273K, 101.3kPa, Dry Gas & 3% Oxygen)

Environmental Compliance Limited	Traverse Data Profoma	Date of Measurement	15/02/2024

Company	Selibon N.V.	Stack Diameter Port A (mm)	300	Average Stack Diameter (mm)	300	Pitot tube coefficient	0.84
Site	ACL Lagun - Bonaire	Stack Diameter Port B (mm)		Port Length (mm)	90	Pitot Id	602
Location	Incinerator	Duct Length Port A (mm)		Average Duct Length (mm) L		Stack Thermocouple ID	1329
Stack	Incinerator Exhaust	Duct Length Port B (mm)		Duct width (mm) B		Stack Temp Reader ID	987
Job No	P5632	Duct Length Port C (mm)		Barometric Pressure. (mb)	1015	Manometer ID	989
Operators	SH & LPH	Duct Length Port D (mm)		Ave Static Press. (mm H_20)	24.20	Barometer ID	204

Pre - Traverse Checks Carried Out	Time	Pass/ Fail
Pre - Traverse PITOT Visual Inspection	15:38:00	Pass
Pre - Traverse PITOT Leak Check	15:40:00	Pass

Smooth Walls

Static Pressure Readings (mm H_2O)			
Port A	Port B	Port C	Port D
24.20			

Port/ Point	Distance to Point (mm)	Time	Temperature Readings (^oC) 1	2	3	(ΔP) Pitot Readings (mm H_2O) 1	2	3	Average Temp. (^oC)	Average (ΔP) (mm H_2O)	Swirl Test ^{o} From Reference
A1	150	15:42:00	372.0	365.0	369.0	76.00	72.00	80.00	368.7	76.00	11
									368.7	76.0	Total
Blockage Check @ A1 (L-Type Pitot Only)			Mean			Mean			368.7	76.0	Max
			Difference <5% from Initial ?			Difference <5% from Initial ?			368.7	76.0	Min
									368.7	76.0	Average

Stagnation Check (S-type Pitot Only)	Time	Reading
Static Pressure Via Positive Leg (mm H_2O)	15:44:00	24.20
Static Pressure Via Negative Leg (mm H_2O)	15:46:00	25.00
Difference (Pa) < 1 mm H_20 ?		0.80

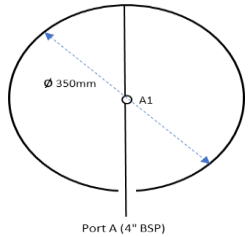
Post - Traverse Checks Carried Out	Time	Pass/ Fail
Post - Traverse PITOT Visual Inspection	15:48:00	Pass
Post - Traverse PITOT Leak Check	15:50:00	Pass

Average temp (K)	641.667

Suitability of Sampling Position	Actual Stack Conditions
Highest:lowest flow pressure ratio < 9:1?	1:1
Maximum deviation of flow from axis <15^o?	11
X-sectional area for stacks= πr2	0.07 m^2
X-sectional area for ducts = L x B	m^2
Suitability of Position for Sampling	OK

Stack Moisture	12.04	%	Gas Velocity (as Measured) Adjusted for Smooth Walls	44.09820	m/sec
Measured Oxygen	13.40	%	Gas Velocity (Reference Conditions) Adjusted for Smooth Walls	6.94445	m/sec*
Measured Carbon Dioxide	5.68	%	Volumetric Flowrate (as Measured) Adjusted for Smooth Walls	3.11712	m^3/sec
Dry Gas Molecular Weight	29.44480	g/g mole	Volumetric Flowrate (Ref Cond) Adjusted for Smooth Walls	0.49087	m^3/sec*

Diagram/ Description of Cross Section of Stack/Duct



Notes
Including expected or actual deviations from procedures / non-conformities

Compliance With Positional Requirements?

Height of sample ports from Platform	1.3m
Number of sample ports	1
Width of platform (port back to handrail)	1.4

Nearest downstream disturbance	Diameter Change	0.62m
Nearest upstream disturbance	Fan / Diameter Change	0.83m / 0.55m

Disturbances are classed as bends, fans or diameter variations

*Reference Conditions: 273K, 101.3kPa, 3% Oxygen, Dry Gas NOTE: Velocity / volume flowrate calculations exclude contributions from the measurement point(s) where swirl >15°

FIELD CALIBRATION AND SAMPLING DATA

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Horiba Calibration Summary (NO_x, CO, CO_2 & O_2) Light Medical Waste 13/02/2024

	Horiba PG 350 E Ranges:			
	NO as NO_2	CO	O_2	CO_2
Units	1025 mg/m^3	6250 mg/m^3	25 %Vol	20 %Vol
Zero Values (Direct)				
Mean Initial Direct Zero	0.00	-0.14	0.01	0.00
Mean Confirmation Direct Zero	0.00	-0.03	0.01	0.03
Difference in Direct Zero	0.00	0.12	0.01	0.03
Repeatability at Zero	4.10	2.50	0.20	0.20
<2 x Repeatability at Zero?	YES	YES	YES	YES
Pre Zero Values (System)				
Mean Pre Test Zero	0.00	0.11	-0.01	0.01
% of Measurement Range?	0.00%	0.00%	-0.05%	0.05%
Detection Limit (LOD)	0.00	0.47	0.20	0.00
Applied Span:				
	NO	CO	O_2	CO_2
Actual Applied Span Concentration	623.41	376.38	15.05	17.95
Pre Test System Zero Values				
Mean Pre Test System Zero	0.00	0.11	-0.01	0.01
Difference ≤ ± 2% of Span Value?	0.00%	0.03%	0.09%	0.05%
Post Test Direct Zero Values				
Mean Post Test Direct Zero	0.00	-0.94	-0.07	0.03
% of Certified Range?	0.00%	-0.02%	-0.28%	0.17%
Zero Drift ≤ ± 5% of Applied Span?	0.00%	0.21%	0.50%	0.17%
Pre Test System Span Values				
Mean Pre Test System Span	620.95	374.90	15.00	17.89
Difference ≤ ± 2% of Span Value ?	0.39%	0.39%	0.31%	0.36%
Post Test Direct Span Values				
Mean Post Test Direct Span	625.97	371.62	14.89	17.94
Span Drift ≤ ± 5% Span Value?	0.41%	1.26%	1.08%	0.04%

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Horiba Calibration Summary (NO_x, CO, CO_2 & O_2) Medium Bin Medical Waste 14/02/2024

	Horiba PG 350 E Ranges:			
	NO as NO_2	CO	O_2	CO_2
Units	1025 mg/m^3	6250 mg/m^3	25 %Vol	20 %Vol
Zero Values (Direct)				
Mean Initial Direct Zero	0.00	-0.14	0.01	0.00
Mean Confirmation Direct Zero	0.00	-0.03	0.01	0.03
Difference in Direct Zero	0.00	0.12	0.01	0.03
Repeatability at Zero	4.10	2.50	0.20	0.20
<2 x Repeatability at Zero?	YES	YES	YES	YES
Pre Zero Values (System)				
Mean Pre Test Zero	0.00	0.11	-0.01	0.01
% of Measurement Range?	0.00%	0.00%	-0.05%	0.05%
Detection Limit (LOD)	0.00	0.47	0.20	0.00
Applied Span:				
	NO	CO	O_2	CO_2
Actual Applied Span Concentration	623.41	376.38	15.05	17.95
Pre Test System Zero Values				
Mean Pre Test System Zero	0.00	0.11	-0.01	0.01
Difference ≤ ± 2% of Span Value?	0.00%	0.03%	0.09%	0.05%
Post Test Direct Zero Values				
Mean Post Test Direct Zero	0.00	-0.81	-0.10	0.05
% of Certified Range?	0.00%	-0.01%	-0.41%	0.24%
Zero Drift ≤ ± 5% of Applied Span?	0.00%	0.18%	0.72%	0.25%
Pre Test System Span Values				
Mean Pre Test System Span	620.95	374.90	15.00	17.89
Difference ≤ ± 2% of Span Value ?	0.39%	0.39%	0.31%	0.36%
Post Test Direct Span Values				
Mean Post Test Direct Span	625.67	373.10	15.01	18.02
Span Drift ≤ ± 5% Span Value?	0.36%	0.87%	0.24%	0.36%

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Horiba Calibration Summary (NO_x, CO, CO_2 & O_2) Dead Animal Waste 15/02/2024

	Horiba PG 350 E Ranges:			
	NO as NO_2	CO	O_2	CO_2
Units	1025 mg/m^3	6250 mg/m^3	25 %Vol	20 %Vol
Zero Values (Direct)				
Mean Initial Direct Zero	0.00	-0.14	0.01	0.00
Mean Confirmation Direct Zero	0.00	-0.03	0.01	0.03
Difference in Direct Zero	0.00	0.12	0.01	0.03
Repeatability at Zero	4.10	2.50	0.20	0.20
<2 x Repeatability at Zero?	YES	YES	YES	YES
Pre Zero Values (System)				
Mean Pre Test Zero	0.00	0.11	-0.01	0.01
% of Measurement Range?	0.00%	0.00%	-0.05%	0.05%
Detection Limit (LOD)	0.00	0.47	0.20	0.00
Applied Span:				
	NO	CO	O_2	CO_2
Actual Applied Span Concentration	623.41	376.38	15.05	17.95
Pre Test System Zero Values				
Mean Pre Test System Zero	0.00	0.11	-0.01	0.01
Difference ≤ ± 2% of Span Value?	0.00%	0.03%	0.09%	0.05%
Post Test Direct Zero Values				
Mean Post Test Direct Zero	0.00	-0.51	-0.07	0.03
% of Certified Range?	0.00%	-0.01%	-0.29%	0.17%
Zero Drift ≤ ± 5% of Applied Span?	0.00%	0.10%	0.51%	0.17%
Pre Test System Span Values				
Mean Pre Test System Span	620.95	374.90	15.00	17.89
Difference ≤ ± 2% of Span Value ?	0.39%	0.39%	0.31%	0.36%
Post Test Direct Span Values				
Mean Post Test Direct Span	625.25	375.86	15.06	18.02
Span Drift ≤ ± 5% Span Value?	0.30%	0.14%	0.04%	0.38%

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Horiba Calibration Summary (NO_x, CO, CO_2 & O_2) Dead Animal Waste 16/02/2024

	Horiba PG 350 E Ranges:			
	NO as NO_2	CO	O_2	CO_2
Units	1025 mg/m^3	6250 mg/m^3	25 %Vol	20 %Vol
Zero Values (Direct)				
Mean Initial Direct Zero	0.00	-0.14	0.01	0.00
Mean Confirmation Direct Zero	0.00	-0.03	0.01	0.03
Difference in Direct Zero	0.00	0.12	0.01	0.03
Repeatability at Zero	4.10	2.50	0.20	0.20
<2 x Repeatability at Zero?	YES	YES	YES	YES
Pre Zero Values (System)				
Mean Pre Test Zero	0.00	0.11	-0.01	0.01
% of Measurement Range?	0.00%	0.00%	-0.05%	0.05%
Detection Limit (LOD)	0.00	0.47	0.20	0.00
Applied Span:				
	NO	CO	O_2	CO_2
Actual Applied Span Concentration	623.41	376.38	15.05	17.95
Pre Test System Zero Values				
Mean Pre Test System Zero	0.00	0.11	-0.01	0.01
Difference ≤ ± 2% of Span Value?	0.00%	0.03%	0.09%	0.05%
Post Test Direct Zero Values				
Mean Post Test Direct Zero	0.00	-0.30	-0.08	0.05
% of Certified Range?	0.00%	0.00%	-0.31%	0.27%
Zero Drift ≤ ± 5% of Applied Span?	0.00%	0.04%	0.56%	0.29%
Pre Test System Span Values				
Mean Pre Test System Span	620.95	374.90	15.00	17.89
Difference ≤ ± 2% of Span Value ?	0.39%	0.39%	0.31%	0.36%
Post Test Direct Span Values				
Mean Post Test Direct Span	625.28	374.25	15.02	17.96
Span Drift ≤ ± 5% Span Value?	0.30%	0.57%	0.22%	0.04%

Selibon N.V.		Installation Name	: Incinerator Exhaust
Permit No	: …	Visit Details	: Emissions Survey – February 2024
Variation No	: …	Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632 : R001	Report Issue Date.	: 20th December 2024

Light Medical Waste

Particulates, Hydrogen Fluoride / Hydrogen Chloride

Environmental Compliance Limited	PARTICULATE DATA SAMPLING PROFORMA	Date of Measurement	13/02/2024
ECL/TPD/	027 & 081	Time taken to change Ports?	0
Start Time	10:15	End Time	11:15
Test Duration	60 mins		

Client	Selibon N.V.	Stack Profile	Circular	Console id	U010	Barometer id	204
Site	ACL Lagun - Bonaire	Stack Area (m^2)	0.07	Pump id	U010	Nozzle Id	402
Location	Incinerator	Barometric Pressure (mb)	1015	Probe id	1328	Nozzle size	7.08
Stack ID	Incinerator Exhaust	Static Pres. (mm H_20)	8.2	DGM Yd	1.0074	Filter Id	4505-259199
Test No.	TPM / HCL & HF 1	Pitot coefficient	0.84	ΔH@	40.96	Pitot ID	602
Job No	P5632	Probe Heater Setting (^oC)	160	Impinger Id	660	Hot Box ID	978
ECL Site Staff	SH & LPH	Hot Box Setting (^oC)	160	Balance Id	368		

IF SAMPLING FOR PARTICULATES NO LEAK CHECKS ARE ALLOWED AFTER SAMPLING HAS STARTED (NOT EVEN IF TRAIN IS BROKEN DOWN)
FOR OTHER SAMPLING (WITHOUT PARTICULATES) LEAK CHECKS ARE ALLOWED AFTER SAMPLING HAS STARTED (BUT ARE NOT MANDATORY)

Silica < 50% Spent at End of Test?	YES

Original K Factor Settings	
Meter Temp.	40
Stack Temp	365
%Moisture	2.00
K factor	2.9
Reference Oxygen Percentage	11

	Sample	Leak 1	Leak 2	Leak 3	Leak 4	Leak 5	Total
Start Volume	2833896.4						
Final Volume	2835015.6						
Total Volume	1119.2	0.0	0.0	0.0	0.0	0.0	1119.2

Leak Check	First	Second	Third	Fourth	Fifth
Leak rate l/min	0.2				
Vaccum "Hg	15				
Time of Check	10:13				
Set Rate l/min	20				
Leak < 2%?	YES				

Dry O_2 (Atmospheric)	16.53
Dry Carbon Dioxide %	3.21

Smooth Walls

Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point (mins)	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	
ΔP (mm H20)	11.00	12.20	10.00	10.40	10.60	10.40	10.80	9.80	10.65
K factor	2.90	2.90	3.20	3.70	3.50	4.20	4.40	2.80	
ΔH (Orifice)	31.90	35.38	32.00	38.48	37.10	43.68	47.52	27.44	36.69
Meter (Tm in)	32.00	33.00	34.00	34.00	35.00	35.00	35.00	35.00	34.13
Meter (Tm out)	32.00	33.00	34.00	34.00	35.00	35.00	35.00	35.00	34.13
Stack Temp (Ts)	371.00	365.00	301.00	232.00	251.00	172.00	151.00	392.00	279.38
Impinger T Outlet	18.00	17.00	15.00	16.00	17.00	17.00	18.00	16.00	16.75
Vaccum (" Hg)	2.00	5.00	7.50	8.00	8.00	8.50	9.00	9.50	7.19

Traverse Point	A1	A1	A1	A1					Total
Time/Point(mins)	40 - 45	45 - 50	50 - 55	55 - 60					
ΔP (mm H20)	9.60	10.00	9.20	8.40					9.30
K factor	3.20	3.60	3.90	4.00					
ΔH (Orifice)	30.72	36.00	35.88	33.60					34.05
Meter (Tm in)	36.00	36.00	37.00	37.00					36.50
Meter (Tm out)	36.00	36.00	37.00	37.00					36.50
Stack Temp (Ts)	304.00	237.00	202.00	185.00					232.00
Impinger T Outlet	15.00	15.00	17.00	18.00					16.25
Vaccum (" Hg)	9.50	10.50	10.50	10.50					10.25

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)									
K factor									
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)									
K factor									
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

Impinger 1	DI H2O
SOL/	5061
Start Weight (g)	660.6
End Weight (g)	674.6
Total weight (g)	14
Impinger 2	DI H2O
SOL/	5061
Start Weight (g)	591.8
End Weight (g)	598.2
Total weight (g)	6.4
Impinger3	DI H2O
SOL/	5061
Start Weight (g)	593
End Weight (g)	596.1
Total weight (g)	3.1
Impinger 4	Empty
SOL/	
Start Weight (g)	553.1
End Weight (g)	557.2
Total weight (g)	4.1
Impinger 5	Silica
SOL/	
Start Weight (g)	748.6
End Weight (g)	760.5
Total weight (g)	11.9
Impinger 6	
SOL/	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Impinger 7	
SOL/	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Impinger 8	
SOL/	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Total (g)	39.50

PRE-Sample PITOT Visual Inspection	
Time	09:52
Pass ? (Y/N)	Y

PRE-Sample PITOT Leak Check	
Time	09:54
Pass ? (Y/N)	Y

Rinse Solutions used	
Solution	SOL NO
DI Water	5061
Acetone	4932

If moisture was not measured and gas was dried before entering the gas meter, impinger weights must be included to produce the moisture concentration used in the isokinetic calculations. If the gas was not dried before it entered the gas meter then impinger weights may be included to produce a nominal 0.1% moisture value.

Additional Moisture Weighings	
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Post-Sample Blockage Check (L-type)	
Time	
Reading (mm H_2O)	
Pass (< 5%) ?	

POST-Sample PITOT Visual Inspection	
Time	11:17
Pass ? (Y/N)	Y

POST-Sample PITOT Leak Check	
Time	11:19
Pass ? (Y/N)	Y

Light Medical Waste

Sulphur Dioxide

Environmental Compliance Limited	NON ISOKINETIC SAMPLING PROFORMA	Date of Measurement	13/02/2024
ECL/TPD/	039	Time taken to change Ports?	0
Start Time	12:25	End Time	13:25
Test Duration	60 mins		

If moisture was not measured see detailed notes below.

Client	Selibon N.V.	Stack Profile	Circular	Console id	U010	Barometer id	204
Site	ACL Lagun - Bonaire	Stack Area (m^2)	0.07	Pump id	U010	Nozzle Id	n/a
Location	Incinerator	Barometric Pressure (mb)	1015	Probe id	1328	Nozzle size	n/a
Stack ID	Incinerator Exhaust	Static Pres. (mm H_20)	8.2	DGM Yd	1.0074	Filter Id	QMA
Test No.	Sulphur Dioxide 1	Pitot coefficient	n/a	ΔH@	40.96	Pitot ID	n/a
Job No	P5632	Probe Heater Setting (^oC)	160	Impinger Id	660	Hot Box ID	978
ECL Site Staff	SH & LPH	Hot Box Setting (^oC)	160	Balance Id	368		

For all parameters a leak check is OPTIONAL at the end of the test.
(and when moving between sample ports if any disconnections are required).

Required Sample Flowrate l/min	Suggested ΔH Entered Below
3	1
6	3
10	10
15	25
25	50
Initial ΔH	25
Reference Oxygen Percentage	11

	Sample	Leak 1	Leak 2	Leak 3	Leak 4	Leak 5	Total
Start Volume	2835770.2						
Final Volume	2836731.0						
Total Volume	960.8	0.0	0.0	0.0	0.0	0.0	960.8

Leak Check	First	Second	Third	Fourth	Fifth
Leak rate l/min	0	0			
Vaccum "Hg	15	10			
Time of Check	12:10	13:27			
Set Rate l/min	20	16.02			
Leak < 2%?	YES	YES			

Dry O_2 (Atmospheric)	17.19
Dry Carbon Dioxide %	2.55
Dry Carbon Monoxide ppm	18.75

Traverse Point	A1	A1	A1	A1	A1	A1			Total
Time/Point (mins)	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60			
ΔP (mm H20)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
K factor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ΔH (Orifice)	25.00	25.00	25.00	25.00	25.00	25.00			25.00
Meter (Tm in)	35.00	36.00	37.00	38.00	38.00	38.00			37.00
Meter (Tm out)	35.00	36.00	37.00	38.00	38.00	38.00			37.00
Stack Temp (Ts)	416.00	252.00	159.00	134.00	108.00	433.00			250.33
Impinger T Outlet	14.00	13.00	11.00	13.00	15.00	17.00			13.83
Vaccum (" Hg)	2.00	2.50	3.00	4.00	5.00	7.50			4.00

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
K factor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
K factor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
K factor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

Impinger 1	3% H2O2
SOL/	5058
Start Weight (g)	654.1
End Weight (g)	670.2
Total weight (g)	16.1
Impinger 2	3% H2O2
SOL/	5058
Start Weight (g)	580.9
End Weight (g)	587.4
Total weight (g)	6.5
Impinger3	3% H2O2
SOL/	5058
Start Weight (g)	582
End Weight (g)	585.1
Total weight (g)	3.1
Impinger 4	Empty
SOL/	
Start Weight (g)	555.3
End Weight (g)	557.1
Total weight (g)	1.8
Impinger 5	Silica
SOL/	
Start Weight (g)	759.2
End Weight (g)	767.7
Total weight (g)	8.5
Impinger 6	
SOL/	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Impinger 7	
SOL/	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Impinger 8	
SOL/	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Total (g)	36.00

Silica < 50% used at End of Test? Y/N	YES

Rinse Solutions used	
Solution	SOL NO
DI Water	5061
Acetone	4932

Additional Moisture Weighings	
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

If moisture was not measured and gas was dried before entering the gas meter, impinger weights must be included to produce the moisture concentration used in the isokinetic calculations. If the gas was not dried before it entered the gas meter then impinger weights may be included to produce a nominal 0.1% moisture value.

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
Permit No	**: ...**		**Visit Details**	**: Emissions Survey – February 2024**
Variation No	**: ...**		**Survey Dates**	**: 12th – 16th February 2024**
Report Ref	**: P5632**	**: R001**	**Report Issue Date.**	**: 20th December 2024**

Light Medical Waste

Heavy Metals & Mercury

METALS DATA SAMPLING PROFORMA			Date of Measurement	13/02/2024
ECL/TPD/	Based on 028 & 030	Time taken to change Ports?	0	Start Time 13:55 — End Time 15:55 — Test Duration 120 mins

Client	Selibon N.V.	Stack Profile	Circular	Console id	U010	Barometer id	204	Rinse Solutions used
Site	ACL Lagun - Bonaire	Stack Area (m^2)	0.07	Pump id	U010	Nozzle Id	402	Solution: SOL NO
Location	Incinerator	Barometric Pressure (mb)	1015	Probe id	1328	Nozzle size	7.08	DI H2O: 5061
Stack ID	Incinerator Exhaust	Static Pres. (mm H_2O)	8.20	DGM Yd	1.0074	Filter Id	QMA	
Test No.	Heavy Metals & Hg	Pitot coefficient	0.84	ΔH@	40.96	Pitot ID	602	
Job No	P5632	Probe Heater Setting (°C)	180	Impinger Id	660	Hot Box ID	978	
ECL Site Staff	SH & LPH	Hot Box Setting (°C)	180	Balance Id	368			

NB: Leak Check - Record Actual leak rate or "0" but not 'less than' values

	Sample	Leak 1	Leak 2	Leak 3	Leak 4	Leak 5	Total
Start Volume	2837393.4						
Final Volume	2839820.6						
Total Volume	2427.2	0.0	0.0	0.0	0.0	0.0	2427.2
Leak Check	First	Second	Third	Fourth	Fifth		
Leak rate l/min	0.2						
Vaccum "Hg	18						
Time of Check	13:53						
Set Rate l/min	18.67						
Leak < 2%?	YES						

Smooth Walls

Dry O_2 (☐ Atmospheric)	16.65
Dry Carbon Dioxide %	3.16

Original K Factor Settings

Meter Temp.	40
Stack Temp	365
%Moisture	4.20
Silica < 50% Spent at End of Test?	YES
K factor	2.9
Reference Oxygen Percentage	11

Leak checks DO NOT NEED to be performed (BUT ARE ALLOWED) at the end of the test or when moving between sample ports, EVEN when disconnections are made.

Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point (mins)	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	
ΔP (mm H20)	10.40	10.60	11.00	10.40	9.80	11.00	10.40	10.60	10.5
K factor	3.80	4.00	4.20	4.30	4.80	2.40	2.80	2.80	
ΔH (Orifice)	39.52	42.40	46.20	44.72	47.04	26.40	29.12	29.68	38.1
Meter (Tm in)	38.00	39.00	39.00	39.00	39.00	40.00	40.00	40.00	39.3
Meter (Tm out)	38.00	39.00	39.00	39.00	39.00	40.00	40.00	40.00	39.3
Stack Temp (Ts)	202.00	175.00	154.00	146.00	101.00	456.00	376.00	361.00	246.4
Impinger T Outlet	18.00	16.00	13.00	11.00	12.00	13.00	14.00	15.00	14.0
Vaccum (" Hg)	2.00	2.00	3.00	3.00	3.50	7.00	9.00	11.00	5.0625

Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point(mins)	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75	75 - 80	
ΔP (mm H20)	10.40	10.00	10.20	10.80	10.40	10.40	10.20	10.00	10.3
K factor	3.20	3.60	3.80	4.00	3.90	4.00	4.00	4.10	
ΔH (Orifice)	33.28	36.00	38.76	43.20	40.56	41.60	40.80	41.00	39.4
Meter (Tm in)	41.00	41.00	41.00	41.00	42.00	42.00	42.00	42.00	41.5
Meter (Tm out)	41.00	41.00	41.00	41.00	42.00	42.00	42.00	42.00	41.5
Stack Temp (Ts)	286.00	221.00	198.00	176.00	181.00	172.00	168.00	164.00	195.8
Impinger T Outlet	15.00	15.00	16.00	16.00	16.00	13.00	12.00	11.00	14.3
Vaccum (" Hg)	11.50	12.00	12.00	12.50	12.50	13.00	13.00	13.00	12.4375

Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point(mins)	80 - 85	85 - 90	90 - 95	95 - 100	100 - 105	105 - 110	110 - 115	115 - 120	
ΔP (mm H20)	10.20	10.00	9.80	9.60	9.80	9.60	9.40	9.60	9.8
K factor	4.10	4.10	4.10	4.10	4.20	4.20	4.20	4.30	
ΔH (Orifice)	41.82	41.00	40.18	39.36	41.16	40.32	39.48	41.28	40.6
Meter (Tm in)	42.00	42.00	42.00	43.00	43.00	43.00	43.00	43.00	42.6
Meter (Tm out)	42.00	42.00	42.00	43.00	43.00	43.00	43.00	43.00	42.6
Stack Temp (Ts)	161.00	157.00	156.00	161.00	153.00	151.00	148.00	138.00	153.1
Impinger T Outlet	11.00	11.00	12.00	13.00	14.00	16.00	16.00	17.00	13.8
Vaccum (" Hg)	13.50	13.50	13.50	14.00	14.00	14.00	14.50	15.00	14

	DI H2O
Impinger 1	
SOL/	5061
Start Weight (g)	654
End Weight (g)	689.4
Total weight (g)	35.4
Impinger 2	
SOL/	5061
Start Weight (g)	684.3
End Weight (g)	701.2
Total weight (g)	16.9
Impinger3	
SOL/	5061
Start Weight (g)	584
End Weight (g)	587.9
Total weight (g)	3.9
Impinger 4	
SOL/	5061
Start Weight (g)	612.1
End Weight (g)	613.4
Total weight (g)	1.3
Impinger 5	Empty
SOL/	
Start Weight (g)	554.7
End Weight (g)	560.2
Total weight (g)	5.5
Impinger 6	Silica
SOL/	
Start Weight (g)	767.7
End Weight (g)	784.1
Total weight (g)	16.4
Impinger 7	
SOL/	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Total (g)	79.4

Pitot Quality Control Checks

PRE-Sample PITOT Visual Inspection	
Time	13:49
Pass? (Y/N)	Y
PRE-Sample PITOT Leak Check	
Time	13:51
Pass? (Y/N)	Y
Post-Sample Blockage Check (L-Type ONLY)	
Time	
Reading (mm H_2O)	
Pass (< 5%) ?	
POST-Sample PITOT Visual Inspection	
Time	15:57
Pass? (Y/N)	Y
POST-Sample PITOT Leak Check	
Time	15:59
Pass? (Y/N)	Y

Additional Moisture Weighings

Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Medium Bin Medical Waste

Particulates, Hydrogen Fluoride / Hydrogen Chloride

Environmental Compliance Limited	PARTICULATE DATA SAMPLING PROFORMA	Date of Measurement	14/02/2024
ECL/TPD/ 027 & 081	Time taken to change Ports? 0	Start Time 09:25 — End Time 10:25 — Test Duration 60 mins	

Client	Selibon N.V.	Stack Profile	Circular	Console id	U010	Barometer id	204	Rinse Solutions used
Site	ACL Lagun - Bonaire	Stack Area (m^2)	0.07	Pump id	U010	Nozzle Id	402	Solution: SOL NO
Location	Incinerator	Barometric Pressure (mb)	1016	Probe id	1328	Nozzle size	5.18	DI Water: 5061
Stack ID	Incinerator Exhaust	Static Pres. (mm H_2O)	17.8	DGM Yd	1.0074	Filter Id	4505-259202	Acetone: 4932
Test No.	TPM / HCL & HF 2	Pitot coefficient	0.84	ΔH@	40.96	Pitot ID	602	
Job No	P5632	Probe Heater Setting (°C)	160	Impinger Id	660	Hot Box ID	978	
ECL Site Staff	SH & LPH	Hot Box Setting (°C)	160	Balance Id	368			

IF SAMPLING FOR PARTICULATES NO LEAK CHECKS ARE ALLOWED AFTER SAMPLING HAS STARTED (NOT EVEN IF TRAIN IS BROKEN DOWN)
FOR OTHER SAMPLING (WITHOUT PARTICULATES) LEAK CHECKS ARE ALLOWED AFTER SAMPLING HAS STARTED (BUT ARE NOT MANDATORY)

	Sample	Leak 1	Leak 2	Leak 3	Leak 4	Leak 5	Total
Start Volume	2840381.0						
Final Volume	2841504.4						
Total Volume	1123.4	0.0	0.0	0.0	0.0	0.0	1123.4
Leak Check	First	Second	Third	Fourth	Fifth		
Leak rate l/min	0.2						
Vaccum "Hg	20						
Time of Check	09:23						
Set Rate l/min	20						
Leak < 2%?	YES						

Dry O_2 (☐ Atmospheric)	16.26
Dry Carbon Dioxide %	3.33

Smooth Walls

Original K Factor Settings

Meter Temp.	40
Stack Temp	500
%Moisture	4.20
Silica < 50% Spent at End of Test?	YES
K factor	0.7
Reference Oxygen Percentage	11

Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point (mins)	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	
ΔP (mm H20)	52.00	52.00	52.00	50.00	52.00	52.00	52.00	52.00	51.75
K factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	
ΔH (Orifice)	36.40	36.40	36.40	35.00	36.40	36.40	36.40	36.40	36.23
Meter (Tm in)	32.00	33.00	34.00	34.00	34.00	35.00	35.00	36.00	34.13
Meter (Tm out)	32.00	33.00	34.00	34.00	34.00	35.00	35.00	36.00	34.13
Stack Temp (Ts)	582.00	569.00	572.00	564.00	456.00	412.00	364.00	332.00	481.38
Impinger T Outlet	18.00	17.00	15.00	14.00	13.00	13.00	13.00	14.00	14.63
Vaccum (" Hg)	3.00	3.00	3.50	3.50	4.00	4.00	4.50	4.50	3.75

Traverse Point	A1	A1	A1	A1					Total
Time/Point(mins)	40 - 45	45 - 50	50 - 55	55 - 60					
ΔP (mm H20)	52.00	52.00	52.00	52.00					52.00
K factor	0.70	0.70	0.70	0.70					
ΔH (Orifice)	36.40	36.40	36.40	36.40					36.40
Meter (Tm in)	36.00	36.00	36.00	36.00					36.00
Meter (Tm out)	36.00	36.00	36.00	36.00					36.00
Stack Temp (Ts)	579.00	364.00	523.00	443.00					477.25
Impinger T Outlet	15.00	16.00	16.00	16.00					15.75
Vaccum (" Hg)	5.00	5.00	5.50	6.00					5.38

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)									
K factor									
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)									
K factor									
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

	DI H2O
Impinger 1	
SOL/	5061
Start Weight (g)	678.8
End Weight (g)	693.5
Total weight (g)	14.7
Impinger 2	
SOL/	5061
Start Weight (g)	675
End Weight (g)	684.8
Total weight (g)	9.8
Impinger3	
SOL/	5061
Start Weight (g)	599.7
End Weight (g)	602.9
Total weight (g)	3.2
Impinger 4	Empty
SOL/	
Start Weight (g)	496.7
End Weight (g)	500.8
Total weight (g)	4.1
Impinger 5	Silica
SOL/	
Start Weight (g)	783.1
End Weight (g)	788.6
Total weight (g)	5.5
Impinger 6	
SOL/	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Impinger 7	
SOL/	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Impinger 8	
SOL/	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Total (g)	37.30

If moisture was not measured and gas was dried before entering the gas meter, impinger weights must be included to produce the moisture concentration used in the isokinetic calculations. If the gas was not dried before it entered the gas meter then impinger weights may be included to produce a nominal 0.1% moisture value.

Additional Moisture Weighings

Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

PRE-Sample PITOT Visual Inspection	
Time	09:19
Pass? (Y/N)	Y
PRE-Sample PITOT Leak Check	
Time	09:21
Pass? (Y/N)	Y

Post-Sample Blockage Check (L-type)	
Time	
Reading (mm H_2O)	
Pass (< 5%) ?	
POST-Sample PITOT Visual Inspection	
Time	10:27
Pass? (Y/N)	Y
POST-Sample PITOT Leak Check	
Time	10:29
Pass? (Y/N)	Y

Environmental Compliance Limited

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: …		Visit Details	: Emissions Survey – February 2024
Variation No	: …		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Medium Bin Medical Waste
Sulphur Dioxide

Environmental Compliance Limited	NON ISOKINETIC SAMPLING PROFORMA	Date of Measurement	14/02/2024

If moisture was not measured see detailed notes below.

ECL/TPD/	039	Time taken to change Ports?	0	Start Time	11:20	End Time	12:20
				Test Duration	60 mins		

Client	Selibon N.V.	Stack Profile	Circular	Console id	U010	Barometer id	204
Site	ACL Lagun - Bonaire	Stack Area (m^2)	0.07	Pump id	U010	Nozzle Id	n/a
Location	Incinerator	Barometric Pressure (mb)	1016	Probe id	1328	Nozzle size	n/a
Stack ID	Incinerator Exhaust	Static Pres. (mm H_20)	17.8	DGM Yd	1.0074	Filter Id	QMA
Test No.	Sulphur Dioxide 2	Pitot coefficient	n/a	ΔH@	40.96	Pitot ID	n/a
Job No	P5632	Probe Heater Setting (^oC)	160	Impinger Id	660	Hot Box ID	978
ECL Site Staff	SH & LPH	Hot Box Setting (^oC)	160	Balance Id	368		

For all parameters a leak check is OPTIONAL at the end of the test.
(and when moving between sample ports if any disconnections are required).

	Sample	Leak 1	Leak 2	Leak 3	Leak 4	Leak 5	Total
Start Volume	2842436.4						
Final Volume	2843352.6						
Total Volume	916.2	0.0	0.0	0.0	0.0	0.0	916.2

Leak Check	First	Second	Third	Fourth	Fifth
Leak rate l/min	0.2	0.2			
Vaccum "Hg	15	12			
Time of Check	11:17	12:22			
Set Rate l/min	20	15.27			
Leak < 2%?	YES	YES			

Required Sample Flowrate l/min	Suggested ΔH Entered Below
3	1
6	3
10	10
15	25
25	50
Initial ΔH	25

Dry O_2 (Atmospheric)	16.13	
Dry Carbon Dioxide %	3.46	Reference Oxygen Percentage: 11
Dry Carbon Monoxide ppm	539.51	

Traverse Point	A1	A1	A1	A1	A1	A1			Total
Time/Point (mins)	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60			
ΔP (mm H20)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
K factor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ΔH (Orifice)	25.00	25.00	25.00	25.00	25.00	25.00			25.00
Meter (Tm in)	36.00	37.00	37.00	37.00	38.00	38.00			37.17
Meter (Tm out)	36.00	37.00	37.00	37.00	38.00	38.00			37.17
Stack Temp (Ts)	549.00	509.00	532.00	492.00	432.00	534.00			508.00
Impinger T Outlet	16.00	14.00	11.00	10.00	11.00	12.00			12.33
Vaccum (" Hg)	3.00	5.00	6.00	7.50	8.50	10.00			6.67

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
K factor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
K factor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
K factor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

	Impinger 1	Impinger 2	Impinger3	Impinger 4	Impinger 5	Impinger 6	Impinger 7	Impinger 8
Solution	3% H2O2	3% H2O2	3% H2O2	Empty	Silica			
SOL/	5058	5058	5058					
Start Weight (g)	684.6	674.5	595.9	497.4	788.5			
End Weight (g)	702.4	680.1	597.1	499.5	794			
Total weight (g)	17.8	5.6	1.2	2.1	5.5	0	0	0

Total (g)	32.20
Silica < 50% used at End of Test? Y/N	YES

Rinse Solutions used	
Solution	SOL NO
DI Water	5061
Acetone	4932

Additional Moisture Weighings

Item Name	Start Weight (g)	End Weight (g)	Total weight (g)
			0
			0
			0
			0
			0
			0
			0
			0
			0
			0

If moisture was not measured and gas was dried before entering the gas meter, impinger weights must be included to produce the moisture concentration used in the isokinetic calculations. If the gas was not dried before it entered the gas meter then impinger weights may be included to produce a nominal 0.1% moisture value.

Medium Bin Medical Waste
Heavy Metals & Mercury

	METALS DATA SAMPLING PROFORMA	Date of Measurement	14/02/2024

ECL/TPD/	Based on 028 & 030	Time taken to change Ports?	10	Start Time	13:33	End Time	15:43
				Test Duration	120 mins		

Client	Selibon N.V.	Stack Profile	Circular	Console id	U010	Barometer id	204
Site	ACL Lagun - Bonaire	Stack Area (m^2)	0.07	Pump id	U010	Nozzle Id	402
Location	Incinerator	Barometric Pressure (mb)	1016	Probe id	1328	Nozzle size	5.18
Stack ID	Incinerator Exhaust	Static Pres. (mm H^20)	17.8	DGM Yd	1.0074	Filter Id	QMA
Test No.	Heavy Metals & Hg 2	Pitot coefficient	0.84	ΔH@	40.96	Pitot ID	602
Job No	P5632	Probe Heater Setting (^oC)	180	Impinger Id	660	Hot Box ID	978
ECL Site Staff	SH & LPH	Hot Box Setting (^oC)	180	Balance Id	368		

NB: Leak Check - Record Actual leak rate or '0' but not 'less than' values

	Sample	Leak 1	Leak 2	Leak 3	Leak 4	Leak 5	Total
Start Volume	2844633.4	2846127.2	2846142.2				
Final Volume	2847112.8	2846134.2	2846148.4				
Total Volume	2479.4	7.0	6.2	0.0	0.0	0.0	2466.2

Leak Check	First	Second	Third	Fourth	Fifth
Leak rate l/min	0.2	0	0		
Vaccum "Hg	18	15	15		
Time of Check	12:58	14:50	14:58		
Set Rate l/min	18.73	19.9	19.9		
Leak < 2%?	YES	YES	YES		

Smooth Walls

Dry O_2 (Atmospheric)	17.35
Dry Carbon Dioxide %	2.62

Original K Factor Settings	
Meter Temp.	40
Stack Temp	500
%Moisture	4.20
Silica < 50% Spent at End of Test?	YES
K factor	0.7
Reference Oxygen Percentage	11

Leak checks DO NOT NEED to be performed (BUT ARE ALLOWED) at the and of the test or when moving between sample ports, EVEN when disconnections are made.

Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point (mins)	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	
ΔP (mm H20)	50.00	52.00	52.00	48.00	42.00	44.00	46.00	62.00	49.5
K factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	
ΔH (Orifice)	35.00	36.40	36.40	33.60	29.40	30.80	32.20	43.40	34.7
Meter (Tm in)	37.00	37.00	38.00	38.00	38.00	39.00	39.00	39.00	38.1
Meter (Tm out)	37.00	37.00	38.00	38.00	38.00	39.00	39.00	39.00	38.1
Stack Temp (Ts)	565.00	460.00	565.00	465.00	370.00	270.00	473.00	450.00	452.3
Impinger T Outlet	12.00	11.00	10.00	10.00	10.00	9.00	9.00	9.00	10.0
Vaccum (" Hg)	3.00	4.00	5.00	5.00	5.50	5.00	6.00	7.50	5.125

Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point(mins)	40 - 45	45 - 50	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75	75 - 80	
ΔP (mm H20)	56.00	58.00	56.00	58.00	60.00	56.00	62.00	66.00	59.0
K factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	
ΔH (Orifice)	39.20	40.60	39.20	40.60	42.00	39.20	43.40	46.20	41.3
Meter (Tm in)	39.00	40.00	40.00	40.00	40.00	41.00	41.00	41.00	40.3
Meter (Tm out)	39.00	40.00	40.00	40.00	40.00	41.00	41.00	41.00	40.3
Stack Temp (Ts)	428.00	471.00	444.00	451.00	457.00	468.00	403.00	475.00	449.6
Impinger T Outlet	10.00	10.00	11.00	11.00	12.00	12.00	13.00	13.00	11.5
Vaccum (" Hg)	7.00	8.00	8.00	8.00	9.50	11.00	2.00	3.50	7.125

Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point(mins)	80 - 85	85 - 90	90 - 95	95 - 100	100 - 105	105 - 110	110 - 115	115 - 120	
ΔP (mm H20)	66.00	68.00	66.00	68.00	72.00	66.00	68.00	66.00	67.5
K factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	
ΔH (Orifice)	46.20	47.60	46.20	47.60	50.40	46.20	47.60	46.20	47.3
Meter (Tm in)	42.00	42.00	42.00	43.00	43.00	43.00	43.00	44.00	42.8
Meter (Tm out)	42.00	42.00	42.00	43.00	43.00	43.00	43.00	44.00	42.8
Stack Temp (Ts)	385.00	448.00	407.00	451.00	439.00	461.00	355.00	397.00	417.9
Impinger T Outlet	13.00	11.00	12.00	12.00	13.00	13.00	13.00	14.00	12.6
Vaccum (" Hg)	3.50	4.00	5.50	6.00	6.00	6.50	7.00	8.00	5.8125

Rinse Solutions used	
Solution	SOL NO
DI H2O	5061

	Impinger 1	Impinger 2	Impinger3	Impinger 4	Impinger 5	Impinger 6	Impinger 7
Solution	DI H2O	DI H2O	DI H2O	DI H2O	Empty	Silica	
SOL/	5061	5061	5061	5061			
Start Weight (g)	747.3	705.4	597.6	592.8	500.8	794.1	
End Weight (g)	743.6	747.4	625.5	594.6	501.2	804.2	
Total weight (g)	-3.7	42	27.9	1.8	0.4	10.1	0

Total (g)	78.5

Pitot Quality Control Checks

PRE-Sample PITOT Visual Inspection	
Time	12:54
Pass ? (Y/N)	Y
PRE-Sample PITOT Leak Check	
Time	12:56
Pass ? (Y/N)	Y
Post-Sample Blockage Check (L-Type ONLY)	
Time	
Reading (mm H_2O)	
Pass (< 5%) ?	
POST-Sample PITOT Visual Inspection	
Time	15:45
Pass ? (Y/N)	Y
POST-Sample PITOT Leak Check	
Time	15:47
Pass ? (Y/N)	Y

Additional Moisture Weighings

Item Name	Start Weight (g)	End Weight (g)	Total weight (g)
			0
			0
			0
			0
			0
			0
			0

Medium Bin Medical Waste

Chlorinated Dioxins & Furans

DIOXIN & FURANS DATA SAMPLING PROFORMA	Date of Measurement	15/02/2024	

ECL/TPD/	31	Time taken to change Ports?	10	Start Time	09:40	End Time	14:50
				Sample Time (mins)	300		

Client	Selibon N.V.	Stack Profile	Circular	Console ID	U010	Barometer ID	204
Site	ACL Lagun - Bonaire	Stack Area (m^2)	0.071	Pump ID	U010	Nozzle ID	402
Location	Incinerator	Barometric Pressure (mb)	1015	Probe ID	1328	Nozzle size	5.18
Stack ID	Incinerator Exhaust	Static Pres. (mm H_20)	17.8	DGM Yd	1.0074	Filter ID	GFA
Test No.	Chlorinated D & F	Pitot coefficient	0.84	DH@	40.96	Pitot ID	602
Job No	P5632	Probe Heater Setting (°C)	120	Impinger ID	660	Hot Box ID	978
Operators	SH & LPH	Hot Box Setting (°C)	120	Balance ID	368	XAD Therm ID	938

	Sample	Leak 1	Leak 2	Leak 3	Leak 4	Leak 5	Total
Start Volume	2848024.2	2853485.2	2853508.0				
Final Volume	2854950.0	2853496.4	2853515.6				
Total Volume	6925.8	11.2	7.6	0.0	0.0	0.0	6907.0
Leak Check	First	Second	Third	Fourth	Fifth		
Leak rate l/min	0	0.2	0.2	0.4			
Vaccum "Hg	20	20	20	20			
Time of Check	09:05	13:35	13:39	14:52			
Set Rate l/min	20	26.64	26.64	23.09			
Leak < 4%?	YES	YES	YES	YES			

Smooth Walls

Dry O_2 (Atmospheric)	15.19	K factor	0.7
Dry Carbon Dioxide %	4.24	Reference Oxygen Percentage	11

Original K Factor Settings	
Meter Temp.	40
Stack Temp	500
%Moisture	4.20
Silica < 50% Spent at End of Test?	Yes

Leak check ALWAYS needs to be performed when moving between sample ports.
Leak check IS ALWAYS required on completion of the sample.

Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point(mins)	0 - 15	15 - 30	30 - 45	45 - 60	60 - 75	75 - 90	90 - 105	105 - 120	
DP (mm H20)	52.0	66.0	76.0	78.0	74.0	80.0	82.0	80.0	73.5
K factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	
DH (Orifice)	36.40	46.20	53.20	54.60	51.80	56.00	57.40	56.00	51.5
Meter (Tm in)	34.00	35.00	35.00	36.00	37.00	38.00	38.00	39.00	36.5
Meter (Tm out)	34.00	35.00	35.00	36.00	37.00	38.00	38.00	39.00	36.5
Stack Temp (Ts)	637.00	439.00	606.00	523.00	683.00	437.00	471.00	531.00	540.9
Impinger T Outlet	19.00	16.00	14.00	12.00	14.00	16.00	15.00	14.00	15.0
Vaccum (" Hg)	2.50	4.00	5.00	6.50	7.50	8.50	9.00	9.00	6.5
XAD Temperature (°C)	18.00	15.00	13.00	10.00	13.00	14.00	13.00	10.00	13.3
Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point(mins)	120 - 135	135 - 150	150 - 165	165 - 180	180 - 195	195 - 210	210 - 225	225 - 240	
DP (mm H20)	80.0	84.0	88.0	90.0	80.0	82.0	88.0	90.0	85.3
K factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	
DH (Orifice)	56.00	58.80	61.60	63.00	56.00	57.40	61.60	63.00	59.7
Meter (Tm in)	39.0	39.0	39.0	40.0	40.0	40.0	40.0	41.0	39.8
Meter (Tm out)	39.0	39.0	39.0	40.0	40.0	40.0	40.0	41.0	39.8
Stack Temp (Ts)	481.0	429.0	274.0	255.0	235.0	171.0	567.0	671.0	385.4
Impinger T Outlet	13.0	13.0	14.0	14.0	15.0	15.0	12.0	11.0	13.4
Vaccum (" Hg)	12.0	12.5	12.5	12.5	12.5	12.5	12.5	5.0	11.5
XAD Temperature (°C)	10.00	10.00	11.00	11.00	12.00	12.00	11.00	12.00	11.1
Traverse Point	A1	A1	A1	A1					Total
Time/Point(mins)	240 - 255	255 - 270	270 - 285	285 - 300					
DP (mm H20)	72.0	66.0	62.0	64.0					66.0
K factor	0.70	0.70	0.70	0.70					
DH (Orifice)	50.40	46.20	43.40	44.80					46.2
Meter (Tm in)	42.0	43.0	44.0	45.0					43.5
Meter (Tm out)	42.0	43.0	44.0	45.0					43.5
Stack Temp (Ts)	721.0	671.0	517.0	616.0					631.3
Impinger T Outlet	14.0	11.0	13.0	15.0					13.3
Vaccum (" Hg)	10.0	14.0	16.0	18.0					14.5
XAD Temperature (°C)	12.00	10.00	12.00	14.00					12.0
Traverse Point									Total
Time/Point(mins)									
DP (mm H20)									
K factor									
DH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									
XAD Temperature (°C)									

Impinger 1	XAD	Impinger 2	Condenser	Impinger3	Empty	Impinger 4	Silica
TRAP ID	077						
Start Weight (g)	273.4	Start Weight (g)	562.9	Start Weight (g)	554.6	Start Weight (g)	803.4
End Weight (g)	279.2	End Weight (g)	720.4	End Weight (g)	553.1	End Weight (g)	807.5
Total weight (g)	5.8	Total weight (g)	157.5	Total weight (g)	-1.5	Total weight (g)	4.1

Impinger 5		Impinger 6		Impinger 7		Impinger 8	
Start Weight (g)		Start Weight (g)		Start Weight (g)		Start Weight (g)	
End Weight (g)		End Weight (g)		End Weight (g)		End Weight (g)	
Total weight (g)	0	Total weight (g)	0	Total weight (g)	0	Total weight (g)	0

Total (g)	165.9

Rinse Solutions used	
Solution	SOL NO
DCM	4846
Acetone	4932
Toluene	4931

Additional Moisture Weighings

Item Name		Item Name		Item Name		Item Name	
Start Weight (g)		Start Weight (g)		Start Weight (g)		Start Weight (g)	
End Weight (g)		End Weight (g)		End Weight (g)		End Weight (g)	
Total weight (g)	0	Total weight (g)	0	Total weight (g)	0	Total weight (g)	0
Item Name		Item Name		Item Name		Item Name	
Start Weight (g)		Start Weight (g)		Start Weight (g)		Start Weight (g)	
End Weight (g)		End Weight (g)		End Weight (g)		End Weight (g)	
Total weight (g)	0	Total weight (g)	0	Total weight (g)	0	Total weight (g)	0

PRE-Sample PITOT Visual Inspection	
Time	09:01
Pass ? (Y/N)	Y

PRE-Sample PITOT Leak Check	
Time	09:03
Pass ? (Y/N)	Y

Post-Sample Blockage Check (L-type)	
Time	
Reading (mm H_2O)	
Pass (< 5%) ?	

POST-Sample PITOT Visual Inspection	
Time	14:54
Pass ? (Y/N)	Y
POST-Sample PITOT Leak Check	
Time	14:56
Pass ? (Y/N)	Y

Dead Animal Waste

Particulates, Hydrogen Fluoride / Hydrogen Chloride

Environmental Compliance Limited	PARTICULATE DATA SAMPLING PROFORMA	Date of Measurement	15/02/2024

ECL/TPD/	027 & 081	Time taken to change Ports?	0	Start Time	16:00	End Time	17:00
				Test Duration	60	mins	

Client	Selibon N.V.	Stack Profile	Circular	Console id	U010	Barometer id	204
Site	ACL Lagun - Bonaire	Stack Area (m^2)	0.07	Pump id	U010	Nozzle Id	402
Location	Incinerator	Barometric Pressure (mb)	1015	Probe id	1328	Nozzle size	5.18
Stack ID	Incinerator Exhaust	Static Pres. (mm H_20)	24.2	DGM Yd	1.0074	Filter Id	4505-259203
Test No.	TPM / HCL & HF 3	Pitot coefficient	0.84	ΔH@	40.96	Pitot ID	602
Job No	P5632	Probe Heater Setting (°C)	160	Impinger Id	660	Hot Box ID	978
ECL Site Staff	SH & LPH	Hot Box Setting (°C)	160	Balance Id	368		

IF SAMPLING FOR PARTICULATES NO LEAK CHECKS ARE ALLOWED AFTER SAMPLING HAS STARTED (NOT EVEN IF TRAIN IS BROKEN DOWN)
FOR OTHER SAMPLING (WITHOUT PARTICULATES) LEAK CHECKS ARE ALLOWED AFTER SAMPLING HAS STARTED (BUT ARE NOT MANDATORY)

	Sample	Leak 1	Leak 2	Leak 3	Leak 4	Leak 5	Total
Start Volume	2855972.4						
Final Volume	2857498.6						
Total Volume	1526.2	0.0	0.0	0.0	0.0	0.0	1526.2
Leak Check	First	Second	Third	Fourth	Fifth		
Leak rate l/min	0.2						
Vaccum "Hg	18						
Time of Check	15:59						
Set Rate l/min	26						
Leak < 2%?	YES						

Silica < 50% Spent at End of Test?	YES
Original K Factor Settings	
Meter Temp.	40
Stack Temp	365
%Moisture	4.20

Dry O_2 (Atmospheric)	18.42	K factor	0.8
Dry Carbon Dioxide %	1.80	Reference Oxygen Percentage	11

Smooth Walls

Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point (mins)	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	
ΔP (mm H20)	70.00	72.00	72.00	72.00	74.00	74.00	76.00	78.00	73.50
K factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	
ΔH (Orifice)	56.00	57.60	57.60	57.60	59.20	59.20	60.80	62.40	58.80
Meter (Tm in)	34.00	34.00	34.00	34.00	34.00	34.00	33.00	33.00	33.75
Meter (Tm out)	34.00	34.00	34.00	34.00	34.00	34.00	33.00	33.00	33.75
Stack Temp (Ts)	368.00	337.00	337.00	324.00	321.00	316.00	313.00	307.00	327.88
Impinger T Outlet	18.00	16.00	15.00	14.00	13.00	13.00	13.00	14.00	14.50
Vaccum (" Hg)	2.00	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.44

Traverse Point	A1	A1	A1	A1					Total
Time/Point(mins)	40 - 45	45 - 50	50 - 55	55 - 60					
ΔP (mm H20)	76.00	80.00	72.00	62.00					72.50
K factor	0.80	0.80	0.80	0.80					
ΔH (Orifice)	60.80	64.00	57.60	49.60					58.00
Meter (Tm in)	33.00	33.00	33.00	33.00					33.00
Meter (Tm out)	33.00	33.00	33.00	33.00					33.00
Stack Temp (Ts)	294.00	284.00	536.00	665.00					444.75
Impinger T Outlet	14.00	15.00	15.00	16.00					15.00
Vaccum (" Hg)	2.50	2.50	2.50	2.50					2.50

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)									
K factor									
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)									
K factor									
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

Impinger 1	DI H2O	Impinger 2	DI H2O	Impinger3	DI H2O	Impinger 4	Empty
SOL/	5061	SOL/	5061	SOL/	5061	SOL/	
Start Weight (g)	646.3	Start Weight (g)	715.1	Start Weight (g)	628.3	Start Weight (g)	555.8
End Weight (g)	721.4	End Weight (g)	756.1	End Weight (g)	652.3	End Weight (g)	558.2
Total weight (g)	75.1	Total weight (g)	41	Total weight (g)	24	Total weight (g)	2.4

Impinger 5	Silica	Impinger 6		Impinger 7		Impinger 8	
SOL/		SOL/		SOL/		SOL/	
Start Weight (g)	808.7	Start Weight (g)		Start Weight (g)		Start Weight (g)	
End Weight (g)	810.8	End Weight (g)		End Weight (g)		End Weight (g)	
Total weight (g)	2.1	Total weight (g)	0	Total weight (g)	0	Total weight (g)	0

Total (g)	144.60

Rinse Solutions used	
Solution	SOL NO
DI Water	5061
Acetone	4932

If moisture was not measured and gas was dried before entering the gas meter, impinger weights must be included to produce the moisture concentration used in the isokinetic calculations. If the gas was not dried before it entered the gas meter then impinger weights may be included to produce a nominal 0.1% moisture value.

Additional Moisture Weighings

Item Name		Item Name		Item Name		Item Name	
Start Weight (g)		Start Weight (g)		Start Weight (g)		Start Weight (g)	
End Weight (g)		End Weight (g)		End Weight (g)		End Weight (g)	
Total weight (g)	0	Total weight (g)	0	Total weight (g)	0	Total weight (g)	0
Item Name		Item Name		Item Name		Item Name	
Start Weight (g)		Start Weight (g)		Start Weight (g)		Start Weight (g)	
End Weight (g)		End Weight (g)		End Weight (g)		End Weight (g)	
Total weight (g)	0	Total weight (g)	0	Total weight (g)	0	Total weight (g)	0

PRE-Sample PITOT Visual Inspection	
Time	15:48
Pass ? (Y/N)	Y

PRE-Sample PITOT Leak Check	
Time	15:50
Pass ? (Y/N)	Y

Post-Sample Blockage Check (L-type)	
Time	
Reading (mm H_2O)	
Pass (< 5%) ?	

POST-Sample PITOT Visual Inspection	
Time	17:02
Pass ? (Y/N)	Y

POST-Sample PITOT Leak Check	
Time	17:04
Pass ? (Y/N)	Y

Environmental Compliance Limited

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Dead Animal Waste
Sulphur Dioxide

Environmental Compliance Limited	NON ISOKINETIC SAMPLING PROFORMA	Date of Measurement	15/02/2024
ECL/TPD/ 039	Time taken to change Ports? 0	Start Time 17:45	End Time 18:45
		Test Duration 60 mins	

If moisture was not measured see detailed notes below.

Client	Selibon N.V.	Stack Profile	Circular	Console id	U010	Barometer id	204
Site	ACL Lagun - Bonaire	Stack Area (m^2)	0.07	Pump id	U010	Nozzle Id	n/a
Location	Incinerator	Barometric Pressure (mb)	1015	Probe id	1328	Nozzle size	n/a
Stack ID	Incinerator Exhaust	Static Pres. (mm $H_2$0)	24.2	DGM Yd	1.0074	Filter Id	QMA
Test No.	Sulphur Dioxide 3	Pitot coefficient	n/a	ΔH@	40.96	Pitot ID	n/a
Job No	P5632	Probe Heater Setting (^{O}C)	160	Impinger Id	660	Hot Box ID	978
ECL Site Staff	SH & LPH	Hot Box Setting (^{O}C)	160	Balance Id	368		

For all parameters a leak check is OPTIONAL at the end of the test.
(and when moving between sample ports if any disconnections are required).

	Sample	Leak 1	Leak 2	Leak 3	Leak 4	Leak 5	Total
Start Volume	2858053.4						
Final Volume	2858932.6						
Total Volume	879.2	0.0	0.0	0.0	0.0	0.0	879.2

Leak Check	First	Second	Third	Fourth	Fifth
Leak rate l/min	0	0.2			
Vaccum "Hg	18	20			
Time of Check	17:43	18:47			
Set Rate l/min	15	14.65			
Leak < 2%?	YES	YES			

Required Sample Flowrate l/min	Suggested ΔH Entered Below
3	1
6	3
10	10
15	25
25	50
Initial ΔH	25

Dry O_2 (☐ Atmospheric)	6.71	
Dry Carbon Dioxide %	10.81	Reference Oxygen Percentage: 11
Dry Carbon Monoxide ppm	827.62	

Traverse Point	A1	A1	A1	A1	A1	A1			Total
Time/Point (mins)	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60			
ΔP (mm H20)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
K factor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ΔH (Orifice)	25.00	25.00	25.00	25.00	25.00	25.00			25.00
Meter (Tm in)	33.00	34.00	36.00	37.00	37.00	38.00			35.83
Meter (Tm out)	33.00	34.00	36.00	37.00	37.00	38.00			35.83
Stack Temp (Ts)	514.00	790.00	827.00	828.00	677.00	959.00			765.83
Impinger T Outlet	10.00	12.00	14.00	15.00	16.00	18.00			14.17
Vaccum (" Hg)	1.50	2.50	7.50	10.00	12.50	16.00			8.33

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
K factor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
K factor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
K factor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

	Impinger 1	Impinger 2	Impinger3	Impinger 4	Impinger 5	Impinger 6	Impinger 7	Impinger 8
Contents	3% H2O2	3% H2O2	3% H2O2	Empty	Silica			
SOL/	5058	5058	5058					
Start Weight (g)	567.1	635.2	586.4	555.4	810.8			
End Weight (g)	632.6	656.1	592.1	557.8	813.1			
Total weight (g)	65.5	20.9	5.7	2.4	2.3	0	0	0

Total (g)	96.80
Silica < 50% used at End of Test? Y/N	YES

Rinse Solutions used	
Solution	SOL NO
DI Water	5061
Acetone	4932

Additional Moisture Weighings

	1	2	3	4	5	6	7	8	9	10
Item Name										
Start Weight (g)										
End Weight (g)										
Total weight (g)	0	0	0	0	0	0	0	0	0	0

If moisture was not measured and gas was dried before entering the gas meter, impinger weights must be included to produce the moisture concentration used in the isokinetic calculations. If the gas was not dried before it entered the gas meter then impinger weights may be included to produce a nominal 0.1% moisture value.

Dead Animal Waste
Heavy Metals & Mercury

	METALS DATA SAMPLING PROFORMA	Date of Measurement	15/02/2024
ECL/TPD/ Based on 028 & 030	Time taken to change Ports? 0	Start Time 19:45	End Time 20:45
		Test Duration 60 mins	

Client	Selibon N.V.	Stack Profile	Circular	Console id	U010	Barometer id	204
Site	ACL Lagun - Bonaire	Stack Area (m^2)	0.07	Pump id	U010	Nozzle Id	402
Location	Incinerator	Barometric Pressure (mb)	1015	Probe id	1328	Nozzle size	5.18
Stack ID	Incinerator Exhaust	Static Pres. (mm $H^2$0)	24.2	DGM Yd	1.0074	Filter Id	QMA
Test No.	Heavy Metals & Hg 3	Pitot coefficient	0.84	ΔH@	40.96	Pitot ID	602
Job No	P5632	Probe Heater Setting (^{O}C)	180	Impinger Id	660	Hot Box ID	978
ECL Site Staff	SH & LPH	Hot Box Setting (^{O}C)	180	Balance Id	368		

Rinse Solutions used	
Solution	SOL NO
DI H2O	5061

NB: Leak Check - Record Actual leak rate or '0' but not 'less than' values

	Sample	Leak 1	Leak 2	Leak 3	Leak 4	Leak 5	Total
Start Volume	2859644.6						
Final Volume	2861290.0						
Total Volume	1645.4	0.0	0.0	0.0	0.0	0.0	1645.4

Leak Check	First	Second	Third	Fourth	Fifth
Leak rate l/min	0.2				
Vaccum "Hg	20				
Time of Check	19:28				
Set Rate l/min	25.43				
Leak < 2%?	YES				

Smooth Walls

Dry O_2 (☐ Atmospheric)	13.16	K factor	0.8
Dry Carbon Dioxide %	5.93	Reference Oxygen Percentage	11

Original K Factor Settings	
Meter Temp.	40
Stack Temp	365
%Moisture	4.20
Silica < 50% Spent at End of Test?	YES

Leak checks DO NOT NEED to be performed (BUT ARE ALLOWED) at the and of the test or when moving between sample ports, EVEN when disconnections are made.

Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point (mins)	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	
ΔP (mm H20)	82.00	76.00	86.00	84.00	82.00	82.00	80.00	82.00	81.8
K factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	
ΔH (Orifice)	65.60	60.80	68.80	67.20	65.60	65.60	64.00	65.60	65.4
Meter (Tm in)	35.00	35.00	36.00	36.00	35.00	35.00	35.00	35.00	35.3
Meter (Tm out)	35.00	35.00	36.00	36.00	35.00	35.00	35.00	35.00	35.3
Stack Temp (Ts)	429.00	471.00	400.00	340.00	336.00	327.00	356.00	349.00	376.0
Impinger T Outlet	16.00	13.00	11.00	9.00	9.00	9.00	10.00	11.00	11.0
Vaccum (" Hg)	1.50	3.00	3.50	4.00	5.00	5.50	8.50	9.50	5.0625

Traverse Point	A1	A1	A1	A1					Total
Time/Point(mins)	40 - 45	45 - 50	50 - 55	55 - 60					
ΔP (mm H20)	82.00	86.00	90.00	94.00					88.0
K factor	0.80	0.80	0.80	0.80					
ΔH (Orifice)	65.60	68.80	72.00	75.20					70.4
Meter (Tm in)	35.00	35.00	36.00	36.00					35.5
Meter (Tm out)	35.00	35.00	36.00	36.00					35.5
Stack Temp (Ts)	312.00	285.00	261.00	244.00					275.5
Impinger T Outlet	12.00	12.00	13.00	13.00					12.5
Vaccum (" Hg)	11.00	12.50	13.00	15.00					12.875

Traverse Point									Total
Time/Point(mins)									
ΔP (mm H20)									
K factor									
ΔH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									

	Impinger 1	Impinger 2	Impinger3	Impinger 4	Impinger 5	Impinger 6	Impinger 7
Contents	DI H2O	DI H2O	DI H2O	DI H2O	Empty	Silica	
SOL/	5061	5061	5061	5061			
Start Weight (g)	604.6	631.4	608.3	668.4	510.1	813.1	
End Weight (g)	673	700.6	615.5	671.2	510.9	816	
Total weight (g)	68.4	69.2	7.2	2.8	0.8	2.9	0

Total (g)	151.3

Pitot Quality Control Checks	
PRE-Sample PITOT Visual Inspection	
Time	19:24
Pass ? (Y/N)	Y
PRE-Sample PITOT Leak Check	
Time	19:26
Pass ? (Y/N)	Y
Post-Sample Blockage Check (L-Type ONLY)	
Time	
Reading (mm H_2O)	
Pass (< 5%) ?	
POST-Sample PITOT Visual Inspection	
Time	20:47
Pass ? (Y/N)	Y
POST-Sample PITOT Leak Check	
Time	20:49
Pass ? (Y/N)	Y

Additional Moisture Weighings

	1	2	3	4	5	6	7
Item Name							
Start Weight (g)							
End Weight (g)							
Total weight (g)	0	0	0	0	0	0	0

Environmental Compliance Limited

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Dead Animal Waste

Chlorinated Dioxins & Furans

DIOXIN & FURANS DATA SAMPLING PROFORMA		Date of Measurement	16/02/2024

ECL/TPD/	31	Time taken to change Ports?	0	Start Time	10:40	End Time	11:40
				Sample Time (mins)	60		

Client	Selibon N.V.	Stack Profile	Circular	Console ID	U010	Barometer ID	204
Site	ACL Lagun - Bonaire	Stack Area (m^2)	0.071	Pump ID	U010	Nozzle ID	402
Location	Incinerator	Barometric Pressure (mb)	1015	Probe ID	1328	Nozzle size	6.09
Stack ID	Incinerator Exhaust	Static Pres. (mm H_20)	24.2	DGM Yd	1.0074	Filter ID	GFA
Test No.	Chlorinated D & F T2	Pitot coefficient	0.84	DH@	40.96	Pitot ID	602
Job No	P5632	Probe Heater Setting (°C)	120	Impinger ID	660	Hot Box ID	978
Operators	SH & LPH	Hot Box Setting (°C)	120	Balance ID	368	XAD Therm ID	938

	Sample	Leak 1	Leak 2	Leak 3	Leak 4	Leak 5	Total
Start Volume	2862118.0						
Final Volume	2863484.4						
Total Volume	1366.4	0.0	0.0	0.0	0.0	0.0	1366.4
Leak Check	First	Second	Third	Fourth	Fifth		
Leak rate l/min	0.2	0.2					
Vaccum "Hg	20	15					
Time of Check	10:15	11:42					
Set Rate l/min	25	22.77					
Leak < 4%?	YES	YES					

Smooth Walls

Dry O_2 (Atmospheric)	10.13
Dry Carbon Dioxide %	8.14

Leak check ALWAYS needs to be performed when moving between sample ports.
Leak check IS ALWAYS required on completion of the sample.

Original K Factor Settings	
Meter Temp.	40
Stack Temp	500
%Moisture	4.20
Silica < 50% Spent at End of Test?	Yes
K factor	0.9
Reference Oxygen Percentage	11

Traverse Point	A1	A1	A1	A1	A1	A1	A1	A1	Total
Time/Point(mins)	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35	35 - 40	
DP (mm H20)	42.0	40.0	44.0	48.0	42.0	38.0	38.0	40.0	41.5
K factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
DH (Orifice)	37.80	36.00	39.60	43.20	37.80	34.20	34.20	36.00	37.4
Meter (Tm in)	30.00	32.00	33.00	34.00	35.00	36.00	36.00	37.00	34.1
Meter (Tm out)	30.00	32.00	33.00	34.00	35.00	36.00	36.00	37.00	34.1
Stack Temp (Ts)	559.00	699.00	722.00	748.00	778.00	674.00	639.00	638.00	682.1
Impinger T Outlet	16.00	14.00	14.00	15.00	15.00	15.00	14.00	13.00	14.5
Vaccum (" Hg)	7.50	10.00	11.00	11.50	12.00	12.00	12.50	12.50	11.1
XAD Temperature (°C)	13.00	11.00	12.00	13.00	13.00	13.00	14.00	11.00	12.5
Traverse Point	A1	A1	A1	A1					Total
Time/Point(mins)	40 - 45	45 - 50	50 - 55	55 - 60					
DP (mm H20)	44.0	46.0	46.0	46.0					45.5
K factor	0.90	0.90	0.90	0.90					
DH (Orifice)	39.60	41.40	41.40	41.40					41.0
Meter (Tm in)	37.0	38.0	38.0	38.0					37.8
Meter (Tm out)	37.0	38.0	38.0	38.0					37.8
Stack Temp (Ts)	638.0	629.0	623.0	611.0					625.3
Impinger T Outlet	11.0	11.0	12.0	13.0					11.8
Vaccum (" Hg)	12.5	13.0	13.5	13.5					13.1
XAD Temperature (°C)	9.00	10.00	10.00	11.00					10.0
Traverse Point									Total
Time/Point(mins)									
DP (mm H20)									
K factor									
DH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									
XAD Temperature (°C)									
Traverse Point									Total
Time/Point(mins)									
DP (mm H20)									
K factor									
DH (Orifice)									
Meter (Tm in)									
Meter (Tm out)									
Stack Temp (Ts)									
Impinger T Outlet									
Vaccum (" Hg)									
XAD Temperature (°C)									

Impinger 1	XAD
TRAP ID	
Start Weight (g)	220.54
End Weight (g)	221.9
Total weight (g)	1.36

Impinger 2	Condenser
Start Weight (g)	362.4
End Weight (g)	406.3
Total weight (g)	43.9

Impinger3	Empty
Start Weight (g)	554.6
End Weight (g)	562.1
Total weight (g)	7.5

Impinger 4	Silica
Start Weight (g)	817.6
End Weight (g)	823.4
Total weight (g)	5.8

Impinger 5	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Impinger 6	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Impinger 7	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Impinger 8	
Start Weight (g)	
End Weight (g)	15
Total weight (g)	15

Total (g)	73.56

PRE-Sample PITOT Visual Inspection	
Time	10:06
Pass ? (Y/N)	Y

PRE-Sample PITOT Leak Check	
Time	10:08
Pass ? (Y/N)	Y

Rinse Solutions used	
Solution	SOL NO
DCM	4846
Acetone	4932
Toluene	4931

Additional Moisture Weighings

Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0
Item Name	
Start Weight (g)	
End Weight (g)	
Total weight (g)	0

Post-Sample Blockage Check (L-type)	
Time	
Reading (mm H_2O)	
Pass (< 5%) ?	

POST-Sample PITOT Visual Inspection	
Time	11:44
Pass ? (Y/N)	Y
POST-Sample PITOT Leak Check	
Time	11:46
Pass ? (Y/N)	Y

LABORATORY ANALYSIS RESULTS

Laboratory analysis for Particulates, Hydrogen Chloride, Hydrogen Fluoride, Sulphur Dioxide, Heavy Metals & Mercury was subcontracted to RPS laboratories, a UKAS Accredited Testing Laboratory, Number 0605.

RPS DO hold UKAS & MCERTS accreditation for this analysis.

As required by the MCERTS Performance Standard for Organisations, the analysis results are shown below.

Laboratory analysis for Dioxins & Furans was subcontracted to Marchwood, a UKAS Accredited Testing Laboratory, Number 1668.

Marchwood DO hold UKAS & MCERTS accreditation for this analysis.

As required by the MCERTS Performance Standard for Organisations, the analysis results are shown below.

Environmental Compliance Limited

Selibon N.V.
Permit No : ...
Variation No : ...
Report Ref : P5632 : R001

Installation Name : Incinerator Exhaust
Visit Details : Emissions Survey – February 2024
Survey Dates : 12th – 16th February 2024
Report Issue Date. : 20th December 2024

Determinand	CAS No	Codes	SOP	RL	Units	Customer Sample No	ECL/24/0437	ECL/24/0438	ECL/24/0439	ECL/24/0440	ECL/24/0441	ECL/24/0442	ECL/24/1144
						RPS Sample No	270094	270095	270096	270097	270098	270099	270100
						Sample Matrix	SOLUTION	SOLUTION	SOLUTION	SOLUTION	SOLUTION	SOLUTION	SOLUTION
						Sampling Date	13/02/2024	13/02/2024	14/02/2024	15/02/2024	13/02/2024	14/02/2024	15/02/2024
volume of sample supplied		U	N/A	n/a	ml		370	186	410	545	275	271	246
hydrogen chloride	7647-01-0	UM	C27	0.05	ug/mL		437	< 0.05	205	15.2	< 0.05	< 0.05	< 0.05
hydrogen fluoride	7664-39-3	UM	C27	0.05	ug/mL		2.43	< 0.05	3.84	6.07	< 0.05	< 0.05	< 0.05

Determinand	CAS No	Codes	SOP	RL	Units	Customer Sample No	ECL/24/0443	ECL/24/0444	ECL/24/0445	ECL/24/0446	ECL/24/0447	ECL/24/0448	ECL/24/1145
						RPS Sample No	270101	270102	270103	270104	270105	270106	270107
						Sample Matrix	SOLUTION	SOLUTION	SOLUTION	SOLUTION	SOLUTION	SOLUTION	SOLUTION
						Sampling Date	13/02/2024	13/02/2024	14/02/2024	15/02/2024	13/02/2024	14/02/2024	15/02/2024
volume of sample supplied		U	N/A	n/a	ml		330	116	416	466	291	296	241
sulphur dioxide	7446-09-5	UM	C27	0.05	ug/mL		29.9	0.70	16.5	1350	0.62	0.61	0.60

Determinand	CAS No	Codes	SOP	RL	Units	Customer Sample No	ECL/24/0411 - 259199	ECL/24/0412	ECL/24/0413 - 259202	ECL/24/0414	ECL/24/0415 - 259203	ECL/24/0416	ECL/24/0417 - 259198	ECL/24/0418	ECL/24/0419 - 259200	ECL/24/0420	ECL/24/1142 - 260267	ECL/24/1143
						RPS Sample No	270066	270067	270068	270069	270070	270071	270072	270073	270074	270075	270076	270077
						Sample Matrix	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION
						Sampling Date	13/02/2024	13/02/2024	14/02/2024	14/02/2024	15/02/2024	15/02/2024	13/02/2024	13/02/2024	14/02/2024	14/02/2024	15/02/2024	15/02/2024
particulates		UM	D9	0.04	mg		168		102		40.0		3.50		4.01		0.41	
particulates		UM	D9	0.5	mg			26.1		14.1		6.2		< 0.5		< 0.5		< 0.5

Environmental Compliance Limited

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
Permit No	**: ...**		**Visit Details**	**: Emissions Survey – February 2024**
Variation No	**: ...**		**Survey Dates**	**: 12th – 16th February 2024**
Report Ref	**: P5632**	**: R001**	**Report Issue Date.**	**: 20th December 2024**

Determinand	CAS No	Codes	SOP	RL	Units	Customer Sample No	ECL/24/0421	ECL/24/0422	ECL/24/0423	ECL/24/0424	ECL/24/0425	ECL/24/0426	ECL/24/0427	ECL/24/0428	ECL/24/0429	ECL/24/0430	ECL/24/0431	ECL/24/0432	ECL/24/0433	ECL/24/0434	ECL/24/0435	ECL/24/0436
						RPS Sample No	270078	270079	270080	270081	270082	270083	270084	270085	270086	270087	270088	270089	270090	270091	270092	270093
						Sample Matrix	FILTER	SOLUTION	SOLUTION	SOLUTION	FILTER	SOLUTION	SOLUTION	SOLUTION	FILTER	SOLUTION	SOLUTION	SOLUTION	FILTER	SOLUTION	SOLUTION	SOLUTION
						Sampling Date	13/02/2024	13/02/2024	13/02/2024	13/02/2024	14/02/2024	14/02/2024	14/02/2024	14/02/2024	15/02/2024	15/02/2024	15/02/2024	15/02/2024	13/02/2024	13/02/2024	13/02/2024	13/02/2024
volume of sample supplied		U	N/A	n/a	ml		286	336	175		284	767	190		194	604	134		162	254	269	
antimony	7440-36-0	UM	M31	0.4	ug	62.9				42.6				5.7				< 0.4				
antimony	7440-36-0		M31	0.2	ug		1.9				3.4				1.3				< 0.2			
antimony	7440-36-0		M31	0.2	ug/L			35.0	< 0.2			1.9	< 0.2			0.3	< 0.2			< 0.2	< 0.2	
arsenic	7440-38-2	UM	M31	0.2	ug	0.9				0.6				2.7				0.3				
arsenic	7440-38-2		M31	0.3	ug		< 0.3				0.3				0.5				< 0.3			
arsenic	7440-38-2		M31	0.3	ug/L			< 0.3	< 0.3			1.0	< 0.3			< 0.3	< 0.3			< 0.3	< 0.3	
cadmium	7440-43-9	UM	M31	0.2	ug	1.3				0.9				0.5				1.8				
cadmium	7440-43-9		M31	0.3	ug		< 0.3				< 0.3				0.6				< 0.3			
cadmium	7440-43-9		M31	0.2	ug/L			< 0.2	< 0.2			< 0.2	< 0.2			< 0.2	< 0.2			< 0.2	< 0.2	
chromium	7440-47-3	UM	M31	0.3	ug	8.5				94.1				8.3				1.1				
chromium	7440-47-3		M31	0.3	ug		2.0				5.2				11.5				< 0.3			
chromium	7440-47-3		M31	0.2	ug/L			0.8	< 0.2			1.0	< 0.2			1.1	< 0.2			< 0.2	< 0.2	
cobalt	7440-48-4	UM	M31	0.2	ug	0.4				1.1				< 0.2				< 0.2				
cobalt	7440-48-4		M31	0.3	ug		< 0.3				< 0.3				< 0.3				< 0.3			
cobalt	7440-48-4		M31	0.2	ug/L			< 0.2	< 0.2			< 0.2	< 0.2			< 0.2	< 0.2			< 0.2	< 0.2	
copper	7440-50-8	UM	M31	0.2	ug	303				53.6				40.0				0.7				
copper	7440-50-8		M31	0.4	ug		9.7				2.3				6.0				< 0.4			
copper	7440-50-8		M31	0.4	ug/L			3.7	< 0.4			1.7	4.6			0.6	< 0.4			< 0.4	< 0.4	
lead	7439-92-1	UM	M31	0.3	ug	25.0				10.5				54.1				3.6				
lead	7439-92-1		M31	0.2	ug		1.7				0.4				7.1				0.2			
lead	7439-92-1		M31	0.2	ug/L			5.6	< 0.2			2.4	< 0.2			4.6	< 0.2			< 0.2	< 0.2	
manganese	7439-96-5	UM	M31	0.2	ug	14.6				19.5				3.2				6.3				
manganese	7439-96-5		M31	0.2	ug		7.0				3.6				3.1				< 0.2			
manganese	7439-96-5		M31	0.2	ug/L			1.7	< 0.2			1.2	< 0.2			1.1	< 0.2			< 0.2	< 0.2	
mercury	7439-97-6	UM	M112	0.03	ug	0.03				0.08				0.08				< 0.03				
mercury	7439-97-6		M112	0.5	ug/l			< 0.5	< 0.5			< 0.5	< 0.5			< 0.5	< 0.5			< 0.5	< 0.5	
mercury	7439-97-6		M112	0.5	ug/l		< 0.50				< 0.50				< 0.50				< 0.50			
nickel	7440-02-0	UM	M31	0.5	ug	6.7				34.8				4.2				0.6				
nickel	7440-02-0		M31	0.1	ug		16.1				3.6				2.4				< 0.1			
nickel	7440-02-0		M31	0.3	ug/L			1.7	< 0.3			0.4	3.1			0.6	< 0.3			< 0.3	< 0.3	
thallium	7440-28-0	UM	M31	0.2	ug	< 0.2				< 0.2				0.3				< 0.2				
thallium	7440-28-0		M31	0.2	ug		< 0.2				< 0.2				< 0.2				< 0.2			
thallium	7440-28-0		M31	0.2	ug/L			< 0.2	< 0.2			< 0.2	< 0.2			< 0.2	< 0.2			< 0.2	< 0.2	
vanadium	7440-62-2	UM	M31	0.2	ug	0.5				2.4				0.3				0.9				
vanadium	7440-62-2		M31	0.2	ug		0.3				0.5				< 0.2				< 0.2			
vanadium	7440-62-2		M31	0.1	ug/L			0.2	< 0.1			0.2	< 0.1			< 0.1	< 0.1			< 0.1	< 0.1	

Selibon N.V.
Permit No : ...
Variation No : ...
Report Ref : P5632 : R001

Installation Name : Incinerator Exhaust
Visit Details : Emissions Survey – February 2024
Survey Dates : 12th – 16th February 2024
Report Issue Date. : 20th December 2024

465386 Dioxin Results

Sample Type : Stack
MSS Sample Ref : 465386
Customer Sample Ref : ECL/24/0402 -ECL/24/0404
Sample Condition : Non-Conforming (1)
Test Method : 2002b

Congener	LOD	Detected	Lower Bound	Upper Bound	Recovery	Sampling Recovery	UKAS
Dioxins/Furans	**ng/Sample**	**ng/Sample**	**ng/Sample**	**ng/Sample**	%	%	
2378-TCDD	0.0176	6.39	6.39	6.39	87		M
12378-PeCDD	0.0140	10.0	5.02	5.02	97		M
123478-HxCDD	0.00740	2.64	0.264	0.264	86		M
123678-HxCDD	0.00758	2.85	0.285	0.285	79		M
123789-HxCDD	0.00817	4.05	0.405	0.405			M
1234678-HpCDD	0.00519	4.72	0.0472	0.0472	85		M
OCDD	0.0040	1.73	0.00173	0.00173	61		M
Dioxins Total			**12.4**	**12.4**			M
2378-TCDF	0.0212	40.4	4.04	4.04	79		M
12378-PeCDF	0.0140	38.0	1.90	1.90		106	M
23478-PeCDF	0.0147	35.7	17.8	17.8	82		M
123478-HxCDF	0.0127	18.0	1.80	1.80	81		M
123678-HxCDF	0.0113	19.0	1.90	1.90	83		M
234678-HxCDF	0.0114	10.9	1.09	1.09	86		M
123789-HxCDF	0.0130	0.879	0.0879	0.0879		104	M
1234678-HpCDF	0.00402	13.6	0.136	0.136	81		M
1234789-HpCDF	0.00589	1.96	0.0196	0.0196		90	M
OCDF	0.00215	1.71	0.00171	0.00171	58		M
Furans Total			**28.8**	**28.8**			M
Dioxin/Furan Total			**41.2**	**41.2**			M

Selibon N.V.
Permit No : ...
Variation No : ...
Report Ref : P5632 : R001

Installation Name : Incinerator Exhaust
Visit Details : Emissions Survey – February 2024
Survey Dates : 12th – 16th February 2024
Report Issue Date. : 20th December 2024

465387 Dioxin Results

Sample Type : Stack
MSS Sample Ref : 465387
Customer Sample Ref : ECL/24/0405 - ECL/24/0407
Sample Condition : Non-Conforming (1)
Test Method : 2002b

Congener	LOD	Detected	Lower Bound	Upper Bound	Recovery	Sampling Recovery	UKAS
Dioxins/Furans	**ng/Sample**	**ng/Sample**	**ng/Sample**	**ng/Sample**	%	%	
2378-TCDD	0.0116	0.163	0.163	0.163	108		M
12378-PeCDD	0.00655	0.514	0.257	0.257	121		M
123478-HxCDD	0.00617	0.278	0.0278	0.0278	91		M
123678-HxCDD	0.00590	0.378	0.0378	0.0378	91		M
123789-HxCDD	0.00683	0.411	0.0411	0.0411			M
1234678-HpCDD	0.00379	1.86	0.0186	0.0186	69		M
OCDD	0.0041	2.05	0.00205	0.00205	62		M
Dioxins Total			**0.548**	**0.548**			M
2378-TCDF	0.0209	1.20	0.120	0.120	90		M
12378-PeCDF	0.0139	1.16	0.0582	0.0582		105	M
23478-PeCDF	0.0127	1.85	0.925	0.925	107		M
123478-HxCDF	0.00901	1.15	0.115	0.115	87		M
123678-HxCDF	0.00950	1.33	0.133	0.133	80		M
234678-HxCDF	0.00791	1.31	0.131	0.131	90		M
123789-HxCDF	0.00996	0.130	0.0130	0.0130		92	M
1234678-HpCDF	0.00344	2.88	0.0288	0.0288	67		M
1234789-HpCDF	0.00428	0.521	0.00521	0.00521		90	M
OCDF	0.00386	1.40	0.00140	0.00140	53		M
Furans Total			**1.53**	**1.53**			M
Dioxin/Furan Total			**2.08**	**2.08**			M

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

465388 Dioxin Results

Sample Type : Stack
MSS Sample Ref : 465388
Customer Sample Ref : ECL/24/0408 -ECL/24/0410
Sample Condition : Non-Conforming (1)
Test Method : 2002b

Congener	LOD	Detected	Lower Bound	Upper Bound	Recovery	Sampling Recovery	UKAS
Dioxins/Furans	**ng/Sample**	**ng/Sample**	**ng/Sample**	**ng/Sample**	%	%	
2378-TCDD	0.00014	< 0.00014	0.0000	0.00014	119		M
12378-PeCDD	0.00019	< 0.00019	0.0000	0.00009	116		M
123478-HxCDD	0.00032	< 0.00032	0.0000	0.00003	100		M
123678-HxCDD	0.00035	< 0.00035	0.0000	0.00004	94		M
123789-HxCDD	0.00038	< 0.00038	0.0000	0.00004			M
1234678-HpCDD	0.00038	< 0.00038	0.0000	0.00000	88		M
OCDD	0.0014	< 0.00135	0.0000	0.00000	86		M
Dioxins Total			**0.0000**	**0.00035**			M
2378-TCDF	0.00027	< 0.00027	0.0000	0.00003	86		M
12378-PeCDF	0.00026	< 0.00026	0.0000	0.00001		107	M
23478-PeCDF	0.00027	0.00074	0.00037	0.00037	97		M
123478-HxCDF	0.00019	< 0.00019	0.0000	0.00002	80		M
123678-HxCDF	0.00016	< 0.00016	0.0000	0.00002	85		M
234678-HxCDF	0.00016	< 0.00016	0.0000	0.00002	88		M
123789-HxCDF	0.00018	< 0.00018	0.0000	0.00002		89	M
1234678-HpCDF	0.00045	< 0.00045	0.0000	0.00000	71		M
1234789-HpCDF	0.00065	< 0.00065	0.0000	0.00001		92	M
OCDF	0.00056	< 0.00056	0.0000	0.00000	82		M
Furans Total			**0.00037**	**0.00049**			M
Dioxin/Furan Total			**0.00037**	**0.00084**			M

UNCERTAINTY CALCULATIONS

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Combustion Gases (NOx, CO, CO_2 & O_2) Measurement Uncertainty – Light Medical Waste

Measurement Uncertainty Calculations Part 1

Horiba PG 350 E Performance Characteristics	Standard Uncertainty (% of Range)	Distributiuon	Minimum Certified Range (R_i) NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit[1]	u_{lof}	Rectangular (Divisor = √3)	0.75	0.61	0.10	1.00
Span drift[2]	$u_{d,s}$	Rectangular (Divisor = √3)	0.094	0.056	0.0057	0.074
Repeatability Standard Deviation (span)[3]	u_r	Normal (Divisor = 1)	2.08	2.37	0.26	0.18
Losses / leakage in the sample system[4]	u_{loss}	Rectangular (Divisor = √3)	1.84	1.97	0.18	0.32
Temperature dependant span drift[5]	u_t	Rectangular (Divisor = √3)	0.051	0.057	0.014	0.029
Interferents[1]	u_i	Rectangular (Divisor = √3)	0.52	0.87	0.010	0.55
Uncertainty of Reference Gas[6]	u_{ref}	Rectangular (Divisor = √3)	10.80	6.52	0.15	0.31
Effect of Voltage Fluctuation[7]	u_v	Rectangular (Divisor = √3)	0.40	0.50	0.020	0.40
Effect of Sample Gas Flow/ Pressure[7]	u_{sg}	Rectangular (Divisor = √3)	0.10	0.10	0.10	0.10

Note:

$$when\ \left|(x_{i,\max} - x_{i,adj})\right| = \left|(x_{i,\min} - x_{i,adj})\right|, then\ u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$$

1 Expressed as a percentage of the certified range
2 Expressed as a percentage of the certified range as maximum drift per 24hr period
3 Expressed as a percentage of the certified range
4 Expressed as a percentage of the certified range
5 Expressed as a percentage of the certified range per one degree centigrade
6 Expressed as standard uncertainty in units of measurement i.e. mg/m³ / %Vol inc additional uncertainty of 2% for gas blending
7 Expressed as a percentage of the certified range

Measurement Uncertainty Calculations Part 2

Horiba PG 350 E Performance Characteristics	Uncertainty	Value of Standard Uncertainty	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit	u_{lof}	$u(x_i) = \frac{u_{lof} \times R_i}{\sqrt{3}} =$	0.58	0.26	0.014	0.12
Span drift	$u_{d,s}$	$u(x_i) = \frac{u_{d,s} \times R_i}{\sqrt{3}} =$	0.073	0.024	0.00082	0.0085
Repeatability Standard Deviation (span)	u_r	$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}} =$	2.08	2.37	0.26	0.18
Losses / leakage in the sample system	u_{loss}	$u(x_i) = \frac{u_{loss} \times R_i}{\sqrt{3}} =$	1.42	0.85	0.027	0.04
Temperature dependant span drift	u_t	$u(x_i) = \frac{u_t}{100} \times R_i \times \sqrt{\frac{(x_{i,max} - x_{adj})^2 + (x_{i,min} - x_{adj})(x_{i,max} - x_{adj}) + (x_{i,min} - x_{adj})^2}{3}}$	0.13	0.080	0.0067	0.011
Interferents	u_i	$u(x_i) = \frac{u_i \times R_i}{\sqrt{3}} =$	0.40	0.38	0.0014	0.55
Uncertainty of Reference Gas	u_{ref}	$u(x_i) = \frac{u_{ref}}{\sqrt{3}} =$	6.23	3.76	0.087	0.18
Effect of Voltage Fluctuation [7]	u_v	$u(x_i) = \frac{u_v \times R_i}{\sqrt{3}} =$	0.23	0.29	0.012	0.23
Effect of Sample Gas Flow / Pressure [7]	u_{sg}	$u(x_i) = \frac{usg \times R_i}{\sqrt{3}} =$	0.058	0.058	0.058	0.06
Combined Standard Uncertainty		$u_c = \sqrt{u_{lof}^2 + u_{d,s}^2 + u_r^2 + u_{loss}^2 + u_t^2 + u_i^2 + u_{ref}^2 + u2v + u2sg}$	6.77	4.56	0.28	0.37
Expanded measurement uncertainty (at 95% confidence)		$U_{EXP} = 2 \times u_c$	13.53	9.12	0.56	0.74
Applied Span Concentration			623.41	376.38	15.05	17.95
Measured Span Concentration, STP Dry Gas			624.08	373.03	14.95	17.92
Expanded measurement uncertainty as % of Applied Span			2%	2%	4%	4%

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
Permit No	**: ...**		**Visit Details**	**: Emissions Survey – February 2024**
Variation No	**: ...**		**Survey Dates**	**: 12th – 16th February 2024**
Report Ref	**: P5632**	**: R001**	**Report Issue Date.**	**: 20th December 2024**

Combustion Gases (NOx, CO, CO_2 & O_2) Uncertainty of Measurement Results – Light Medical Waste @ Reference Condtions 273K, 101.3kPa, Dry Gas & 3%Oxygen

Uncertainty of Measurement Results - Calculations Part 1

Horiba PG 350 E Performance Characteristics	Standard Uncertainty (% of Range)	Distribution	Divisor	Minimum Certified Range (R_l) NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit[1]	u_{lof}	Rectangular	$\sqrt{3}$	0.75	0.61	0.10	1.00
Span drift[2]	$u_{d,s}$			0.094	0.056	0.0057	0.074
Losses / leakage in the sample system[4]	u_{loss}			1.84	1.97	0.18	0.32
Temperature dependant span drift[5]	u_t			0.051	0.057	0.014	0.029
Interferents[3]	u_i			0.52	0.87	0.010	0.55
Effect of Voltage Fluctuation[7]	u_v			0.40	0.50	0.020	0.40
Sample Gas Pressure/ Flow[7]	u_{sg}			0.10	0.10	0.10	0.10

Notes:

For rectangular distributions, $u(x_i) = \frac{u \times R_l}{\sqrt{3}}$

For $u(x_i) = \Delta x_i \sqrt{\frac{(x_{i,max} - x_{i,adj})^2 + (x_{i,min} - x_{i,adj})(x_{i,max} - x_{i,adj}) + (x_{i,min} - x_{i,adj})^2}{3}}$, when $|(x_{i,max} - x_{i,adj})| = |(x_{i,min} - x_{i,adj})|$, then $u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$

Where $u(x_i) = \frac{\sigma}{\sqrt{n}}$ (See note 6 below), $\sigma = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$

Horiba PG 350 E Performance Characteristics	Uncertainty (Units of final measurement)	Distribution	Divisor	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit	u_{lof}	Rectangular	$\sqrt{3}$	0.58	0.26	0.014	0.12
Span drift	$u_{d,s}$			0.073	0.024	0.00082	0.0085
Temperature dependant span drift	u_t			0.13	0.084	0.0070	0.0066
Interferents	u_i			0.40	0.38	0.0014	0.064
Effect of Voltage Fluctuation[7]	u_v			0.31	0.22	0.0029	0.046
Sample Gas Pressure/ Flow[7]	u_{sg}			0.077	0.043	0.014	0.012

Uncertainty of Measurement Results - Calculations Part 2

Horiba PG 350 E Performance Characteristics	Uncertainty (Units of final measurement)	Date & Time	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Losses / leakage in the sample system	u_{loss}	13/02/24 09:45 - 10:14	4.48	231.46	0.029	0.012
		13/02/24 10:15 - 10:44	4.57	197.13	0.028	0.013
		13/02/24 10:45 - 11:14	7.83	102.97	0.033	0.0080
		13/02/24 11:15 - 11:44	5.28	171.18	0.037	0.0017
		13/02/24 11:45 - 12:14	2.04	121.80	0.037	0.00071
		13/02/24 12:15 - 12:44	4.38	181.24	0.031	0.0093
		13/02/24 12:45 - 13:14	3.21	128.73	0.037	0.0011
		13/02/24 13:15 - 13:44	5.84	183.81	0.023	0.020
		13/02/24 13:45 - 14:14	9.59	103.67	0.034	0.0059
		13/02/24 14:15 - 14:44	3.39	152.76	0.020	0.025
		13/02/24 14:45 - 15:14	6.42	44.93	0.032	0.0085
		13/02/24 15:15 - 15:44	5.93	130.43	0.036	0.0031
Standard Error of Measured Value	u_{SE}	13/02/24 09:45 - 10:14	8.75	823.73	0.99	0.74
		13/02/24 10:15 - 10:44	8.33	785.93	0.89	0.64
		13/02/24 10:45 - 11:14	10.91	301.42	0.54	0.46
		13/02/24 11:15 - 11:44	1.84	21.94	0.050	0.040
		13/02/24 11:45 - 12:14	0.21	4.66	0.0065	0.0058
		13/02/24 12:15 - 12:44	8.12	740.16	0.87	0.62
		13/02/24 12:45 - 13:14	1.20	23.10	0.043	0.033
		13/02/24 13:15 - 13:44	10.37	989.67	0.94	0.67
		13/02/24 13:45 - 14:14	4.63	36.71	0.12	0.097
		13/02/24 14:15 - 14:44	5.58	820.16	0.74	0.54
		13/02/24 14:45 - 15:14	3.16	19.10	0.20	0.16
		13/02/24 15:15 - 15:44	1.40	4.26	0.047	0.040

Effect on Uncertainty Caused by Oxygen $uCorr'_{o_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured})(20.9\% - O_{2,measured})} \times Uncertainty\ of\ O_2\ Measurement = 0.215$

$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.0510$ $uf_{o_2} = \frac{uCorr'_{o_2}}{f_{o_2}} \times 100 = 20.48\ \%$

The effect of oxygen on the overall uncertainties (below) is incorporated using the following equation:-

$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$

Where oxygen or moisture correction is required, uncertainty based on the standard error of the measured peripheral value is converted to units of final measurement using a sensitivity coefficient C,

$\therefore u(x_i) = C_i u_i$ where $C_i = \frac{\partial f}{\partial x_i}$

Uncertainty of Measurement Results - Calculations Part 3

Horiba PG 350 E Uncertainty	Date & Time	NOx (as NO2) 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Measured Concentration	13/02/24 09:45 - 10:14	243.87	11732.38	15.72	3.75
Expanded Uncertainty as Percentage of Measured Concentration		22%	25%	24%	45%
Measured Concentration	13/02/24 10:15 - 10:44	249.17	9992.12	15.26	4.01
Expanded Uncertainty as Percentage of Measured Concentration		22%	26%	24%	38%
Measured Concentration	13/02/24 10:45 - 11:14	426.76	5219.24	17.71	2.47
Expanded Uncertainty as Percentage of Measured Concentration		21%	24%	21%	44%
Measured Concentration	13/02/24 11:15 - 11:44	287.67	8676.88	19.99	0.51
Expanded Uncertainty as Percentage of Measured Concentration		21%	21%	20%	58%
Measured Concentration	13/02/24 11:45 - 12:14	111.16	6174.06	20.35	0.22
Expanded Uncertainty as Percentage of Measured Concentration		21%	21%	20%	>100%
Measured Concentration	13/02/24 12:15 - 12:44	238.78	9186.91	16.87	2.89
Expanded Uncertainty as Percentage of Measured Concentration		22%	26%	23%	48%
Measured Concentration	13/02/24 12:45 - 13:14	175.14	6525.19	20.16	0.35
Expanded Uncertainty as Percentage of Measured Concentration		21%	21%	20%	80%
Measured Concentration	13/02/24 13:15 - 13:44	318.26	9316.88	12.59	6.13
Expanded Uncertainty as Percentage of Measured Concentration		22%	30%	25%	30%
Measured Concentration	13/02/24 13:45 - 14:14	522.31	5254.88	18.28	1.84
Expanded Uncertainty as Percentage of Measured Concentration		21%	21%	21%	27%
Measured Concentration	13/02/24 14:15 - 14:44	184.70	7743.34	10.64	7.80
Expanded Uncertainty as Percentage of Measured Concentration		22%	30%	25%	25%
Measured Concentration	13/02/24 14:45 - 15:14	349.72	2277.23	17.38	2.65
Expanded Uncertainty as Percentage of Measured Concentration		21%	21%	21%	26%
Measured Concentration	13/02/24 15:15 - 15:44	323.22	6611.16	19.42	0.97
Expanded Uncertainty as Percentage of Measured Concentration		21%	21%	20%	35%

Combined Standard Uncertainty $u_c = \sqrt{u_{lof}^2 + u_{d,s}^2 + u_t^2 + u_{loss}^2 + u_i^2 + u_v^2 + u_{ref}^2 + u_{sg}^2}$

Expanded uncertainty (at 95% confidence) $U_{exp} = 2 \times u_c$

1 Expressed as a percentage of the certified range
2 Expressed as a percentage of the certified range as maximum drift per 24hr period
3 Expressed as a percentage of the certified range
4 Expressed as a percentage of the certified range
5 Expressed as a percentage of the certified range per one degree centigrade
6 Where the uncertainty of Moisture is taken as the standard error of the time averaged value used to correct to Dry Conditions
7 If no value for uncertainty is presented above, the uncertainty is considered to be >100%

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Combustion Gases (NOx, CO, CO_2 & O_2) Measurement Uncertainty – Medium Bin Medical Waste

Measurement Uncertainty Calculations Part 1

Horiba PG 350 E Performance Characteristics	Standard Uncertainty (% of Range)	Distributiuon	Minimum Certified Range (R_i) NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit[1]	u_{lof}	Rectangular (Divisor = √3)	0.75	0.61	0.10	1.00
Span drift[2]	$u_{d,s}$	Rectangular (Divisor = √3)	0.094	0.056	0.0057	0.074
Repeatability Standard Deviation (span)[3]	u_r	Normal (Divisor = 1)	2.14	1.36	0.03	0.37
Losses / leakage in the sample system[4]	u_{loss}	Rectangular (Divisor = √3)	1.84	1.97	0.18	0.32
Temperature dependant span drift[5]	u_t	Rectangular (Divisor = √3)	0.051	0.057	0.014	0.029
Interferents[1]	u_i	Rectangular (Divisor = √3)	0.52	0.87	0.010	0.55
Uncertainty of Reference Gas[6]	u_{ref}	Rectangular (Divisor = √3)	10.80	6.52	0.15	0.31
Effect of Voltage Fluctuation[7]	u_v	Rectangular (Divisor = √3)	0.40	0.50	0.020	0.40
Effect of Sample Gas Flow/ Pressure[7]	u_{sg}	Rectangular (Divisor = √3)	0.10	0.10	0.10	0.10

Note:

$$when\ \left|(x_{i,\max} - x_{i,adj})\right| = \left|(x_{i,\min} - x_{i,adj})\right|, then\ u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$$

1 Expressed as a percentage of the certified range
2 Expressed as a percentage of the certified range as maximum drift per 24hr period
3 Expressed as a percentage of the certified range
4 Expressed as a percentage of the certified range
5 Expressed as a percentage of the certified range per one degree centigrade
6 Expressed as standard uncertainty in units of measurement i.e. mg/m³ / %Vol inc additional uncertainty of 2% for gas blending
7 Expressed as a percentage of the certified range

Measurement Uncertainty Calculations Part 2

Horiba PG 350 E Performance Characteristics	Uncertainty	Value of Standard Uncertainty	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit	u_{lof}	$u(x_i) = \frac{u_{lof} \times R_i}{\sqrt{3}} =$	0.58	0.26	0.014	0.12
Span drift	$u_{d,s}$	$u(x_i) = \frac{u_{d,s} \times R_i}{\sqrt{3}} =$	0.073	0.024	0.00082	0.0085
Repeatability Standard Deviation (span)	u_r	$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}} =$	2.14	1.36	0.03	0.37
Losses / leakage in the sample system	u_{loss}	$u(x_i) = \frac{u_{loss} \times R_i}{\sqrt{3}} =$	1.42	0.85	0.027	0.04
Temperature dependant span drift	u_t	$u(x_i) = \frac{u_t}{100} \times R_i \times \sqrt{\frac{(x_{i,max} - x_{adj})^2 + (x_{i,min} - x_{adj})(x_{i,max} - x_{adj}) + (x_{i,min} - x_{adj})^2}{3}}$	0.15	0.093	0.0077	0.012
Interferents	u_i	$u(x_i) = \frac{u_i \times R_i}{\sqrt{3}} =$	0.40	0.38	0.0014	0.55
Uncertainty of Reference Gas	u_{ref}	$u(x_i) = \frac{u_{ref}}{\sqrt{3}} =$	6.23	3.76	0.087	0.18
Effect of Voltage Fluctuation [7]	u_v	$u(x_i) = \frac{u_v \times R_i}{\sqrt{3}} =$	0.23	0.29	0.012	0.23
Effect of Sample Gas Flow / Pressure [7]	u_{sg}	$u(x_i) = \frac{usg \times R_i}{\sqrt{3}} =$	0.058	0.058	0.058	0.06
Combined Standard Uncertainty		$u_c = \sqrt{u_{lof}^2 + u_{d,s}^2 + u_r^2 + u_{loss}^2 + u_t^2 + u_i^2 + u_{ref}^2} + u2v + u2sg$	6.78	4.13	0.11	0.49
Expanded measurement uncertainty (at 95% confidence)		$U_{EXP} = 2 \times u_c$	13.57	8.26	0.23	0.97
Applied Span Concentration			623.41	376.38	15.05	17.95
Measured Span Concentration, STP Dry Gas			623.64	374.00	15.01	17.95
Expanded measurement uncertainty as % of Applied Span			2%	2%	2%	5%

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
Permit No	**: ...**		**Visit Details**	**: Emissions Survey – February 2024**
Variation No	**: ...**		**Survey Dates**	**: 12th – 16th February 2024**
Report Ref	**: P5632**	**: R001**	**Report Issue Date.**	**: 20th December 2024**

Combustion Gases (NOx, CO, CO_2 & O_2) Uncertainty of Measurement Results – Medium Bin Medical Waste @ Reference Condtions 273K, 101.3kPa, Dry Gas & 3%Oxygen (Part 1)

Uncertainty of Measurement Results - Calculations Part 1

Horiba PG 350 E Performance Characteristics	Standard Uncertainty (% of Range)	Distribution	Divisor	Minimum Certified Range (R_c) NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit[1]	u_{lof}	Rectangular	$\sqrt{3}$	0.75	0.61	0.10	1.00
Span drift[2]	u_{dx}			0.094	0.056	0.0057	0.074
Losses / leakage in the sample system[4]	u_{loss}			1.84	1.97	0.18	0.32
Temperature dependant span drift[5]	u_t			0.051	0.057	0.014	0.029
Interferents[1]	u_i			0.52	0.87	0.010	0.55
Effect of Voltage Fluctuation[7]	u_v			0.40	0.50	0.020	0.40
Sample Gas Pressure/ Flow[7]	u_{sg}			0.10	0.10	0.10	0.10

Notes:

For rectangular distributions, $u(x_i) = \frac{u \times R_c}{\sqrt{3}}$

For $u(x_i) = \Delta x_i \sqrt{\frac{(x_{i,max} - x_{i,adj})^2 + (x_{i,min} - x_{i,adj})(x_{i,max} - x_{i,adj}) + (x_{i,min} - x_{i,adj})^2}{3}}$, when $|(x_{i,max} - x_{i,adj})| = |(x_{i,min} - x_{i,adj})|$, then $u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$

Where $u(x_i) = \frac{\sigma}{\sqrt{n}}$ (See note 6 below), $\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$

Horiba PG 350 E Performance Characteristics	Uncertainty (Units of final measurement)	Distribution	Divisor	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit	u_{lof}	Rectangular	$\sqrt{3}$	0.58	0.26	0.014	0.12
Span drift	u_{dx}			0.073	0.024	0.00082	0.0085
Temperature dependant span drift	u_t			0.13	0.081	0.0067	0.0066
Interferents	u_i			0.40	0.38	0.0014	0.064
Effect of Voltage Fluctuation[7]	u_v			0.31	0.22	0.0029	0.046
Sample Gas Pressure/ Flow[7]	u_{sg}			0.077	0.043	0.014	0.012

Uncertainty of Measurement Results - Calculations Part 2

Horiba PG 350 E Performance Characteristics	Uncertainty (Units of final measurement)	Date & Time	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Losses / leakage in the sample system	u_{loss}	14/02/24 09:15 - 09:44	3.73	97.78	0.031	0.0093
		14/02/24 09:45 - 10:14	5.50	126.59	0.031	0.0094
		14/02/24 10:15 - 10:44	5.17	91.04	0.030	0.011
		14/02/24 10:45 - 11:14	4.78	82.45	0.030	0.011
		14/02/24 11:15 - 11:44	6.10	54.39	0.031	0.0099
		14/02/24 11:45 - 12:14	4.55	54.29	0.030	0.011
		14/02/24 12:15 - 12:44	4.07	46.50	0.034	0.0057
		14/02/24 12:45 - 13:14	3.24	36.48	0.034	0.0056
		14/02/24 13:15 - 13:44	2.69	72.89	0.031	0.0090
		14/02/24 13:45 - 14:14	4.00	48.50	0.031	0.0092
		14/02/24 14:15 - 14:44	7.69	37.89	0.032	0.0078
		14/02/24 14:45 - 15:14	8.48	54.20	0.032	0.0086
Standard Error of Measured Value	u_{SE}	14/02/24 09:15 - 09:44	6.23	393.44	0.74	0.51
		14/02/24 09:45 - 10:14	4.52	532.85	0.61	0.42
		14/02/24 10:15 - 10:44	4.44	517.35	0.54	0.36
		14/02/24 10:45 - 11:14	2.02	382.26	0.49	0.34
		14/02/24 11:15 - 11:44	5.79	151.50	0.45	0.34
		14/02/24 11:45 - 12:14	4.16	227.60	0.45	0.31
		14/02/24 12:15 - 12:44	2.86	30.58	0.31	0.22
		14/02/24 12:45 - 13:14	3.52	20.82	0.41	0.31
		14/02/24 13:15 - 13:44	4.85	357.31	0.72	0.53
		14/02/24 13:45 - 14:14	4.62	104.35	0.51	0.38
		14/02/24 14:15 - 14:44	5.01	12.11	0.19	0.15
		14/02/24 14:45 - 15:14	5.62	58.04	0.23	0.23

Effect on Uncertainty Caused by Oxygen $uCorr^{n}_{O_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured})x(20.9\% - O_{2,measured})} x\, Uncertainty\ of\ O_2\ Measurement =$ 0.221

$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} =$ 1.0477 $uf_{o_2} = \frac{uCorr^{n}_{o_2}}{f_{o_2}} x100 =$ 21.12 %

The effect of oxygen on the overall uncertainties (below) is incorporated using the following equation:-

$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$

Where oxygen or moisture correction is required, uncertainty based on the standard error of the measured peripheral value is converted to units of final measurement using a sensitivity coefficient C,

$\therefore u(x_i) = C_i u_i$ where $C_i = \frac{\partial f}{\partial x_i}$

Uncertainty of Measurement Results - Calculations Part 3

Horiba PG 350 E Uncertainty	Date & Time	NOx (as NO2) 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Measured Concentration	14/02/24 09:15 - 09:44	203.19	4956.53	16.79	2.89
Expanded Uncertainty as Percentage of Measured Concentration		22%	27%	23%	42%
Measured Concentration	14/02/24 09:45 - 10:14	299.80	6416.43	16.87	2.93
Expanded Uncertainty as Percentage of Measured Concentration		22%	27%	22%	37%
Measured Concentration	14/02/24 10:15 - 10:44	281.86	4614.66	16.31	3.44
Expanded Uncertainty as Percentage of Measured Concentration		22%	31%	22%	31%
Measured Concentration	14/02/24 10:45 - 11:14	260.49	4179.21	16.37	3.36
Expanded Uncertainty as Percentage of Measured Concentration		22%	28%	22%	31%
Measured Concentration	14/02/24 11:15 - 11:44	332.26	2757.03	16.67	3.07
Expanded Uncertainty as Percentage of Measured Concentration		22%	24%	22%	32%
Measured Concentration	14/02/24 11:45 - 12:14	247.68	2751.77	16.13	3.45
Expanded Uncertainty as Percentage of Measured Concentration		22%	27%	22%	29%
Measured Concentration	14/02/24 12:15 - 12:44	221.73	2357.00	18.52	1.78
Expanded Uncertainty as Percentage of Measured Concentration		22%	22%	21%	36%
Measured Concentration	14/02/24 12:45 - 13:14	176.70	1848.96	18.45	1.75
Expanded Uncertainty as Percentage of Measured Concentration		22%	22%	22%	44%
Measured Concentration	14/02/24 13:15 - 13:44	146.44	3694.55	16.89	2.81
Expanded Uncertainty as Percentage of Measured Concentration		22%	29%	23%	44%
Measured Concentration	14/02/24 13:45 - 14:14	218.01	2458.14	16.94	2.85
Expanded Uncertainty as Percentage of Measured Concentration		22%	23%	22%	35%
Measured Concentration	14/02/24 14:15 - 14:44	419.14	1920.76	17.64	2.42
Expanded Uncertainty as Percentage of Measured Concentration		22%	22%	21%	27%
Measured Concentration	14/02/24 14:45 - 15:14	461.92	2747.17	17.45	2.68
Expanded Uncertainty as Percentage of Measured Concentration		22%	22%	21%	29%

Combined Standard Uncertainty $u_c = \sqrt{u_{lof}^2 + u_{d,x}^2 + u_t^2 + u_{loss}^2 + u_i^2 + u_t^2 + u_{ref}^2 + u_v^2 + u_{sg}^2}$

Expanded uncertainty (at 95% confidence) $U_{Exp} = 2 \times u_c$

1 Expressed as a percentage of the certified range
2 Expressed as a percentage of the certified range as maximum drift per 24hr period
3 Expressed as a percentage of the certified range
4 Expressed as a percentage of the certified range
5 Expressed as a percentage of the certified range per one degree centigrade
6 Where the uncertainty of Moisture is taken as the standard error of the time averaged value used to correct to Dry Conditions
7 If no value for uncertainty is presented above, the uncertainty is considered to be >100%

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
Permit No	**: ...**		**Visit Details**	**: Emissions Survey – February 2024**
Variation No	**: ...**		**Survey Dates**	**: 12th – 16th February 2024**
Report Ref	**: P5632**	**: R001**	**Report Issue Date.**	**: 20th December 2024**

Combustion Gases (NOx, CO, CO_2 & O_2) Uncertainty of Measurement Results – Medium Bin Medical Waste @ Reference Condtions 273K, 101.3kPa, Dry Gas & 3%Oxygen (Part 2)

Uncertainty of Measurement Results - Calculations Part 1

Horiba PG 350 E Performance Characteristics	Standard Uncertainty (% of Range)	Distribution	Divisor	Minimum Certified Range (R_i) NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit[1]	u_{lof}	Rectangular	$\sqrt{3}$	0.75	0.61	0.10	1.00
Span drift[2]	$u_{d,s}$			0.094	0.056	0.0057	0.074
Losses / leakage in the sample system[4]	u_{loss}			1.84	1.97	0.18	0.32
Temperature dependant span drift[5]	u_t			0.051	0.057	0.014	0.029
Interferents[1]	u_i			0.52	0.87	0.010	0.55
Effect of Voltage Fluctuation[7]	u_v			0.40	0.50	0.020	0.40
Sample Gas Pressure/ Flow[7]	u_{sg}			0.10	0.10	0.10	0.10

Notes:

For rectangular distributions, $u(x_i) = \frac{u \times R_i}{\sqrt{3}}$

For $u(x_i) = \Delta x_i \sqrt{\frac{(x_{i,\max} - x_{i,adj})^2 + (x_{i,\min} - x_{i,adj})(x_{i,\max} - x_{i,adj}) + (x_{i,\min} - x_{i,adj})^2}{3}}$, when $\left|(x_{i,\max} - x_{i,adj})\right| = \left|(x_{i,\min} - x_{i,adj})\right|$, then $u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$

Where $u(x_i) = \frac{\sigma}{\sqrt{n}}$ (See note 6 below), $\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$

Horiba PG 350 E Performance Characteristics	Uncertainty (Units of final measurement)	Distribution	Divisor	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit	u_{lof}	Rectangular	$\sqrt{3}$	0.58	0.26	0.014	0.12
Span drift	$u_{d,s}$			0.073	0.024	0.00082	0.0085
Temperature dependant span drift	u_t			0.13	0.081	0.0067	0.0066
Interferents	u_i			0.40	0.38	0.0014	0.064
Effect of Voltage Fluctuation[7]	u_v			0.31	0.22	0.0029	0.046
Sample Gas Pressure/ Flow[7]	u_{sg}			0.077	0.043	0.014	0.012

Uncertainty of Measurement Results - Calculations Part 2

Horiba PG 350 E Performance Characteristics	Uncertainty (Units of final measurement)	Date & Time	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Losses / leakage in the sample system	u_{loss}	14/02/24 15:15 - 15:44	9.06	58.35	0.033	0.0076
Standard Error of Measured Value	u_{SE}	14/02/24 15:15 - 15:44	5.60	36.08	0.23	0.18

Effect on Uncertainty Caused by Oxygen $uCorr^n_{o_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured})x(20.9\% - O_{2,measured})} x\, Uncertainty\ of\ O_2\ Measurement =$ 0.311

$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} =$ 1.0123 $uf_{o_2} = \frac{uCorr^n_{o_2}}{f_{o_2}} x100 =$ 30.76 **%**

The effect of oxygen on the overall uncertainties (below) is incorporated using the following equation:-

$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$

Where oxygen or moisture correction is required, uncertainty based on the standard error of the measured peripheral value is converted to units of final measurement using a sensitivity coefficient C,

$\therefore u(x_i) = C_i u_i$ where $C_i = \frac{\partial f}{\partial x_i}$

Uncertainty of Measurement Results - Calculations Part 3

Horiba PG 350 E Uncertainty	Date & Time	NOx (as NO2) 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Measured Concentration	14/02/24 15:15 - 15:44	493.87	2957.75	17.68	2.37
Expanded Uncertainty as Percentage of Measured Concentration		31%	31%	31%	36%

Combined Standard Uncertainty $u_c = \sqrt{u_{lof}^2 + u_{d,s}^2 + u_r^2 + u_{loss}^2 + u_t^2 + u_i^2 + u_{ref}^2 + u_v^2 + u_{sg}^2}$

Expanded uncertainty (at 95% confidence) $U_{Exp} = 2 \times u_c$

1 Expressed as a percentage of the certified range
2 Expressed as a percentage of the certified range as maximum drift per 24hr period
3 Expressed as a percentage of the certified range
4 Expressed as a percentage of the certified range
5 Expressed as a percentage of the certified range per one degree centigrade
6 Where the uncertainty of Moisture is taken as the standard error of the time averaged value used to correct to Dry Conditions
7 If no value for uncertainty is presented above, the uncertainty is considered to be >100%

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Combustion Gases (NOx, CO, CO_2 & O_2) Measurement Uncertainty – Dead Animal Waste (15/02/2024)

Measurement Uncertainty Calculations Part 1

Horiba PG 350 E Performance Characteristics	Standard Uncertainty (% of Range)	Distributiuon	Minimum Certified Range (R_i) NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit[1]	u_{lof}	Rectangular (Divisor = √3)	0.75	0.61	0.10	1.00
Span drift[2]	$u_{d,s}$	Rectangular (Divisor = √3)	0.094	0.056	0.0057	0.074
Repeatability Standard Deviation (span)[3]	u_r	Normal (Divisor = 1)	1.89	0.90	0.12	0.37
Losses / leakage in the sample system[4]	u_{loss}	Rectangular (Divisor = √3)	1.84	1.97	0.18	0.32
Temperature dependant span drift[5]	u_t	Rectangular (Divisor = √3)	0.051	0.057	0.014	0.029
Interferents[1]	u_i	Rectangular (Divisor = √3)	0.52	0.87	0.010	0.55
Uncertainty of Reference Gas[6]	u_{ref}	Rectangular (Divisor = √3)	10.80	6.52	0.15	0.31
Effect of Voltage Fluctuation[7]	u_v	Rectangular (Divisor = √3)	0.40	0.50	0.020	0.40
Effect of Sample Gas Flow/ Pressure[7]	u_{sg}	Rectangular (Divisor = √3)	0.10	0.10	0.10	0.10

Note:

$$when\ \left|(x_{i,\max} - x_{i,adj})\right| = \left|(x_{i,\min} - x_{i,adj})\right|, then\ u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$$

1 Expressed as a percentage of the certified range
2 Expressed as a percentage of the certified range as maximum drift per 24hr period
3 Expressed as a percentage of the certified range
4 Expressed as a percentage of the certified range
5 Expressed as a percentage of the certified range per one degree centigrade
6 Expressed as standard uncertainty in units of measurement i.e. mg/m³ / %Vol inc additional uncertainty of 2% for gas blending
7 Expressed as a percentage of the certified range

Measurement Uncertainty Calculations Part 2

Horiba PG 350 E Performance Characteristics	Uncertainty	Value of Standard Uncertainty	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit	u_{lof}	$u(x_i) = \frac{u_{lof} \times R_i}{\sqrt{3}} =$	0.58	0.26	0.014	0.12
Span drift	$u_{d,s}$	$u(x_i) = \frac{u_{d,s} \times R_i}{\sqrt{3}} =$	0.073	0.024	0.00082	0.0085
Repeatability Standard Deviation (span)	u_r	$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}} =$	1.89	0.90	0.12	0.37
Losses / leakage in the sample system	u_{loss}	$u(x_i) = \frac{u_{loss} \times R_i}{\sqrt{3}} =$	1.42	0.85	0.027	0.04
Temperature dependant span drift	u_t	$u(x_i) = \frac{u_t}{100} \times R_i \times \sqrt{\frac{(x_{i,max} - x_{adj})^2 + (x_{i,min} - x_{adj})^2 + (x_{i,max} - x_{adj})(x_{i,min} - x_{adj})}{3}}$	0.15	0.093	0.0077	0.012
Interferents	u_i	$u(x_i) = \frac{u_i \times R_i}{\sqrt{3}} =$	0.40	0.38	0.0014	0.55
Uncertainty of Reference Gas	u_{ref}	$u(x_i) = \frac{u_{ref}}{\sqrt{3}} =$	6.23	3.76	0.087	0.18
Effect of Voltage Fluctuation [7]	u_v	$u(x_i) = \frac{u_v \times R_i}{\sqrt{3}} =$	0.23	0.29	0.012	0.23
Effect of Sample Gas Flow / Pressure [7]	u_{sg}	$u(x_i) = \frac{usg \times R_i}{\sqrt{3}} =$	0.058	0.058	0.058	0.06
Combined Standard Uncertainty		$u_c = \sqrt{u_{lof}^2 + u_{d,s}^2 + u_r^2 + u_{loss}^2 + u_t^2 + u_i^2 + u_{ref}^2} + u2v + u2sg$	6.71	4.00	0.17	0.49
Expanded measurement uncertainty (at 95% confidence)		$U_{EXP} = 2 \times u_c$	13.42	8.00	0.33	0.98
Applied Span Concentration			623.41	376.38	15.05	17.95
Measured Span Concentration, STP Dry Gas			623.41	375.45	15.03	17.96
Expanded measurement uncertainty as % of Applied Span			2%	2%	2%	5%

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
Permit No	**: ...**		**Visit Details**	**: Emissions Survey – February 2024**
Variation No	**: ...**		**Survey Dates**	**: 12th – 16th February 2024**
Report Ref	**: P5632**	**: R001**	**Report Issue Date.**	**: 20th December 2024**

Combustion Gases (NOx, CO, CO_2 & O_2) Uncertainty of Measurement Results – Dead Animal Waste @ Reference Condtions 273K, 101.3kPa, Dry Gas & 3%Oxygen (15/02/2024)

Uncertainty of Measurement Results - Calculations Part 1

Horiba PG 350 E Performance Characteristics	Standard Uncertainty (% of Range)	Distribution	Divisor	Minimum Certified Range (R_i) NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit[1]	u_{lof}	Rectangular	$\sqrt{3}$	0.75	0.61	0.10	1.00
Span drift[2]	u_{ds}			0.094	0.056	0.0057	0.074
Losses / leakage in the sample system[4]	u_{loss}			1.84	1.97	0.18	0.32
Temperature dependant span drift[5]	u_t			0.051	0.057	0.014	0.029
Interferents[1]	u_i			0.52	0.87	0.010	0.55
Effect of Voltage Fluctuation[7]	u_v			0.40	0.50	0.020	0.40
Sample Gas Pressure/ Flow[7]	u_{sg}			0.10	0.10	0.10	0.10

Notes:

For rectangular distributions, $u(x_i) = \frac{u \times R_i}{\sqrt{3}}$

For $u(x_i) = \Delta x_i \sqrt{\frac{(x_{i,max} - x_{i,adj})^2 + (x_{i,min} - x_{i,adj})(x_{i,max} - x_{i,adj}) + (x_{i,min} - x_{i,adj})^2}{3}}$, when $|(x_{i,max} - x_{i,adj})| = |(x_{i,min} - x_{i,adj})|$, then $u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$

Where $u(x_i) = \frac{\sigma}{\sqrt{n}}$ (See note 6 below), $\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$

Horiba PG 350 E Performance Characteristics	Uncertainty (Units of final measurement)	Distribution	Divisor	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit	u_{lof}	Rectangular	$\sqrt{3}$	0.58	0.26	0.014	0.12
Span drift	u_{ds}			0.073	0.024	0.00082	0.0085
Temperature dependant span drift	u_t			0.13	0.081	0.0067	0.0066
Interferents	u_i			0.40	0.38	0.0014	0.064
Effect of Voltage Fluctuation[7]	u_v			0.31	0.22	0.0029	0.046
Sample Gas Pressure/ Flow[7]	u_{sg}			0.077	0.043	0.014	0.012

Uncertainty of Measurement Results - Calculations Part 2

Horiba PG 350 E Performance Characteristics	Uncertainty (Units of final measurement)	Date & Time	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Losses / leakage in the sample system	u_{loss}	15/02/24 16:00 - 16:29	6.37	104.92	0.035	0.0041
		15/02/24 16:30 - 16:59	6.13	45.15	0.033	0.0066
		15/02/24 17:00 - 17:29	6.28	19.96	0.023	0.020
		15/02/24 17:30 - 17:59	7.19	34.94	0.022	0.022
		15/02/24 18:00 - 18:29	5.85	3.58	0.011	0.036
		15/02/24 18:30 - 18:59	7.84	38.48	0.013	0.035
		15/02/24 19:00 - 19:29	13.59	5.52	0.027	0.015
		15/02/24 19:30 - 19:59	8.93	37.74	0.027	0.015
		15/02/24 20:00 - 20:29	6.05	9.99	0.024	0.019
		15/02/24 20:30 - 20:59	12.93	26.70	0.030	0.011
Standard Error of Measured Value	u_{SE}	15/02/24 16:00 - 16:29	4.48	47.05	0.13	0.11
		15/02/24 16:30 - 16:59	15.11	22.12	0.63	0.48
		15/02/24 17:00 - 17:29	13.62	125.89	0.92	0.70
		15/02/24 17:30 - 17:59	25.90	184.41	1.38	1.04
		15/02/24 18:00 - 18:29	6.47	62.27	0.69	0.54
		15/02/24 18:30 - 18:59	20.93	501.33	0.83	0.60
		15/02/24 19:00 - 19:29	11.81	33.28	0.59	0.43
		15/02/24 19:30 - 19:59	19.27	107.12	0.94	0.72
		15/02/24 20:00 - 20:29	4.43	14.29	0.12	0.090
		15/02/24 20:30 - 20:59	4.60	53.77	0.25	0.19

Effect on Uncertainty Caused by Oxygen $uCorr^n_{O_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured})(20.9\% - O_{2,measured})} \times Uncertainty\ of\ O_2\ Measurement =$ 0.057

$f_{O_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} =$ 1.3353 $uf_{O_2} = \frac{uCorr^n_{O_2}}{f_{O_2}} \times 100 =$ 4.30 %

The effect of oxygen on the overall uncertainties (below) is incorporated using the following equation:-

$u_{combined} = \sqrt{\sum (uf_{O_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$

Where oxygen or moisture correction is required, uncertainty based on the standard error of the measured peripheral value is converted to units of final measurement using a sensitivity coefficient C,

$\therefore u(x_i) = C_i u_i$ where $C_i = \frac{\partial f}{\partial x_i}$

Uncertainty of Measurement Results - Calculations Part 3

Horiba PG 350 E Uncertainty	Date & Time	NOx (as NO2) 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Measured Concentration	15/02/24 16:00 - 16:29	347.09	5317.99	19.13	1.27
Expanded Uncertainty as Percentage of Measured Concentration		6%	6%	5%	28%
Measured Concentration	15/02/24 16:30 - 16:59	334.02	2288.80	18.03	2.05
Expanded Uncertainty as Percentage of Measured Concentration		11%	6%	8%	48%
Measured Concentration	15/02/24 17:00 - 17:29	342.12	1011.91	12.36	6.27
Expanded Uncertainty as Percentage of Measured Concentration		10%	26%	16%	23%
Measured Concentration	15/02/24 17:30 - 17:59	391.55	1770.92	12.17	6.71
Expanded Uncertainty as Percentage of Measured Concentration		14%	22%	23%	32%
Measured Concentration	15/02/24 18:00 - 18:29	318.54	181.55	6.10	11.15
Expanded Uncertainty as Percentage of Measured Concentration		7%	69%	23%	11%
Measured Concentration	15/02/24 18:30 - 18:59	427.28	1950.34	6.90	10.85
Expanded Uncertainty as Percentage of Measured Concentration		11%	52%	24%	12%
Measured Concentration	15/02/24 19:00 - 19:29	740.55	279.74	14.70	4.76
Expanded Uncertainty as Percentage of Measured Concentration		6%	24%	9%	20%
Measured Concentration	15/02/24 19:30 - 19:59	486.63	1912.88	14.91	4.51
Expanded Uncertainty as Percentage of Measured Concentration		10%	13%	13%	33%
Measured Concentration	15/02/24 20:00 - 20:29	329.60	506.42	13.22	5.91
Expanded Uncertainty as Percentage of Measured Concentration		6%	8%	5%	7%
Measured Concentration	15/02/24 20:30 - 20:59	704.51	1353.35	16.53	3.35
Expanded Uncertainty as Percentage of Measured Concentration		6%	10%	5%	15%

Combined Standard Uncertainty $u_c = \sqrt{u_{lof}^2 + u_{d.s.}^2 + u_t^2 + u_{loss}^2 + u_i^2 + u_i^2 + u_{ref}^2 + u_v^2 + u_{sg}^2}$

Expanded uncertainty (at 95% confidence) $U_{Exp} = 2 \times u_c$

1 Expressed as a percentage of the certified range
2 Expressed as a percentage of the certified range as maximum drift per 24hr period
3 Expressed as a percentage of the certified range
4 Expressed as a percentage of the certified range
5 Expressed as a percentage of the certified range per one degree centigrade
6 Where the uncertainty of Moisture is taken as the standard error of the time averaged value used to correct to Dry Conditions
7 If no value for uncertainty is presented above, the uncertainty is considered to be >100%

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
Permit No	**: ...**		**Visit Details**	**: Emissions Survey – February 2024**
Variation No	**: ...**		**Survey Dates**	**: 12th – 16th February 2024**
Report Ref	**: P5632**	**: R001**	**Report Issue Date.**	**: 20th December 2024**

Combustion Gases (NOx, CO, CO_2 & O_2) Measurement Uncertainty – Dead Animal Waste (16/02/2024)

Measurement Uncertainty Calculations Part 1

Horiba PG 350 E Performance Characteristics	Standard Uncertainty (% of Range)	Distributiuon	Minimum Certified Range (R_i)			
			NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit[1]	u_{lof}	Rectangular (Divisor = √3)	0.75	0.61	0.10	1.00
Span drift[2]	$u_{d,s}$	Rectangular (Divisor = √3)	0.094	0.056	0.0057	0.074
Repeatability Standard Deviation (span)[3]	u_r	Normal (Divisor = 1)	1.98	0.80	0.05	0.22
Losses / leakage in the sample system[4]	u_{loss}	Rectangular (Divisor = √3)	1.84	1.97	0.18	0.32
Temperature dependant span drift[5]	u_t	Rectangular (Divisor = √3)	0.051	0.057	0.014	0.029
Interferents[1]	u_i	Rectangular (Divisor = √3)	0.52	0.87	0.010	0.55
Uncertainty of Reference Gas[6]	u_{ref}	Rectangular (Divisor = √3)	10.80	6.52	0.15	0.31
Effect of Voltage Fluctuation[7]	u_v	Rectangular (Divisor = √3)	0.40	0.50	0.020	0.40
Effect of Sample Gas Flow/ Pressure[7]	u_{sg}	Rectangular (Divisor = √3)	0.10	0.10	0.10	0.10

Note:

$$when\ \left|(x_{i,\max} - x_{i,adj})\right| = \left|(x_{i,\min} - x_{i,adj})\right|, then\ u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$$

1 Expressed as a percentage of the certified range
2 Expressed as a percentage of the certified range as maximum drift per 24hr period
3 Expressed as a percentage of the certified range
4 Expressed as a percentage of the certified range
5 Expressed as a percentage of the certified range per one degree centigrade
6 Expressed as standard uncertainty in units of measurement i.e. mg/m³ / %Vol inc additional uncertainty of 2% for gas blending
7 Expressed as a percentage of the certified range

Measurement Uncertainty Calculations Part 2

Horiba PG 350 E Performance Characteristics	Uncertainty	Value of Standard Uncertainty	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit	u_{lof}	$u(x_i) = \frac{u_{lof} \times R_i}{\sqrt{3}} =$	0.58	0.26	0.014	0.12
Span drift	$u_{d,s}$	$u(x_i) = \frac{u_{d,s} \times R_i}{\sqrt{3}} =$	0.073	0.024	0.00082	0.0085
Repeatability Standard Deviation (span)	u_r	$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}} =$	1.98	0.80	0.05	0.22
Losses / leakage in the sample system	u_{loss}	$u(x_i) = \frac{u_{loss} \times R_i}{\sqrt{3}} =$	1.42	0.85	0.027	0.04
Temperature dependant span drift	u_t	$u(x_i) = \frac{u_t}{100} \times R_i \times \sqrt{\frac{(x_{i,max} - x_{adj})^2 + (x_{i,min} - x_{adj})(x_{i,max} - x_{adj}) + (x_{i,min} - x_{adj})^2}{3}}$	0.15	0.093	0.0077	0.012
Interferents	u_i	$u(x_i) = \frac{u_i \times R_i}{\sqrt{3}} =$	0.40	0.38	0.0014	0.55
Uncertainty of Reference Gas	u_{ref}	$u(x_i) = \frac{u_{ref}}{\sqrt{3}} =$	6.23	3.76	0.087	0.18
Effect of Voltage Fluctuation [7]	u_v	$u(x_i) = \frac{u_v \times R_i}{\sqrt{3}} =$	0.23	0.29	0.012	0.23
Effect of Sample Gas Flow / Pressure [7]	u_{sg}	$u(x_i) = \frac{usg \times R_i}{\sqrt{3}} =$	0.058	0.058	0.058	0.06
Combined Standard Uncertainty		$u_c = \sqrt{u_{lof}^2 + u_{d,s}^2 + u_r^2 + u_{loss}^2 + u_t^2 + u_i^2 + u_{ref}^2} + u2v + u2sg$	6.74	3.98	0.12	0.39
Expanded measurement uncertainty (at 95% confidence)		$U_{EXP} = 2 \times u_c$	13.48	7.96	0.24	0.78
Applied Span Concentration			623.41	376.38	15.05	17.95
Measured Span Concentration, STP Dry Gas			623.84	374.49	15.01	17.92
Expanded measurement uncertainty as % of Applied Span			2%	2%	2%	4%

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
Permit No	**: ...**		**Visit Details**	**: Emissions Survey – February 2024**
Variation No	**: ...**		**Survey Dates**	**: 12th – 16th February 2024**
Report Ref	**: P5632**	**: R001**	**Report Issue Date.**	**: 20th December 2024**

Combustion Gases (NOx, CO, CO_2 & O_2) Uncertainty of Measurement Results – Dead Animal Waste @ Reference Condtions 273K, 101.3kPa, Dry Gas & 3%Oxygen (16/02/2024)

Uncertainty of Measurement Results - Calculations Part 1

Horiba PG 350 E Performance Characteristics	Standard Uncertainty (% of Range)	Distribution	Divisor	Minimum Certified Range (R_i) NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit[1]	u_{lof}	Rectangular	$\sqrt{3}$	0.75	0.61	0.10	1.00
Span drift[2]	$u_{d,s}$			0.094	0.056	0.0057	0.074
Losses / leakage in the sample system[4]	u_{loss}			1.84	1.97	0.18	0.32
Temperature dependant span drift[5]	u_t			0.051	0.057	0.014	0.029
Interferents[1]	u_i			0.52	0.87	0.010	0.55
Effect of Voltage Fluctuation[7]	u_v			0.40	0.50	0.020	0.40
Sample Gas Pressure/ Flow[7]	u_{sg}			0.10	0.10	0.10	0.10

Notes:

For rectangular distributions, $u(x_i) = \frac{u \times R_i}{\sqrt{3}}$

For $u(x_i) = \Delta x_i \sqrt{\frac{(x_{i,\max} - x_{i,adj})^2 + (x_{i,\min} - x_{i,adj})(x_{i,\max} - x_{i,adj}) + (x_{i,\min} - x_{i,adj})^2}{3}}$, when $\left|(x_{i,\max} - x_{i,adj})\right| = \left|(x_{i,\min} - x_{i,adj})\right|$, then $u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$

Where $u(x_i) = \frac{\sigma}{\sqrt{n}}$ (See note 6 below), $\sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$

Horiba PG 350 E Performance Characteristics	Uncertainty (Units of final measurement)	Distribution	Divisor	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Lack of fit	u_{lof}	Rectangular	$\sqrt{3}$	0.58	0.26	0.014	0.12
Span drift	$u_{d,s}$			0.073	0.024	0.00082	0.0085
Temperature dependant span drift	u_t			0.065	0.041	0.0034	0.0066
Interferents	u_i			0.40	0.38	0.0014	0.064
Effect of Voltage Fluctuation[7]	u_v			0.31	0.22	0.0029	0.046
Sample Gas Pressure/ Flow[7]	u_{sg}			0.077	0.043	0.014	0.012

Uncertainty of Measurement Results - Calculations Part 2

Horiba PG 350 E Performance Characteristics	Uncertainty (Units of final measurement)	Date & Time	NO 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Losses / leakage in the sample system	u_{loss}	16/02/24 10:40 - 11:09	4.82	2.57	0.015	0.030
		16/02/24 11:10 - 11:39	6.67	1.04	0.022	0.022
Standard Error of Measured Value	u_{SE}	16/02/24 10:40 - 11:09	11.03	29.95	0.90	0.68
		16/02/24 11:10 - 11:39	10.70	1.63	0.16	0.098

Effect on Uncertainty Caused by Oxygen $uCorr^n_{O_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured})x(20.9\% - O_{2,measured})} x\, Uncertainty\ of\ O_2\ Measurement =$ 0.028

$$f_{O_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.7743 \qquad uf_{O_2} = \frac{uCorr^n_{O_2}}{f_{O_2}} x100 = 1.55\ \%$$

The effect of oxygen on the overall uncertainties (below) is incorporated using the following equation:-

$$u_{combined} = \sqrt{\sum (uf_{O_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Where oxygen or moisture correction is required, uncertainty based on the standard error of the measured peripheral value is converted to units of final measurement using a sensitivity coefficient C,

$\therefore u(x_i) = C_i u_i$ where $C_i = \frac{\partial f}{\partial x_i}$

Uncertainty of Measurement Results - Calculations Part 3

Horiba PG 350 E Uncertainty	Date & Time	NOx (as NO2) 0 - 134 mg/m³	CO 0 - 75 mg/m³	O_2 0 - 25 %Vol	CO_2 0 - 20 %Vol
Measured Concentration	16/02/24 10:40 - 11:09	262.39	130.32	8.34	9.42
Expanded Uncertainty as Percentage of Measured Concentration		9%	46%	22%	15%
Measured Concentration	16/02/24 11:10 - 11:39	363.66	52.88	11.83	6.92
Expanded Uncertainty as Percentage of Measured Concentration		7%	8%	3%	5%

Combined Standard Uncertainty $u_c = \sqrt{u_{lof}^2 + u_{d,s}^2 + u_r^2 + u_{loss}^2 + u_t^2 + u_i^2 + u_{ref}^2 + u_v^2 + u_{sg}^2}$

Expanded uncertainty (at 95% confidence) $U_{Exp} = 2 \times u_c$

1 Expressed as a percentage of the certified range
2 Expressed as a percentage of the certified range as maximum drift per 24hr period
3 Expressed as a percentage of the certified range
4 Expressed as a percentage of the certified range
5 Expressed as a percentage of the certified range per one degree centigrade
6 Where the uncertainty of Moisture is taken as the standard error of the time averaged value used to correct to Dry Conditions
7 If no value for uncertainty is presented above, the uncertainty is considered to be >100%

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
Permit No	**: ...**		**Visit Details**	**: Emissions Survey – February 2024**
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Particulates, HF & HCl Uncertainty – (Light Medical Waste)

Site: ACL Lagun - Bonaire
Location: Incinerator Exhaust

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K=2 Filter mg	LAB Method Uncert (%) K=2 Solution mg	Standard Uncertainty Filter mg	Standard Uncertainty Solution mg	Combined Uncertainty mg
			TPM / HCL & HF 1					
Particulates	168.00	26.10	194.10	0.10	0.50	0.0500	0.25	0.25
Hydrogen Chloride	...	161.70	161.70	...	21.02	...	10.51	10.51
Hydrogen Fluoride	...	0.91	0.91	...	0.12	...	0.0590	0.0590
...	...	...	...	...	...	...	...	...

	TPM / HCL & HF 1					
Sampled Volume (V_m)	1.12	m^3	Standard Uncertainty @ 95%	**uV_m**	0.001	m^3
Meter Correction Factor (Yd)	1.01	...			...	...
Meter Temperature (T_m)	307.92	k		**uT_m**	1.5	k
Average Differential Pressure (ΔH)	35.81	mmH_2O		**uΔH**	0.25	mmH_2O
Barometric Pressure (ρ_b)	761.31	mmHg		**up_b**	3.8	mmHg
ΔH + ρs (ρ_m)	101.85	kPa			...	...
Oxygen content ($O_{2,m}$)	16.53	% by volume	$uO_{2,m} = \sigma/\sqrt{n}$	0.53		% by volume
Moisture Content (H_2O)	4.66	% by volume		**uH_2O**	0.19	% by volume

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i =uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

TPM / HCL & HF 1:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔH), measured stack pressure uncertainty component (up_s) & measured temperature of dry gas uncertainty component ($uT_{m\ Dry}$)

TPM / HCL & HF 1:

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = \quad 0.898$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.90	0.90	0.0000864	0.0000216
up_b	0.90	0.89	0.00118	0.00441
uT_m	0.90	0.89	0.00292	0.00437
H_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00526$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV_{std}) & volume uncertainty component (uV_m)

TPM / HCL & HF 1:

$$V_{std} = V_{measured} \times f_s = \quad 1.005$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty (m^3)
Effect of uV_{std}	1.01	1.00	1.12	0.00588
Effect of uV_m	1.01	1.00	0.90	0.000898

Combined Standard Uncertainty

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.00663$$

Uncertainty of Oxygen Correction Factor (%):-

TPM / HCL & HF 1:

$$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = \quad 4.10$$

$$uCorr^{n}{}_{o_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) x (20.9\% - O_{2,measured})} x\, Uncertainty\ of\ O_2\ Measurement = \quad 0.17$$

$$uf_{o_2} = \frac{uCorr^{n}{}_{o_2}}{f_{o_2}} x100 \quad 4.12\ \%$$

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Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM)

Determinand	TPM / HCL & HF 1:			
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	uM mg/Nm³
Particulates	792.84	790.76	4.08	1.04
Hydrogen Chloride	702.50	616.75	4.08	42.88
Hydrogen Fluoride	3.95	3.46	4.08	0.24
Ammonia	...	...	...	...

Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

Determinand	TPM / HCL & HF 1:
	uL mg/Nm³
Particulates	9.14
Hydrogen Chloride	7.62
Hydrogen Fluoride	0.0428
Ammonia	...

Uncertainty in final measurement @ Reference Conditions due to uVstp

Determinand	TPM / HCL & HF 1:			
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	uVstp mg/Nm³
Particulates	797.06	786.61	788.04	5.23
Hydrogen Chloride	664.01	655.30	656.49	4.35
Hydrogen Fluoride	3.73	3.68	3.69	0.0245
Ammonia	...	...	...	...

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Determinand	TPM / HCL & HF 1:				
	Measurement Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration	Uncertainty as Percentage of ELV
Particulates	10.58	21.17	791.80	2.67	587.92
Hydrogen Chloride	43.76	87.53	659.63	13.27	
Hydrogen Fluoride	0.25	0.49	3.71	13.27	
Ammonia	...	...	...	...	

$$u_{combined} = \sqrt{\sum (uf_{O_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Determinand	TPM / HCL & HF 1:		
	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corrⁿ Factor	Overall Measurement Uncertainty inc O_2 Corrⁿ factor ($U_{combined}$)
Particulates	2.67	4.12	4.91
Hydrogen Chloride	13.27	4.12	13.89
Hydrogen Fluoride	13.27	4.12	13.89
Ammonia	...	...	...

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Sulphur Dioxide Uncertainty - (Light Medical Waste)

Site: ACL Lagun - Bonaire
Location: Incinerator Exhaust

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K=2 Filter mg	LAB Method Uncert (%) K=2 Solution mg	Standard Uncertainty Filter mg	Standard Uncertainty Solution mg	Combined Uncertainty mg
Sulphur Dioxide 1								
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...
Sulphur Dioxide	...	9.95	9.95	...	1.29	...	0.65	0.65
...	...	...	...	...	...	...	...	...
...								
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...

	Sulphur Dioxide 1					
Sampled Volume (V_m)	0.96	**m^3**	**uV_m**	0.001	**m^3**	
Meter Correction Factor (Yd)	1.01	**...**		...	**...**	
Meter Temperature (T_m)	310.00	**k**	**uT_m**	1.5	**k**	
Average Differential Pressure (ΔH)	25.00	**mmH_2O**	**uΔH**	0.25	**mmH_2O**	
Barometric Pressure (ρ_b)	761.31	**mmHg**	**up$_b$**	3.8	**mmHg**	
ΔH + ρs (ρ_m)	101.74	**kPa**		...	**...**	
Oxygen content ($O_{2,m}$)	17.19	**% by volume**	$uO_{2,m} = \sigma/\sqrt{n}$	0.66		**% by volume**
Moisture Content (H_2O)	4.97	**% by volume**	**uH_2O**	0.21		**% by volume**

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i =uV$_m$, uT$_m$ etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

Sulphur Dioxide 1:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔH), measured stack pressure uncertainty component (up$_s$) & measured temperature of dry gas uncertainty component (uT$_{m\ Dry}$)

Sulphur Dioxide 1:

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = \quad 0.891$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.89	0.89	0.0000858	0.0000215
up$_b$	0.90	0.89	0.00117	0.00438
uT$_m$	0.90	0.89	0.00287	0.00431
H_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00515$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV$_{std}$) & volume uncertainty component (uV$_m$)

Sulphur Dioxide 1:

$$V_{std} = V_{measured} \times f_s = \quad 0.856$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty (m^3)
Effect of uV$_{std}$	0.86	0.85	0.96	0.00495
Effect of uV$_m$	0.86	0.86	0.89	0.000891

Combined Standard Uncertainty

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.00482$$

Uncertainty of Oxygen Correction Factor (%):-

Sulphur Dioxide 1:

$$f_{o_2} = \frac{20.9\% - O_{2,\,ref}}{20.9\% - O_{2,\,measured}} = \quad 4.82$$

$$uCorr^n{}_{o_2} = \frac{20.9\% - O_{2,\,ref}}{(20.9\% - O_{2,\,measured}) x (20.9\% - O_{2,\,measured})} x\, Uncertainty\ of\ O_2\ Measurement = \quad 0.23$$

$$uf_{o_2} = \frac{uCorr^n{}_{o_2}}{f_{o_2}} x100 = \quad 4.85\ \%$$

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Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM)

Determinand	Sulphur Dioxide 1:			
	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	uM mg/Nm^3
...	...	...	...	...
...	...	...	...	...
Sulphur Dioxide	59.66	52.37	5.63	3.64
...	...	...	...	...

Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

Determinand	Sulphur Dioxide 1:
	uL mg/Nm^3
...	...
...	...
Sulphur Dioxide	0.65
...	...

Uncertainty in final measurement @ Reference Conditions due to uVstp

Determinand	Sulphur Dioxide 1:			
	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	uVstp mg/Nm^3
...	...	...	...	...
...	...	...	...	...
Sulphur Dioxide	56.33	55.70	65.45	0.32
...	...	...	...	...

Combined Uncertainty excluding oxygen contribution

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Determinand	Sulphur Dioxide 1:			
	Combined Uncertainty mg/Nm^3	Expanded Uncertainty mg/Nm^3	Measured Concentration mg/Nm^3	Percent of Measured Concentration
...	...	...	...	...
...	...	...	...	...
Sulphur Dioxide	3.71	7.42	56.01	13.25
...	...	...	...	...

Combined Uncertainty including oxygen contribution

$$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Determinand	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corrn Factor	Overall Measurement Uncertainty inc O_2 Corr^n factor (Ucombined)
...	...	...	...
...	...	...	...
Sulphur Dioxide	13.25	4.85	14.11
...	...	...	...

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Heavy Metals Uncertainty - (Light Medical Waste)

Site: ACL Lagun - Bonaire
Location: Incinerator Exhaust

$$u_{phase(mg/m^3)} = \frac{u_{method} \times Mass_{\mu g}}{200000} \qquad u_{mass} = \sqrt{\sum (u_{particulate})^2 + (u_{vapour})^2}$$

Metal	Particulate	Vapour	LAB Method Uncert (%) K=2		Standard Uncertainty		Combined Standard Uncertainty of Measured	
					Particulate Phase	Vapour Phase		
	mg	mg	Particulate Phase	Vapour Phase	mg/m³	mg/m³	Symbol	mg/m³
Antimony	64.800	11.795	15	16	0.00486	0.000944	uMSb	0.00495
Arsenic	1.200	0.153	11	12	0.0000660	9.198E-06	uMAs	0.0000666
Cadmium	1.600	0.102	12	10	0.0000960	5.110E-06	uMCd	0.0000961
Chromium	10.500	0.304	12	10	0.000630	0.0000152	uMCr	0.000630
Cobalt	0.700	0.102	12	10	0.0000420	5.110E-06	uMCo	0.0000423
Copper	312.700	1.313	12	10	0.0188	0.0000657	uMCu	0.0188
Lead	26.700	1.917	13	16	0.00174	0.000153	uMPb	0.00174
Manganese	21.600	0.606	16	10	0.00173	0.0000303	uMMn	0.00173
Mercury	0.173	0.256	10	12	8.650E-06	0.0000153	uMHg	0.0000176
Nickel	22.800	0.624	12	9	0.00137	0.0000281	uMNi	0.00137
Thallium	0.400	0.102	14	14	0.0000280	7.154E-06	uMTl	0.0000289
Vanadium	0.800	0.0847	12	9	0.0000480	3.812E-06	uMV	0.0000482

				Standard Uncertainty @ 95%		
Sampled Volume (V_m)	2.427	**m³**	**uV_m**	0.001	**m³**
Meter Correction Factor (Yd)	1.007	**...**		...	**...**
Meter Temperature (T_m)	314.13	**k**	**uTm**	1.5	**k**
Average Differential Pressure (ΔH)	39.37	**mmH₂O**	**uDH**	0.25	**mmH₂O**
Barometric Pressure (ρ_b)	761.31	**mmHg**	**up$_s$**	3.8	**mmHg**
ΔH + ρs (ρ_m)	101.89	**kPa**		...	**...**
Oxygen content ($O_{2,m}$)	16.65	**% by volume**	$uO_{2,m} = \sigma/\sqrt{n}$	0.38	**% by volume**
Moisture Content (H_2O)	4.42	**% by volume**	**uH_2O**	0.13	**% by volume**

Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔH), measured stack pressure uncertainty component (up$_s$) & measured

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = \quad 0.880$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.880	0.880	0.0000847	0.0000212
up$_s$	0.885	0.876	0.00115	0.00432
uT_m	0.885	0.876	0.00280	0.00420
H_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00497$$

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV_{std}) & volume uncertainty component (uV_m)

$$V_{std} = V_{measured} \times f_s = \quad 2.137$$

	Maximum m³	Minimum m³	Sensitivity	Standard Uncertainty m³
Effect of uV_{std}	2.149	2.125	2.427	0.0121
Effect of uV_m	2.138	2.136	0.880	0.000880

Combined Standard Uncertainty

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0293$$

Uncertainty of oxygen correction factor (*uf*$_{O2}$)

$$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = \quad 2.33$$

$$uCorr^n{}_{o_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) x (20.9\% - O_{2,measured})} x\, Uncertainty\ of\ O_2\ Measurement = \quad 0.18$$

$$\therefore uf_{o_2} = \frac{uCorr^n{}_{o_2}}{f_{o_2}} x100 = \quad 7.66\ \%$$

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Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM)

Metal	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	uM mg/Nm³
Antimony	0.0889	0.0781	1.091	0.00540
Arsenic	0.00155	0.00140	1.091	0.0000727
Cadmium	0.00196	0.00175	1.091	0.000105
Chromium	0.0125	0.0111	1.091	0.000687
Cobalt	0.000921	0.000829	1.091	0.0000461
Copper	0.363	0.322	1.091	0.0205
Lead	0.0331	0.0293	1.091	0.00190
Manganese	0.0261	0.0223	1.091	0.00189
Mercury	0.000487	0.000448	1.091	0.0000192
Nickel	0.0270	0.0241	1.091	0.00149
Thallium	0.000579	0.000516	1.091	0.0000315
Vanadium	0.00102	0.000912	1.091	0.0000525

Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system

Metal	uL mg/Nm³
Antimony	0.000965
Arsenic	0.0000170
Cadmium	0.0000214
Chromium	0.000136
Cobalt	0.0000101
Copper	0.00395
Lead	0.000360
Manganese	0.000280
Mercury	5.397E-06
Nickel	0.000295
Thallium	6.325E-06
Vanadium	0.0000111

Uncertainty in final measurement @ Reference Conditions due to uVstp

Metal	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	uVstp mg/Nm³
Antimony	0.0847	0.0824	0.0391	0.00114
Arsenic	0.00150	0.00146	0.000691	0.0000202
Cadmium	0.00188	0.00183	0.000869	0.0000254
Chromium	0.0119	0.0116	0.00552	0.000161
Cobalt	0.000887	0.000863	0.000410	0.0000120
Copper	0.347	0.338	0.160	0.00469
Lead	0.0316	0.0308	0.0146	0.000428
Manganese	0.0246	0.0239	0.0113	0.000332
Mercury	0.000474	0.000461	0.000219	6.402E-06
Nickel	0.0259	0.0252	0.0120	0.000350
Thallium	0.000555	0.000540	0.000256	7.503E-06
Vanadium	0.000978	0.000952	0.000452	0.0000132

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Metal	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
Antimony	0.00560	0.0112	0.0835	13.414
Arsenic	0.0000773	0.000155	0.00148	10.480
Cadmium	0.000110	0.000220	0.00186	11.850
Chromium	0.000719	0.00144	0.0118	12.204
Cobalt	0.0000487	0.0000975	0.000875	11.140
Copper	0.0214	0.0427	0.342	12.475
Lead	0.00198	0.00396	0.0312	12.693
Manganese	0.00193	0.00387	0.0242	15.973
Mercury	0.0000209	0.0000419	0.000467	8.963
Nickel	0.00156	0.00312	0.0255	12.220
Thallium	0.0000330	0.0000660	0.000548	12.054
Vanadium	0.0000553	0.000111	0.000965	11.460

$$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Metal	% of Measured Concentration	Measurement Uncertainty of Oxygen Corr^n Factor	Overall Measurement Uncertainty inc O_2 Corr^n factor ($Ucombined$)	New Combined Uncertainty mg/Nm³
Antimony	13.414	7.660	15.447	0.006453
Arsenic	10.480	7.660	12.981	0.000096
Cadmium	11.850	7.660	14.110	0.000131
Chromium	12.204	7.660	14.409	0.000849
Cobalt	11.140	7.660	13.520	0.000059
Copper	12.475	7.660	14.639	0.025070
Lead	12.693	7.660	14.825	0.002314
Manganese	15.973	7.660	17.714	0.002145
Mercury	8.963	7.660	11.790	0.000028
Nickel	12.220	7.660	14.422	0.001842
Thallium	12.054	7.660	14.282	0.000039
Vanadium	11.460	7.660	13.784	0.000067

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Note: Uncertainty for each metals group is based on the summation in quadrature of the individual standard uncertainties (in mg/m3) of each contributing metal. Combined standard uncertainty of each group is converted to 95% confidence (multiplication by k = 2) before being expressed as a percentage of the combined group concentration.

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Particulates, HF & HCl Uncertainty – (Medium Bin Medical Waste)

Site: ACL Lagun - Bonaire
Location: Incinerator Exhaust

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K=2 Filter mg	Solution mg	Standard Uncertainty Filter mg	Solution mg	Combined Uncertainty mg
			TPM / HCL & HF 2					
Particulates	102.00	14.10	116.10	0.10	0.50	0.0500	0.25	0.25
Hydrogen Chloride	...	84.05	84.05	...	10.93	...	5.46	5.46
Hydrogen Fluoride	...	1.57	1.57	...	0.20	...	0.10	0.10
...	...	...	...	...	...	...	...	...

	TPM / HCL & HF 2			Standard Uncertainty @ 95%		
Sampled Volume (V_m)	1.12	m^3	uV_m	0.001	m^3	
Meter Correction Factor (Yd)	1.01	...		...	...	
Meter Temperature (T_m)	307.75	k	uT_m	1.5	k	
Average Differential Pressure (ΔH)	36.28	mmH_2O	uΔH	0.25	mmH_2O	
Barometric Pressure (ρ_b)	762.06	mmHg	up_b	3.8	mmHg	
ΔH + ρs (ρ_m)	101.96	kPa		...	...	
Oxygen content ($O_{2,m}$)	16.26	% by volume	$uO_{2,m} = \sigma/\sqrt{n}$	0.46		% by volume
Moisture Content (H_2O)	4.39	% by volume	uH_2O	0.18		% by volume

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i =uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

TPM / HCL & HF 2:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔH), measured stack pressure uncertainty component (up_s) & measured temperature of dry gas uncertainty component ($uT_{m\ Dry}$)

TPM / HCL & HF 2:

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = \quad 0.899$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.90	0.90	0.0000865	0.0000216
up_b	0.90	0.89	0.00118	0.00441
uT_m	0.90	0.89	0.00292	0.00438
H_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00527$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV_{std}) & volume uncertainty component (uV_m)

TPM / HCL & HF 2:

$$V_{std} = V_{measured} \times f_s = \quad 1.010$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty (m^3)
Effect of uV_{std}	1.02	1.00	1.12	0.00592
Effect of uV_m	1.01	1.01	0.90	0.000899

Combined Standard Uncertainty

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.00670$$

Uncertainty of Oxygen Correction Factor (%):-

TPM / HCL & HF 2:

$$f_{o_2} = \frac{20.9\% - O_{2,\,ref}}{20.9\% - O_{2,\,measured}} = \quad 3.85$$

$$uCorr^{n}{}_{o_2} = \frac{20.9\% - O_{2,\,ref}}{(20.9\% - O_{2,\,measured})x(20.9\% - O_{2,\,measured})} x\, Uncertainty\ of\ O_2\ Measurement = \quad 0.15$$

$$uf_{o_2} = \frac{uCorr^{n}{}_{o_2}}{f_{o_2}} x100 \quad 3.88\ \%$$

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
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Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM)

Determinand	TPM / HCL & HF 2:			
	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	uM mg/Nm^3
Particulates	443.88	441.94	3.81	0.97
Hydrogen Chloride	341.48	299.80	3.81	20.84
Hydrogen Fluoride	6.40	5.62	3.81	0.39
Ammonia	...	...	...	...

Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

Determinand	TPM / HCL & HF 2:
	uL mg/Nm^3
Particulates	5.11
Hydrogen Chloride	3.70
Hydrogen Fluoride	0.0694
Ammonia	...

Uncertainty in final measurement @ Reference Conditions due to uVstp

Determinand	TPM / HCL & HF 2:			
	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	uVstp mg/Nm^3
Particulates	445.87	439.99	438.47	2.94
Hydrogen Chloride	322.78	318.53	317.43	2.13
Hydrogen Fluoride	6.05	5.97	5.95	0.0398
Ammonia	...	...	...	...

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Determinand	TPM / HCL & HF 2:				
	Measurement Uncertainty mg/Nm^3	Expanded Uncertainty mg/Nm^3	Measured Concentration mg/Nm^3	Percent of Measured Concentration	Uncertainty as Percentage of ELV
Particulates	5.98	11.95	442.91	2.70	332.07
Hydrogen Chloride	21.27	42.55	320.64	13.27	
Hydrogen Fluoride	0.40	0.80	6.01	13.27	
Ammonia	...	...	...	...	

$$u_{combined} = \sqrt{\sum (uf_{O_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Determinand	TPM / HCL & HF 2:		
	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corr^n Factor	Overall Measurement Uncertainty inc O_2 Corr^n factor ($Ucombined$)
Particulates	2.70	3.88	4.73
Hydrogen Chloride	13.27	3.88	13.83
Hydrogen Fluoride	13.27	3.88	13.83
Ammonia	...	...	...

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
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Sulphur Dioxide Uncertainty - (Medium Bin Medical Waste)

Site: ACL Lagun - Bonaire
Location: Incinerator Exhaust

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K=2 Filter mg	Solution mg	Standard Uncertainty Filter mg	Solution mg	Combined Uncertainty mg
			Sulphur Dioxide 2					
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...
Sulphur Dioxide	...	6.86	6.86	...	0.89	...	0.45	0.45
...	...	...	...	...	...	...	...	...
				...				
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...

	Sulphur Dioxide 2			Standard Uncertainty @ 95%		
Sampled Volume (V_m)	0.92	**m^3**	**uV_m**	0.001	**m^3**	
Meter Correction Factor (Yd)	1.01	**...**		...	**...**	
Meter Temperature (T_m)	310.17	**k**	**uT_m**	1.5	**k**	
Average Differential Pressure (ΔH)	25.00	**mmH_2O**	**uΔH**	0.25	**mmH_2O**	
Barometric Pressure (ρ_b)	762.06	**mmHg**	**up$_b$**	3.8	**mmHg**	
ΔH + ρs (ρ_m)	101.84	**kPa**		...	**...**	
Oxygen content ($O_{2,m}$)	16.13	**% by volume**	$uO_{2,m} = \sigma/\sqrt{n}$	0.30		**% by volume**
Moisture Content (H_2O)	4.68	**% by volume**	**uH_2O**	0.22		**% by volume**

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i =uV$_m$, uT$_m$ etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

Sulphur Dioxide 2:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔH), measured stack pressure uncertainty component (up$_s$) & measured temperature of dry gas uncertainty component (uT$_{m\ Dry}$)

Sulphur Dioxide 2:

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = \quad 0.891$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.89	0.89	0.0000858	0.0000214
up$_b$	0.90	0.89	0.00117	0.00438
uT$_m$	0.90	0.89	0.00287	0.00431
H_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00515$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV$_{std}$) & volume uncertainty component (uV$_m$)

Sulphur Dioxide 2:

$$V_{std} = V_{measured} \times f_s = \quad 0.817$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty (m^3)
Effect of uV$_{std}$	0.82	0.81	0.92	0.00472
Effect of uV$_m$	0.82	0.82	0.89	0.000891

Combined Standard Uncertainty

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.00439$$

Uncertainty of Oxygen Correction Factor (%):-

Sulphur Dioxide 2:

$$f_{O_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = \quad 3.75$$

$$uCorr^n{}_{O_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) x (20.9\% - O_{2,measured})} x\, Uncertainty\ of\ O_2\ Measurement = \quad 0.14$$

$$uf_{O_2} = \frac{uCorr^n{}_{O_2}}{f_{O_2}} x100 = \quad 3.77\ \%$$

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Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM)

Determinand	Sulphur Dioxide 2:			
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	uM mg/Nm³
...	...	...	...	...
...	...	...	...	...
Sulphur Dioxide	33.56	29.47	4.59	2.05
...	...	...	...	...

Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

Determinand	Sulphur Dioxide 2:
	uL mg/Nm³
...	...
...	...
Sulphur Dioxide	0.36
...	...

Uncertainty in final measurement @ Reference Conditions due to uVstp

Determinand	Sulphur Dioxide 2:			
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	uVstp mg/Nm³
...	...	...	...	...
...	...	...	...	...
Sulphur Dioxide	31.68	31.35	38.60	0.17
...	...	...	...	...

Combined Uncertainty excluding oxygen contribution

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Determinand	Sulphur Dioxide 2:			
	Combined Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration
...	...	...	...	...
...	...	...	...	...
Sulphur Dioxide	2.09	4.17	31.51	13.25
...	...	...	...	...

Combined Uncertainty including oxygen contribution

$$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Determinand	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corrn Factor	Overall Measurement Uncertainty inc O_2 Corr^n factor (Ucombined)
...	...	...	...
...	...	...	...
Sulphur Dioxide	13.25	3.77	13.77
...	...	...	...

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Heavy Metals Uncertainty - (Medium Bin Medical Waste)

Site: ACL Lagun - Bonaire
Location: Incinerator Exhaust

$$u_{phase(mg/m^3)} = \frac{u_{method} \times Mass_{\mu g}}{200000} \qquad u_{mass} = \sqrt{\sum (u_{particulate})^2 + (u_{vapour})^2}$$

Metal	Particulate	Vapour	LAB Method Uncert (%) K=2		Standard Uncertainty		Combined Standard Uncertainty of Measured	
					Particulate Phase	Vapour Phase		
	mg	mg	Particulate Phase	Vapour Phase	mg/m³	mg/m³	Symbol	mg/m³
Antimony	46.000	1.495	15	16	0.00345	0.000120	uMSb	0.00345
Arsenic	0.900	0.824	11	12	0.0000495	0.0000494	uMAs	0.0000700
Cadmium	1.200	0.191	12	10	0.0000720	9.570E-06	uMCd	0.0000726
Chromium	99.300	0.805	12	10	0.00596	0.0000403	uMCr	0.00596
Cobalt	1.400	0.191	12	10	0.0000840	9.570E-06	uMCo	0.0000845
Copper	55.900	2.178	12	10	0.00335	0.000109	uMCu	0.00336
Lead	10.900	1.879	13	16	0.000709	0.000150	uMPb	0.000724
Manganese	23.100	0.958	16	10	0.00185	0.0000479	uMMn	0.00185
Mercury	0.222	0.479	10	12	0.0000111	0.0000287	uMHg	0.0000308
Nickel	38.400	0.896	12	9	0.00230	0.0000403	uMNi	0.00230
Thallium	0.400	0.191	14	14	0.0000280	0.0000134	uMTl	0.0000310
Vanadium	2.900	0.172	12	9	0.000174	7.758E-06	uMV	0.000174

				Standard Uncertainty @ 95%		
Sampled Volume (V_m)	2.466	**m³**		**uV_m**	0.001	**m³**
Meter Correction Factor (Yd)	1.007	**...**			...	**...**
Meter Temperature (T_m)	313.38	**k**		**uTm**	1.5	**k**
Average Differential Pressure (ΔH)	41.07	**mmH₂O**		**uDH**	0.25	**mmH₂O**
Barometric Pressure (ρ_b)	762.06	**mmHg**		**up$_s$**	3.8	**mmHg**
ΔH + ρs (ρ_m)	102.00	**kPa**			...	**...**
Oxygen content ($O_{2,m}$)	17.35	**% by volume**	$uO_{2,m} = \sigma/\sqrt{n}$		0.17	**% by volume**
Moisture Content (H_2O)	4.29	**% by volume**		**uH_2O**	0.13	**% by volume**

Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔH), measured stack pressure uncertainty component (up$_s$) & measured

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = \quad 0.883$$

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.883	0.883	0.0000849	0.0000212
up$_s$	0.888	0.879	0.00115	0.00433
uT_m	0.888	0.879	0.00282	0.00423
H_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00500$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV_{std}) & volume uncertainty component (uV_m)

$$V_{std} = V_{measured} \times f_s = \quad 2.179$$

	Maximum m³	Minimum m³	Sensitivity	Standard Uncertainty m³
Effect of uV_{std}	2.191	2.166	2.466	0.0123
Effect of uV_m	2.180	2.178	0.883	0.000883

Combined Standard Uncertainty

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0304$$

Uncertainty of oxygen correction factor (*uf*$_{O2}$)

$$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = \quad 2.79$$

$$uCorr^n{}_{o_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) x (20.9\% - O_{2,measured})} x\, Uncertainty\ of\ O_2\ Measurement = \quad 0.26$$

$$\therefore uf_{o_2} = \frac{uCorr^n{}_{o_2}}{f_{o_2}} x100 = \quad 9.17\ \%$$

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Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM)

Metal	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	uM mg/Nm^3
Antimony	0.0652	0.0564	1.280	0.00442
Arsenic	0.00230	0.00212	1.280	0.0000895
Cadmium	0.00187	0.00169	1.280	0.0000929
Chromium	0.136	0.120	1.280	0.00762
Cobalt	0.00214	0.00193	1.280	0.000108
Copper	0.0786	0.0700	1.280	0.00429
Lead	0.0173	0.0154	1.280	0.000927
Manganese	0.0332	0.0284	1.280	0.00237
Mercury	0.000936	0.000857	1.280	0.0000394
Nickel	0.0532	0.0473	1.280	0.00295
Thallium	0.000797	0.000717	1.280	0.0000397
Vanadium	0.00415	0.00371	1.280	0.000223

Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system

Metal	uL mg/Nm^3
Antimony	0.000702
Arsenic	0.0000255
Cadmium	0.0000206
Chromium	0.00148
Cobalt	0.0000235
Copper	0.000858
Lead	0.000189
Manganese	0.000356
Mercury	0.0000104
Nickel	0.000581
Thallium	8.739E-06
Vanadium	0.0000454

Uncertainty in final measurement @ Reference Conditions due to uVstp

Metal	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	uVstp mg/Nm^3
Antimony	0.0616	0.0599	0.0279	0.000849
Arsenic	0.00224	0.00218	0.00101	0.0000308
Cadmium	0.00181	0.00176	0.000817	0.0000249
Chromium	0.130	0.126	0.0588	0.00179
Cobalt	0.00207	0.00201	0.000935	0.0000285
Copper	0.0754	0.0733	0.0341	0.00104
Lead	0.0166	0.0161	0.00751	0.000229
Manganese	0.0312	0.0304	0.0141	0.000430
Mercury	0.000909	0.000884	0.000412	0.0000125
Nickel	0.0510	0.0496	0.0231	0.000703
Thallium	0.000768	0.000746	0.000347	0.0000106
Vanadium	0.00399	0.00388	0.00180	0.0000550

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Metal	Combined Uncertainty mg/Nm^3	Expanded Uncertainty mg/Nm^3	Measured Concentration mg/Nm^3	Percent of Measured Concentration
Antimony	0.00455	0.00911	0.0608	14.982
Arsenic	0.0000981	0.000196	0.00221	8.889
Cadmium	0.0000984	0.000197	0.00178	11.052
Chromium	0.00797	0.0159	0.128	12.444
Cobalt	0.000114	0.000229	0.00204	11.227
Copper	0.00450	0.00900	0.0743	12.112
Lead	0.000973	0.00195	0.0164	11.901
Manganese	0.00243	0.00486	0.0308	15.790
Mercury	0.0000426	0.0000852	0.000896	9.507
Nickel	0.00309	0.00617	0.0503	12.276
Thallium	0.0000420	0.0000841	0.000757	11.106
Vanadium	0.000234	0.000468	0.00393	11.904

$$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Metal	% of Measured Concentration	Measurement Uncertainty of Oxygen Corr^n Factor	Overall Measurement Uncertainty inc O_2 Corr^n factor (*Ucombined*)	New Combined Uncertainty mg/Nm^3
Antimony	14.982	9.170	17.565	0.005338
Arsenic	8.889	9.170	12.771	0.000141
Cadmium	11.052	9.170	14.361	0.000128
Chromium	12.444	9.170	15.458	0.009901
Cobalt	11.227	9.170	14.496	0.000148
Copper	12.112	9.170	15.191	0.005645
Lead	11.901	9.170	15.024	0.001228
Manganese	15.790	9.170	18.259	0.002811
Mercury	9.507	9.170	13.209	0.000059
Nickel	12.276	9.170	15.323	0.003853
Thallium	11.106	9.170	14.402	0.000054
Vanadium	11.904	9.170	15.026	0.000295

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Note: Uncertainty for each metals group is based on the summation in quadrature of the individual standard uncertainties (in mg/m3) of each contributing metal. Combined standard uncertainty of each group is converted to 95% confidence (multiplication by k = 2) before being expressed as a percentage of the combined group concentration.

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Dioxins & Furans Uncertainty - (Medium Bin Medical Waste)

Site: ACL Lagun - Bonaire
Location: Incinerator Exhaust

Dioxin	Recovered Mass ng	LOD ng	LAB Method Uncert (%) K=2 %age	as Mass (ng)	Standard Uncertainty Symbol	ng
2,3,7,8 - TCDD	6.390	0.000140	30	1.917	**u2,3,7,8 - TCDD**	0.959
1,2,3,7,8 - PCDD	10.000	0.000190	30	3.000	**u1,2,3,7,8 - PCDD**	1.500
1,2,3,4,7,8 - HxCDD	2.640	0.000320	30	0.792	**u1,2,3,4,7,8 - HxCDD**	0.396
1,2,3,6,7,8 - HxCDD	2.850	0.000350	30	0.855	**u1,2,3,6,7,8 - HxCDD**	0.428
1,2,3,7,8,9 - HxCDD	4.050	0.000380	30	1.215	**u1,2,3,7,8,9 - HxCDD**	0.608
1,2,3,4,6,7,8 - HpCDD	4.720	0.000380	30	1.416	**u1,2,3,4,6,7,8 - HpCDD**	0.708
OCDD	1.730	0.00135	30	0.519	**uOCDD**	0.260
2,3,7,8 - TCDF	40.400	0.000270	30	12.120	**u2,3,7,8 - TCDF**	6.060
1,2,3,7,8 - PCDF	38.000	0.000260	30	11.400	**u1,2,3,7,8 - PCDF**	5.700
2,3,4,7,8 - PCDF	35.700	0.000740	30	10.710	**u2,3,4,7,8 - PCDF**	5.355
1,2,3,4,7,8 - HxCDF	18.000	0.000190	30	5.400	**u1,2,3,4,7,8 - HxCDF**	2.700
1,2,3,6,7,8 - HxCDF	19.000	0.000160	30	5.700	**u1,2,3,6,7,8 - HxCDF**	2.850
2,3,4,6,7,8 - HxCDF	10.900	0.000160	30	3.270	**u2,3,4,6,7,8 - HxCDF**	1.635
1,2,3,7,8,9 - HxCDF	0.879	0.000180	30	0.264	**u1,2,3,7,8,9 - HxCDF**	0.132
1,2,3,4,6,7,8 - HpCDF	13.600	0.000450	30	4.080	**u1,2,3,4,6,7,8 - HpCDF**	2.040
1,2,3,4,7,8,9 - HpCDF	1.960	0.000650	30	0.588	**u1,2,3,4,7,8,9 - HpCDF**	0.294
OCDF	1.710	0.000560	30	0.513	**uOCDF**	0.257

	Measured Values			Standard Uncertainty @ 95%		
Sampled Volume (V_m)	6.907	**m^3**		**uV_m**	0.001	**m^3**
Meter Correction Factor (Yd)	1.007	**...**			...	**...**
Meter Temperature (T_m)	312.200	**k**		**uTm**	1.5	**k**
Average Differential Pressure (ΔH)	53.690	**mmH_2O**		**uDH**	0.25	**mmH_2O**
Barometric Pressure (ρ_b)	761.310	**mmHg**		**uρ_b**	3.8	**mmHg**
ΔH + ρs (ρ_m)	102.026	**kPa**			...	**...**
Oxygen content ($O_{2,m}$)	15.194	**% by volume**	$uO_{2,m} = \sigma/\sqrt{n}$		0.29	**% by volume**
Moisture Content (H_2O)	3.260	**% by volume**		**uH_2O**	0.09	**% by volume**

Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔ H), measured stack pressure uncertainty component (up$_s$) & measured temperature of dry gas

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = \quad 0.887$$

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.887	0.887	0.0000852	0.0000213
uρ_b	0.891	0.883	0.00116	0.00435
uT_m	0.891	0.883	0.00284	0.00426
H_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00506$$

Uncertainty in volume @ reference conditions due to volume correction factor uncertainty component (uV_{std}) & volume uncertainty component (uV_m)

$$V_{std} = V_{measured} \times f_s = \quad 6.127$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uV_{std}	6.161	6.092	6.907	0.0349
Effect of uV_m	6.127	6.126	0.887	0.000887

Combined Standard Uncertainty

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.2413$$

Uncertainty of oxygen correction factor (ufO_2)

$$f_{o_2} = \frac{20.9\% - O_{2,\,ref}}{20.9\% - O_{2,\,measured}} = \quad 3.100 \qquad uCorr^n{}_{o_2} = \frac{20.9\% - O_{2,\,ref}}{(20.9\% - O_{2,\,measured})x(20.9\% - O_{2,\,measured})} x\, Uncertainty\ of\ O_2\ Measurement =$$

$$\therefore uf_{o_2} = \frac{uCorr^n{}_{o_2}}{f_{o_2}} x100 = \quad 3.19\ \%$$

Selibon N.V.		**Installation Name**	**: Incinerator Exhaust**
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Uncertainty in final dioxin measurement @ reference conditions due to mass uncertainty component (uM)

Dioxin	Maximum ng/Nm³	Minimum ng/Nm³	Sensitivity	uM ng/Nm³
2,3,7,8 - TCDD	3.719	2.749	0.506	0.485
1,2,3,7,8 - PCDD	5.820	4.301	0.506	0.759
1,2,3,4,7,8 - HxCDD	1.536	1.136	0.506	0.200
1,2,3,6,7,8 - HxCDD	1.659	1.226	0.506	0.216
1,2,3,7,8,9 - HxCDD	2.357	1.742	0.506	0.307
1,2,3,4,6,7,8 - HpCDD	2.747	2.030	0.506	0.358
OCDD	1.007	0.744	0.506	0.131
2,3,7,8 - TCDF	23.511	17.378	0.506	3.067
1,2,3,7,8 - PCDF	22.115	16.346	0.506	2.885
2,3,4,7,8 - PCDF	20.776	15.356	0.506	2.710
1,2,3,4,7,8 - HxCDF	10.475	7.743	0.506	1.366
1,2,3,6,7,8 - HxCDF	11.057	8.173	0.506	1.442
2,3,4,6,7,8 - HxCDF	6.343	4.689	0.506	0.827
1,2,3,7,8,9 - HxCDF	0.512	0.378	0.506	0.0667
1,2,3,4,6,7,8 - HpCDF	7.915	5.850	0.506	1.032
1,2,3,4,7,8,9 - HpCDF	1.141	0.843	0.506	0.149
OCDF	0.995	0.736	0.506	0.130

Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss in the sample system (uL)

Dioxin	uL ng/Nm³
2,3,7,8 - TCDD	0.0373
1,2,3,7,8 - PCDD	0.0584
1,2,3,4,7,8 - HxCDD	0.0154
1,2,3,6,7,8 - HxCDD	0.0167
1,2,3,7,8,9 - HxCDD	0.0237
1,2,3,4,6,7,8 - HpCDD	0.0276
OCDD	0.0101
2,3,7,8 - TCDF	0.236
1,2,3,7,8 - PCDF	0.222
2,3,4,7,8 - PCDF	0.209
1,2,3,4,7,8 - HxCDF	0.105
1,2,3,6,7,8 - HxCDF	0.111
2,3,4,6,7,8 - HxCDF	0.0637
1,2,3,7,8,9 - HxCDF	0.00514
1,2,3,4,6,7,8 - HpCDF	0.0795
1,2,3,4,7,8,9 - HpCDF	0.0115
OCDF	0.00999

Uncertainty in final measurement @ Reference Conditions due to uVstp

Dioxin	Maximum ng/Nm³	Minimum ng/Nm³	Sensitivity	uVstp mg/Nm³
2,3,7,8 - TCDD	3.366	3.111	0.529	0.128
1,2,3,7,8 - PCDD	5.268	4.869	0.827	0.200
1,2,3,4,7,8 - HxCDD	1.391	1.285	0.218	0.0527
1,2,3,6,7,8 - HxCDD	1.501	1.388	0.236	0.0569
1,2,3,7,8,9 - HxCDD	2.134	1.972	0.335	0.0809
1,2,3,4,6,7,8 - HpCDD	2.487	2.298	0.390	0.0942
OCDD	0.911	0.842	0.143	0.0345
2,3,7,8 - TCDF	21.283	19.670	3.342	0.807
1,2,3,7,8 - PCDF	20.019	18.501	3.144	0.759
2,3,4,7,8 - PCDF	18.807	17.381	2.953	0.713
1,2,3,4,7,8 - HxCDF	9.483	8.764	1.489	0.359
1,2,3,6,7,8 - HxCDF	10.009	9.251	1.572	0.379
2,3,4,6,7,8 - HxCDF	5.742	5.307	0.902	0.218
1,2,3,7,8,9 - HxCDF	0.463	0.428	0.0727	0.0176
1,2,3,4,6,7,8 - HpCDF	7.165	6.622	1.125	0.272
1,2,3,4,7,8,9 - HpCDF	1.033	0.954	0.162	0.0391
OCDF	0.901	0.833	0.141	0.0341

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Dioxin	Combined Uncertainty ng/Nm³	Expanded Uncertainty ng/Nm³	Measured Concentration ng/Nm³	% of Measured Concentration
2,3,7,8 - TCDD	0.503	1.006	3.234	31.106
1,2,3,7,8 - PCDD	0.787	1.574	5.061	31.106
1,2,3,4,7,8 - HxCDD	0.208	0.416	1.336	31.106
1,2,3,6,7,8 - HxCDD	0.224	0.449	1.442	31.106
1,2,3,7,8,9 - HxCDD	0.319	0.638	2.050	31.106
1,2,3,4,6,7,8 - HpCDD	0.371	0.743	2.389	31.106
OCDD	0.136	0.272	0.875	31.106
2,3,7,8 - TCDF	3.180	6.360	20.445	31.106
1,2,3,7,8 - PCDF	2.991	5.982	19.230	31.106
2,3,4,7,8 - PCDF	2.810	5.620	18.066	31.106
1,2,3,4,7,8 - HxCDF	1.417	2.833	9.109	31.106
1,2,3,6,7,8 - HxCDF	1.495	2.991	9.615	31.106
2,3,4,6,7,8 - HxCDF	0.858	1.716	5.516	31.106
1,2,3,7,8,9 - HxCDF	0.0692	0.138	0.445	31.106
1,2,3,4,6,7,8 - HpCDF	1.070	2.141	6.882	31.106
1,2,3,4,7,8,9 - HpCDF	0.154	0.309	0.992	31.106
OCDF	0.135	0.269	0.865	31.106
		Total (ng/Nm³)	107.551	10.9

$$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Dioxin	% of Measured Concentration	Measurement Uncertainty of Oxygen Corr^n Factor	Overall Measurement Uncertainty inc O_2 Corr^n factor ($U_{combined}$)	New Combined Uncertainty ng/Nm³
2,3,7,8 - TCDD	31.106	3.190	31.269	0.504
1,2,3,7,8 - PCDD	31.106	3.190	31.269	0.788
1,2,3,4,7,8 - HxCDD	31.106	3.190	31.269	0.208
1,2,3,6,7,8 - HxCDD	31.106	3.190	31.269	0.225
1,2,3,7,8,9 - HxCDD	31.106	3.190	31.269	0.319
1,2,3,4,6,7,8 - HpCDD	31.106	3.190	31.269	0.372
OCDD	31.106	3.190	31.269	0.136
2,3,7,8 - TCDF	31.106	3.190	31.269	3.185
1,2,3,7,8 - PCDF	31.106	3.190	31.269	2.996
2,3,4,7,8 - PCDF	31.106	3.190	31.269	2.814
1,2,3,4,7,8 - HxCDF	31.106	3.190	31.269	1.419
1,2,3,6,7,8 - HxCDF	31.106	3.190	31.269	1.498
2,3,4,6,7,8 - HxCDF	31.106	3.190	31.269	0.859
1,2,3,7,8,9 - HxCDF	31.106	3.190	31.269	0.0693
1,2,3,4,6,7,8 - HpCDF	31.106	3.190	31.269	1.072
1,2,3,4,7,8,9 - HpCDF	31.106	3.190	31.269	0.155
OCDF	31.106	3.190	31.269	0.135

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Uncertainty - Adjusted for TEQ / TEF

Dioxin	TEQ ng/m³	Uncertainty ng/Nm³	Conc ng/Nm³	WHO Humans & Mammals (TEF)	Uncertainty ng/Nm³	Conc ng/Nm³	WHO Fish (TEF)	Uncertainty ng/Nm³	Conc ng/Nm³	WHO Birds (TEF)	Uncertainty ng/Nm³	Conc ng/Nm³
2,3,7,8 - TCDD	1	1.008	3.234	1	1.008	3.234	1	1.008	3.234	1	1.008	3.234
1,2,3,7,8 - PCDD	0.5	0.788	2.530	1	1.577	5.061	1	1.577	5.061	1	1.577	5.061
1,2,3,4,7,8 - HxCDD	0.1	0.0416	0.134	0.1	0.0416	0.134	0.5	0.208	0.668	0.05	0.0208	0.0668
1,2,3,6,7,8 - HxCDD	0.1	0.0449	0.144	0.1	0.0449	0.144	0.01	0.00449	0.0144	0.01	0.00449	0.0144
1,2,3,7,8,9 - HxCDD	0.1	0.0639	0.205	0.1	0.0639	0.205	0.01	0.00639	0.0205	0.1	0.0639	0.205
1,2,3,4,6,7,8 - HpCDD	0.01	0.00744	0.0239	0.01	0.00744	0.0239	0.001	0.000744	0.00239	0.001	0.000744	0.00239
OCDD	0.001	0.000273	0.000875	0.0001	0.0000273	0.0000875	...	...	...	...	...	...
2,3,7,8 - TCDF	0.1	0.637	2.044	0.1	0.637	2.044	0.05	0.318	1.022	1	6.370	20.445
1,2,3,7,8 - PCDF	0.05	0.300	0.962	0.05	0.300	0.962	0.05	0.300	0.962	0.1	0.599	1.923
2,3,4,7,8 - PCDF	0.5	2.814	9.033	0.5	2.814	9.033	0.5	2.814	9.033	1	5.629	18.066
1,2,3,4,7,8 - HxCDF	0.1	0.284	0.911	0.1	0.284	0.911	0.1	0.284	0.911	0.1	0.284	0.911
1,2,3,6,7,8 - HxCDF	0.1	0.300	0.962	0.1	0.300	0.962	0.1	0.300	0.962	0.1	0.300	0.962
2,3,4,6,7,8 - HxCDF	0.1	0.172	0.552	0.1	0.172	0.552	0.1	0.172	0.552	0.1	0.172	0.552
1,2,3,7,8,9 - HxCDF	0.1	0.0139	0.0445	0.1	0.0139	0.0445	0.1	0.0139	0.0445	0.1	0.0139	0.0445
1,2,3,4,6,7,8 - HpCDF	0.01	0.0214	0.0688	0.01	0.0214	0.0688	0.01	0.0214	0.0688	0.01	0.0214	0.0688
1,2,3,4,7,8,9 - HpCDF	0.01	0.00309	0.00992	0.01	0.00309	0.00992	0.01	0.00309	0.00992	0.01	0.00309	0.00992
OCDF	0.001	0.000270	0.000865	0.0001	0.0000270	0.0000865	0.0001	0.0000270	0.0000865	0.0001	0.0000270	0.0000865
TOTAL	...	3.203	20.859	...	3.482	23.387	...	3.443	22.564	...	8.736	51.564
% Uncertainty	...	...	15.358	...	...	14.889	...	...	15.261	...	...	16.9

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
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Particulates, HF & HCl Uncertainty – (Dead Animal Waste)

Site: ACL Lagun - Bonaire
Location: Incinerator Exhaust

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K=2 Filter mg	LAB Method Uncert (%) K=2 Solution mg	Standard Uncertainty Filter mg	Standard Uncertainty Solution mg	Combined Uncertainty mg
			TPM / HCL & HF 3					
Particulates	40.00	6.20	46.20	0.10	0.50	0.0500	0.25	0.25
Hydrogen Chloride	...	8.28	8.28	...	1.08	...	0.54	0.54
Hydrogen Fluoride	...	3.31	3.31	...	0.43	...	0.22	0.22
...	...	...	...	...	...	...	...	...

	TPM / HCL & HF 3			Standard Uncertainty @ 95%		
Sampled Volume (V_m)	1.53	m^3	uV_m	0.001	m^3	
Meter Correction Factor (Yd)	1.01	...		...	...	
Meter Temperature (T_m)	306.50	k	uT_m	1.5	k	
Average Differential Pressure (ΔH)	58.53	mmH_2O	uΔH	0.25	mmH_2O	
Barometric Pressure (ρ_b)	761.31	mmHg	up_b	3.8	mmHg	
ΔH + ρs (ρ_m)	102.07	kPa		...	...	
Oxygen content ($O_{2,m}$)	18.42	% by volume	$uO_{2,m} = \sigma/\sqrt{n}$	0.36		% by volume
Moisture Content (H_2O)	11.54	% by volume	uH_2O	0.32		% by volume

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i =uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

TPM / HCL & HF 3:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔH), measured stack pressure uncertainty component (up_s) & measured temperature of dry gas uncertainty component ($uT_{m\ Dry}$)

TPM / HCL & HF 3:

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = \quad 0.904$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.90	0.90	0.0000868	0.0000217
up_b	0.91	0.90	0.00118	0.00443
uT_m	0.91	0.90	0.00295	0.00442
H_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00534$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV_{std}) & volume uncertainty component (uV_m)

TPM / HCL & HF 3:

$$V_{std} = V_{measured} \times f_s = \quad 1.380$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty (m^3)
Effect of uV_{std}	1.39	1.37	1.53	0.00814
Effect of uV_m	1.38	1.38	0.90	0.000904

Combined Standard Uncertainty

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0125$$

Uncertainty of Oxygen Correction Factor (%):-

TPM / HCL & HF 3:

$$f_{o_2} = \frac{20.9\% - O_{2,\,ref}}{20.9\% - O_{2,\,measured}} = \quad 7.21$$

$$uCorr^{n}{}_{o_2} = \frac{20.9\% - O_{2,\,ref}}{(20.9\% - O_{2,\,measured}) x (20.9\% - O_{2,\,measured})} x\, Uncertainty\ of\ O_2\ Measurement = \quad 0.52$$

$$uf_{o_2} = \frac{uCorr^{n}{}_{o_2}}{f_{o_2}} x100 \quad 7.25\ \%$$

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
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Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM)

Determinand	TPM / HCL & HF 3:			
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	uM mg/Nm³
Particulates	242.63	239.97	5.22	1.33
Hydrogen Chloride	46.08	40.45	5.22	2.81
Hydrogen Fluoride	18.40	16.16	5.22	1.12
Ammonia	...	...	...	...

Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

Determinand	TPM / HCL & HF 3:
	uL mg/Nm³
Particulates	2.79
Hydrogen Chloride	0.50
Hydrogen Fluoride	0.20
Ammonia	...

Uncertainty in final measurement @ Reference Conditions due to uVstp

Determinand	TPM / HCL & HF 3:			
	Maximum mg/Nm³	Minimum mg/Nm³	Sensitivity	uVstp mg/Nm³
Particulates	243.50	239.14	174.92	2.18
Hydrogen Chloride	43.66	42.88	31.37	0.39
Hydrogen Fluoride	17.44	17.12	12.53	0.16
Ammonia	...	...	...	...

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Determinand	TPM / HCL & HF 3:				
	Measurement Uncertainty mg/Nm³	Expanded Uncertainty mg/Nm³	Measured Concentration mg/Nm³	Percent of Measured Concentration	Uncertainty as Percentage of ELV
Particulates	3.78	7.56	241.30	3.13	209.97
Hydrogen Chloride	2.88	5.77	43.27	13.33	
Hydrogen Fluoride	1.15	2.30	17.28	13.33	
Ammonia	...	...	...	...	

$$u_{combined} = \sqrt{\sum (uf_{O_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Determinand	TPM / HCL & HF 3:		
	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corrⁿ Factor	Overall Measurement Uncertainty inc O_2 Corrⁿ factor ($U_{combined}$)
Particulates	3.13	7.25	7.90
Hydrogen Chloride	13.33	7.25	15.17
Hydrogen Fluoride	13.33	7.25	15.17
Ammonia	...	...	...

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
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Sulphur Dioxide Uncertainty - (Dead Animal Waste)

Site: ACL Lagun - Bonaire
Location: Incinerator Exhaust

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K=2 Filter mg	LAB Method Uncert (%) K=2 Solution mg	Standard Uncertainty Filter mg	Standard Uncertainty Solution mg	Combined Uncertainty mg
Sulphur Dioxide 3								
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...
Sulphur Dioxide	...	629.10	629.10	...	81.78	...	40.89	40.89
...	...	...	...	...	...	...	...	...
...								
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...

	Sulphur Dioxide 3			Standard Uncertainty @ 95%		
Sampled Volume (V_m)	0.88	**m^3**	**uV_m**	0.001	**m^3**	
Meter Correction Factor (Yd)	1.01	**...**		...	**...**	
Meter Temperature (T_m)	308.83	**k**	**uT_m**	1.5	**k**	
Average Differential Pressure (ΔH)	25.00	**mmH_2O**	**uΔH**	0.25	**mmH_2O**	
Barometric Pressure (ρ_b)	761.31	**mmHg**	**up$_b$**	3.8	**mmHg**	
ΔH + ρs (ρ_m)	101.74	**kPa**		...	**...**	
Oxygen content ($O_{2,m}$)	6.71	**% by volume**	$uO_{2,m} = \sigma/\sqrt{n}$	0.69		**% by volume**
Moisture Content (H_2O)	13.29	**% by volume**	**uH_2O**	0.39		**% by volume**

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i =uV$_m$, uT$_m$ etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

Sulphur Dioxide 3:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1.00$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔH), measured stack pressure uncertainty component (up$_s$) & measured temperature of dry gas uncertainty component (uT$_{m\ Dry}$)

Sulphur Dioxide 3:

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = \quad 0.894$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.89	0.89	0.0000862	0.0000215
up$_b$	0.90	0.89	0.00117	0.00439
uT$_m$	0.90	0.89	0.00290	0.00434
H_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00521$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV$_{std}$) & volume uncertainty component (uV$_m$)

Sulphur Dioxide 3:

$$V_{std} = V_{measured} \times f_s = \quad 0.786$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty (m^3)
Effect of uV$_{std}$	0.79	0.78	0.88	0.00458
Effect of uV$_m$	0.79	0.79	0.89	0.000894

Combined Standard Uncertainty

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.00410$$

Uncertainty of Oxygen Correction Factor (%):-

Sulphur Dioxide 3:

$$f_{o_2} = \frac{20.9\% - O_{2,\,ref}}{20.9\% - O_{2,\,measured}} = \quad 1.26$$

$$uCorr^n{}_{o_2} = \frac{20.9\% - O_{2,\,ref}}{(20.9\% - O_{2,\,measured}) x (20.9\% - O_{2,\,measured})} x\, Uncertainty\ of\ O_2\ Measurement = \quad 0.0160$$

$$uf_{o_2} = \frac{uCorr^n{}_{o_2}}{f_{o_2}} x100 = \quad 1.27\ \%$$

Selibon N.V.			**Installation Name**	**: Incinerator Exhaust**
Permit No	**: ...**		**Visit Details**	**: Emissions Survey – February 2024**
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Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM)

Determinand	Sulphur Dioxide 3:			
	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	uM mg/Nm^3
...	...	...	...	...
...	...	...	...	...
Sulphur Dioxide	1075.19	943.95	1.60	65.62
...	...	...	...	...

Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system (uL)

Determinand	Sulphur Dioxide 3:
	uL mg/Nm^3
...	...
...	...
Sulphur Dioxide	11.66
...	...

Uncertainty in final measurement @ Reference Conditions due to uVstp

Determinand	Sulphur Dioxide 3:			
	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	uVstp mg/Nm^3
...	...	...	...	...
...	...	...	...	...
Sulphur Dioxide	1014.87	1004.33	1284.18	5.27
...	...	...	...	...

Combined Uncertainty excluding oxygen contribution

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Determinand	Sulphur Dioxide 3:			
	Combined Uncertainty mg/Nm^3	Expanded Uncertainty mg/Nm^3	Measured Concentration mg/Nm^3	Percent of Measured Concentration
...	...	...	...	...
...	...	...	...	...
Sulphur Dioxide	66.86	133.72	1009.57	13.24
...	...	...	...	...

Combined Uncertainty including oxygen contribution

$$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Determinand	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corrn Factor	Overall Measurement Uncertainty inc O_2 Corr^n factor (Ucombined)
...	...	...	...
...	...	...	...
Sulphur Dioxide	13.24	1.27	13.31
...	...	...	...

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Heavy Metals Uncertainty - (Dead Animal Waste)

Site: ACL Lagun - Bonaire
Location: Incinerator Exhaust

$$u_{phase(mg/m^3)} = \frac{u_{method} \times Mass_{\mu g}}{200000} \qquad u_{mass} = \sqrt{\sum (u_{particulate})^2 + (u_{vapour})^2}$$

Metal	Particulate	Vapour	LAB Method Uncert (%) K=2		Standard Uncertainty		Combined Standard Uncertainty of Measured	
					Particulate Phase	Vapour Phase		
	mg	mg	Particulate Phase	Vapour Phase	mg/m³	mg/m³	Symbol	mg/m³
Antimony	7.000	0.208	15	16	0.000525	0.0000166	uMSb	0.000525
Arsenic	3.200	0.221	11	12	0.000176	0.0000133	uMAs	0.000177
Cadmium	1.100	0.148	12	10	0.0000660	7.380E-06	uMCd	0.0000664
Chromium	19.800	0.691	12	10	0.00119	0.0000346	uMCr	0.00119
Cobalt	0.500	0.148	12	10	0.0000300	7.380E-06	uMCo	0.0000309
Copper	46.000	0.416	12	10	0.00276	0.0000208	uMCu	0.00276
Lead	61.200	2.805	13	16	0.00398	0.000224	uMPb	0.00398
Manganese	6.300	0.691	16	10	0.000504	0.0000346	uMMn	0.000505
Mercury	0.177	0.369	10	12	8.850E-06	0.0000221	uMHg	0.0000238
Nickel	6.600	0.403	12	9	0.000396	0.0000181	uMNi	0.000396
Thallium	0.500	0.148	14	14	0.0000350	0.0000103	uMTl	0.0000365
Vanadium	0.500	0.0738	12	9	0.0000300	3.321E-06	uMV	0.0000302

				Standard Uncertainty @ 95%		
Sampled Volume (V_m)	1.645	**m³**	**uV$_m$**	0.001	**m³**
Meter Correction Factor (Yd)	1.007	**...**		...	**...**
Meter Temperature (T_m)	308.33	**k**	**uTm**	1.5	**k**
Average Differential Pressure (ΔH)	67.07	**mmH$_2$O**	**uDH**	0.25	**mmH$_2$O**
Barometric Pressure (ρ_b)	761.31	**mmHg**	**up$_s$**	3.8	**mmHg**
ΔH + ρs (ρ_m)	102.16	**kPa**		...	**...**
Oxygen content ($O_{2,m}$)	13.16	**% by volume**	$uO_{2,m} = \sigma/\sqrt{n}$	0.33	**% by volume**
Moisture Content (H$_2$O)	11.29	**% by volume**	**uH$_2$O**	0.31	**% by volume**

Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔH), measured stack pressure uncertainty component (up$_s$) & measured

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = \quad 0.899$$

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.899	0.899	0.0000863	0.0000216
up$_s$	0.904	0.895	0.00117	0.00440
uT$_m$	0.904	0.895	0.00292	0.00437
H$_2$O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00525$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV$_{std}$) & volume uncertainty component (uV$_m$)

$$V_{std} = V_{measured} \times f_s = \quad 1.480$$

	Maximum m³	Minimum m³	Sensitivity	Standard Uncertainty m³
Effect of uV$_{std}$	1.488	1.471	1.645	0.00864
Effect of uV$_m$	1.481	1.479	0.899	0.000899

Combined Standard Uncertainty

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0142$$

Uncertainty of oxygen correction factor (*uf*$_{O2}$)

$$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = \quad 1.28$$

$$uCorr^n{}_{o_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) x (20.9\% - O_{2,measured})} x\, Uncertainty\ of\ O_2\ Measurement = \quad 0.05$$

$$\therefore uf_{o_2} = \frac{uCorr^n{}_{o_2}}{f_{o_2}} x100 = \quad 4.2\ \%$$

Selibon N.V.		Installation Name	: Incinerator Exhaust
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Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM)

Metal	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	uM mg/Nm^3
Antimony	0.00669	0.00578	0.864	0.000454
Arsenic	0.00311	0.00281	0.864	0.000153
Cadmium	0.00114	0.00102	0.864	0.0000574
Chromium	0.0187	0.0167	0.864	0.00103
Cobalt	0.000587	0.000533	0.864	0.0000267
Copper	0.0425	0.0377	0.864	0.00239
Lead	0.0588	0.0519	0.864	0.00344
Manganese	0.00648	0.00561	0.864	0.000437
Mercury	0.000493	0.000451	0.864	0.0000206
Nickel	0.00640	0.00571	0.864	0.000343
Thallium	0.000591	0.000528	0.864	0.0000315
Vanadium	0.000522	0.000470	0.864	0.0000261

Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss (assumed 2% max) in the sample system

Metal	uL mg/Nm^3
Antimony	0.0000719
Arsenic	0.0000342
Cadmium	0.0000125
Chromium	0.000205
Cobalt	6.464E-06
Copper	0.000463
Lead	0.000639
Manganese	0.0000698
Mercury	5.450E-06
Nickel	0.0000699
Thallium	6.464E-06
Vanadium	5.728E-06

Uncertainty in final measurement @ Reference Conditions due to uVstp

Metal	Maximum mg/Nm^3	Minimum mg/Nm^3	Sensitivity	uVstp mg/Nm^3
Antimony	0.00629	0.00617	0.00421	0.0000599
Arsenic	0.00299	0.00293	0.00200	0.0000285
Cadmium	0.00109	0.00107	0.000729	0.0000104
Chromium	0.0179	0.0175	0.0120	0.000170
Cobalt	0.000565	0.000554	0.000378	5.386E-06
Copper	0.0405	0.0397	0.0271	0.000386
Lead	0.0559	0.0548	0.0374	0.000532
Manganese	0.00610	0.00599	0.00408	0.0000581
Mercury	0.000477	0.000467	0.000319	4.541E-06
Nickel	0.00611	0.00600	0.00409	0.0000582
Thallium	0.000565	0.000554	0.000378	5.386E-06
Vanadium	0.000501	0.000491	0.000335	4.772E-06

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Metal	Combined Uncertainty mg/Nm^3	Expanded Uncertainty mg/Nm^3	Measured Concentration mg/Nm^3	Percent of Measured Concentration
Antimony	0.000464	0.000927	0.00623	14.881
Arsenic	0.000159	0.000318	0.00296	10.746
Cadmium	0.0000597	0.000119	0.00108	11.062
Chromium	0.00106	0.00212	0.0177	11.983
Cobalt	0.0000280	0.0000560	0.000560	10.003
Copper	0.00246	0.00492	0.0401	12.267
Lead	0.00354	0.00709	0.0553	12.808
Manganese	0.000446	0.000892	0.00604	14.761
Mercury	0.0000218	0.0000436	0.000472	9.237
Nickel	0.000355	0.000709	0.00605	11.714
Thallium	0.0000326	0.0000653	0.000560	11.664
Vanadium	0.0000271	0.0000543	0.000496	10.941

$$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Metal	% of Measured Concentration	Measurement Uncertainty of Oxygen Corr^n Factor	Overall Measurement Uncertainty inc O_2 Corr^n factor ($Ucombined$)	New Combined Uncertainty mg/Nm^3
Antimony	14.881	4.200	15.463	0.000482
Arsenic	10.746	4.200	11.538	0.000171
Cadmium	11.062	4.200	11.833	0.000064
Chromium	11.983	4.200	12.698	0.001125
Cobalt	10.003	4.200	10.849	0.000030
Copper	12.267	4.200	12.966	0.002601
Lead	12.808	4.200	13.479	0.003729
Manganese	14.761	4.200	15.347	0.000464
Mercury	9.237	4.200	10.147	0.000024
Nickel	11.714	4.200	12.444	0.000377
Thallium	11.664	4.200	12.397	0.000035
Vanadium	10.941	4.200	11.720	0.000029

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Note: Uncertainty for each metals group is based on the summation in quadrature of the individual standard uncertainties (in mg/m3) of each contributing metal. Combined standard uncertainty of each group is converted to 95% confidence (multiplication by k = 2) before being expressed as a percentage of the combined group concentration.

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Dioxins & Furans Uncertainty - (Dead Animal Waste)

Site: ACL Lagun - Bonaire
Location: Incinerator Exhaust

Dioxin	Recovered Mass ng	LOD ng	LAB Method Uncert (%) K=2 %age	as Mass (ng)	Standard Uncertainty Symbol	ng
2,3,7,8 - TCDD	0.163	0.000140	30	0.0489	**u2,3,7,8 - TCDD**	0.0245
1,2,3,7,8 - PCDD	0.514	0.000190	30	0.154	**u1,2,3,7,8 - PCDD**	0.0771
1,2,3,4,7,8 - HxCDD	0.278	0.000320	30	0.0834	**u1,2,3,4,7,8 - HxCDD**	0.0417
1,2,3,6,7,8 - HxCDD	0.378	0.000350	30	0.113	**u1,2,3,6,7,8 - HxCDD**	0.0567
1,2,3,7,8,9 - HxCDD	0.411	0.000380	30	0.123	**u1,2,3,7,8,9 - HxCDD**	0.0617
1,2,3,4,6,7,8 - HpCDD	1.860	0.000380	30	0.558	**u1,2,3,4,6,7,8 - HpCDD**	0.279
OCDD	2.050	0.00135	30	0.615	**uOCDD**	0.308
2,3,7,8 - TCDF	1.200	0.000270	30	0.360	**u2,3,7,8 - TCDF**	0.180
1,2,3,7,8 - PCDF	1.160	0.000260	30	0.348	**u1,2,3,7,8 - PCDF**	0.174
2,3,4,7,8 - PCDF	1.850	0.000740	30	0.555	**u2,3,4,7,8 - PCDF**	0.278
1,2,3,4,7,8 - HxCDF	1.150	0.000190	30	0.345	**u1,2,3,4,7,8 - HxCDF**	0.173
1,2,3,6,7,8 - HxCDF	1.330	0.000160	30	0.399	**u1,2,3,6,7,8 - HxCDF**	0.200
2,3,4,6,7,8 - HxCDF	1.310	0.000160	30	0.393	**u2,3,4,6,7,8 - HxCDF**	0.197
1,2,3,7,8,9 - HxCDF	0.130	0.000180	30	0.0390	**u1,2,3,7,8,9 - HxCDF**	0.0195
1,2,3,4,6,7,8 - HpCDF	2.880	0.000450	30	0.864	**u1,2,3,4,6,7,8 - HpCDF**	0.432
1,2,3,4,7,8,9 - HpCDF	0.521	0.000650	30	0.156	**u1,2,3,4,7,8,9 - HpCDF**	0.0782
OCDF	1.400	0.000560	30	0.420	**uOCDF**	0.210

	Measured Values			Standard Uncertainty @ 95%		
Sampled Volume (V_m)	1.366	**m^3**		**uV_m**	0.001	**m^3**
Meter Correction Factor (Yd)	1.007	**...**			...	**...**
Meter Temperature (T_m)	308.333	**k**		**uTm**	1.5	**k**
Average Differential Pressure (ΔH)	38.550	**mmH_2O**		**uDH**	0.25	**mmH_2O**
Barometric Pressure (ρ_b)	761.310	**mmHg**		**up$_b$**	3.8	**mmHg**
ΔH + ρs (ρ_m)	101.878	**kPa**			...	**...**
Oxygen content ($O_{2,m}$)	10.128	**% by volume**	$uO_{2,m} = \sigma/\sqrt{n}$		0.50	**% by volume**
Moisture Content (H_2O)	6.951	**% by volume**		**uH_2O**	0.22	**% by volume**

Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔ H), measured stack pressure uncertainty component (up$_s$) & measured temperature of dry gas

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = \quad 0.897$$

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = \quad 1$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.897	0.897	0.0000863	0.0000216
up$_b$	0.901	0.892	0.00117	0.00440
uT_m	0.901	0.892	0.00291	0.00436
H_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)}\right)^2} = \quad 0.00524$$

Uncertainty in volume @ reference conditions due to volume correction factor uncertainty component (uV_{std}) & volume uncertainty component (uV_m)

$$V_{std} = V_{measured} \times f_s = \quad 1.225$$

	Maximum m^3	Minimum m^3	Sensitivity	Standard Uncertainty m^3
Effect of uV_{std}	1.233	1.218	1.366	0.00715
Effect of uV_m	1.226	1.225	0.897	0.000897

Combined Standard Uncertainty

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = \quad 0.0098$$

Uncertainty of oxygen correction factor (ufO_2)

$$f_{o_2} = \frac{20.9\% - O_{2,\,ref}}{20.9\% - O_{2,\,measured}} = \quad 1.656 \qquad uCorr^n{}_{o_2} = \frac{20.9\% - O_{2,\,ref}}{(20.9\% - O_{2,\,measured})x(20.9\% - O_{2,\,measured})} x\, Uncertainty\ of\ O_2\ Measurement =$$

$$\therefore uf_{o_2} = \frac{uCorr^n{}_{o_2}}{f_{o_2}} x100 = \quad 1.68\ \%$$

Selibon N.V.		**Installation Name**	**: Incinerator Exhaust**
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Uncertainty in final dioxin measurement @ reference conditions due to mass uncertainty component (uM)

Dioxin	Maximum ng/Nm³	Minimum ng/Nm³	Sensitivity	uM ng/Nm³
2,3,7,8 - TCDD	0.253	0.187	1.351	0.0330
1,2,3,7,8 - PCDD	0.799	0.590	1.351	0.104
1,2,3,4,7,8 - HxCDD	0.432	0.319	1.351	0.0563
1,2,3,6,7,8 - HxCDD	0.587	0.434	1.351	0.0766
1,2,3,7,8,9 - HxCDD	0.639	0.472	1.351	0.0833
1,2,3,4,6,7,8 - HpCDD	2.890	2.136	1.351	0.377
OCDD	3.185	2.354	1.351	0.415
2,3,7,8 - TCDF	1.865	1.378	1.351	0.243
1,2,3,7,8 - PCDF	1.802	1.332	1.351	0.235
2,3,4,7,8 - PCDF	2.874	2.125	1.351	0.375
1,2,3,4,7,8 - HxCDF	1.787	1.321	1.351	0.233
1,2,3,6,7,8 - HxCDF	2.067	1.527	1.351	0.270
2,3,4,6,7,8 - HxCDF	2.035	1.504	1.351	0.265
1,2,3,7,8,9 - HxCDF	0.202	0.149	1.351	0.0263
1,2,3,4,6,7,8 - HpCDF	4.475	3.308	1.351	0.584
1,2,3,4,7,8,9 - HpCDF	0.810	0.598	1.351	0.106
OCDF	2.175	1.608	1.351	0.284

Uncertainty in final measurement @ reference conditions due to uncertainty component arrising from leak and/or loss in the sample system (uL)

Dioxin	uL ng/Nm³
2,3,7,8 - TCDD	0.00254
1,2,3,7,8 - PCDD	0.00802
1,2,3,4,7,8 - HxCDD	0.00434
1,2,3,6,7,8 - HxCDD	0.00590
1,2,3,7,8,9 - HxCDD	0.00641
1,2,3,4,6,7,8 - HpCDD	0.0290
OCDD	0.0320
2,3,7,8 - TCDF	0.0187
1,2,3,7,8 - PCDF	0.0181
2,3,4,7,8 - PCDF	0.0289
1,2,3,4,7,8 - HxCDF	0.0179
1,2,3,6,7,8 - HxCDF	0.0207
2,3,4,6,7,8 - HxCDF	0.0204
1,2,3,7,8,9 - HxCDF	0.00203
1,2,3,4,6,7,8 - HpCDF	0.0449
1,2,3,4,7,8,9 - HpCDF	0.00813
OCDF	0.0218

Uncertainty in final measurement @ Reference Conditions due to uVstp

Dioxin	Maximum ng/Nm³	Minimum ng/Nm³	Sensitivity	uVstp mg/Nm³
2,3,7,8 - TCDD	0.222	0.218	0.180	0.00176
1,2,3,7,8 - PCDD	0.700	0.689	0.567	0.00556
1,2,3,4,7,8 - HxCDD	0.379	0.373	0.307	0.00301
1,2,3,6,7,8 - HxCDD	0.515	0.507	0.417	0.00409
1,2,3,7,8,9 - HxCDD	0.560	0.551	0.453	0.00445
1,2,3,4,6,7,8 - HpCDD	2.533	2.493	2.051	0.0201
OCDD	2.792	2.748	2.260	0.0222
2,3,7,8 - TCDF	1.634	1.608	1.323	0.0130
1,2,3,7,8 - PCDF	1.580	1.555	1.279	0.0125
2,3,4,7,8 - PCDF	2.520	2.480	2.040	0.0200
1,2,3,4,7,8 - HxCDF	1.566	1.541	1.268	0.0124
1,2,3,6,7,8 - HxCDF	1.811	1.783	1.467	0.0144
2,3,4,6,7,8 - HxCDF	1.784	1.756	1.444	0.0142
1,2,3,7,8,9 - HxCDF	0.177	0.174	0.143	0.00141
1,2,3,4,6,7,8 - HpCDF	3.923	3.860	3.176	0.0312
1,2,3,4,7,8,9 - HpCDF	0.710	0.698	0.574	0.00564
OCDF	1.907	1.877	1.544	0.0151

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Dioxin	Combined Uncertainty ng/Nm³	Expanded Uncertainty ng/Nm³	Measured Concentration ng/Nm³	% of Measured Concentration
2,3,7,8 - TCDD	0.0332	0.0664	0.220	30.131
1,2,3,7,8 - PCDD	0.105	0.209	0.694	30.131
1,2,3,4,7,8 - HxCDD	0.0566	0.113	0.376	30.131
1,2,3,6,7,8 - HxCDD	0.0769	0.154	0.511	30.131
1,2,3,7,8,9 - HxCDD	0.0837	0.167	0.555	30.131
1,2,3,4,6,7,8 - HpCDD	0.379	0.757	2.513	30.131
OCDD	0.417	0.835	2.770	30.131
2,3,7,8 - TCDF	0.244	0.489	1.621	30.131
1,2,3,7,8 - PCDF	0.236	0.472	1.567	30.131
2,3,4,7,8 - PCDF	0.377	0.753	2.500	30.131
1,2,3,4,7,8 - HxCDF	0.234	0.468	1.554	30.131
1,2,3,6,7,8 - HxCDF	0.271	0.541	1.797	30.131
2,3,4,6,7,8 - HxCDF	0.267	0.533	1.770	30.131
1,2,3,7,8,9 - HxCDF	0.0265	0.0529	0.176	30.131
1,2,3,4,6,7,8 - HpCDF	0.586	1.172	3.891	30.131
1,2,3,4,7,8,9 - HpCDF	0.106	0.212	0.704	30.131
OCDF	0.285	0.570	1.892	30.131
		Total (ng/Nm³)	25.110	8.9

$$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Dioxin	% of Measured Concentration	Measurement Uncertainty of Oxygen Corrⁿ Factor	Overall Measurement Uncertainty inc O_2 Corrⁿ factor ($U_{combined}$)	New Combined Uncertainty ng/Nm³
2,3,7,8 - TCDD	30.131	1.680	30.178	0.0332
1,2,3,7,8 - PCDD	30.131	1.680	30.178	0.105
1,2,3,4,7,8 - HxCDD	30.131	1.680	30.178	0.0566
1,2,3,6,7,8 - HxCDD	30.131	1.680	30.178	0.0770
1,2,3,7,8,9 - HxCDD	30.131	1.680	30.178	0.0837
1,2,3,4,6,7,8 - HpCDD	30.131	1.680	30.178	0.379
OCDD	30.131	1.680	30.178	0.417
2,3,7,8 - TCDF	30.131	1.680	30.178	0.244
1,2,3,7,8 - PCDF	30.131	1.680	30.178	0.236
2,3,4,7,8 - PCDF	30.131	1.680	30.178	0.377
1,2,3,4,7,8 - HxCDF	30.131	1.680	30.178	0.234
1,2,3,6,7,8 - HxCDF	30.131	1.680	30.178	0.271
2,3,4,6,7,8 - HxCDF	30.131	1.680	30.178	0.267
1,2,3,7,8,9 - HxCDF	30.131	1.680	30.178	0.0265
1,2,3,4,6,7,8 - HpCDF	30.131	1.680	30.178	0.587
1,2,3,4,7,8,9 - HpCDF	30.131	1.680	30.178	0.106
OCDF	30.131	1.680	30.178	0.285

Selibon N.V.		**Installation Name**	**: Incinerator Exhaust**
Permit No	**: ...**	**Visit Details**	**: Emissions Survey – February 2024**
Variation No	**: ...**	**Survey Dates**	**: 12th – 16th February 2024**
Report Ref	**: P5632 : R001**	**Report Issue Date.**	**: 20th December 2024**

Uncertainty - Adjusted for TEQ / TEF

Dioxin	TEQ ng/m³	Uncertainty ng/Nm³	Conc ng/Nm³	WHO Humans & Mammals (TEF)	Uncertainty ng/Nm³	Conc ng/Nm³	WHO Fish (TEF)	Uncertainty ng/Nm³	Conc ng/Nm³	WHO Birds (TEF)	Uncertainty ng/Nm³	Conc ng/Nm³
2,3,7,8 - TCDD	1	0.0664	0.220	1	0.0664	0.220	1	0.0664	0.220	1	0.0664	0.220
1,2,3,7,8 - PCDD	0.5	0.105	0.347	1	0.209	0.694	1	0.209	0.694	1	0.209	0.694
1,2,3,4,7,8 - HxCDD	0.1	0.0113	0.0376	0.1	0.0113	0.0376	0.5	0.0566	0.188	0.05	0.00566	0.0188
1,2,3,6,7,8 - HxCDD	0.1	0.0154	0.0511	0.1	0.0154	0.0511	0.01	0.00154	0.00511	0.01	0.00154	0.00511
1,2,3,7,8,9 - HxCDD	0.1	0.0167	0.0555	0.1	0.0167	0.0555	0.01	0.00167	0.00555	0.1	0.0167	0.0555
1,2,3,4,6,7,8 - HpCDD	0.01	0.00758	0.0251	0.01	0.00758	0.0251	0.001	0.000758	0.00251	0.001	0.000758	0.00251
OCDD	0.001	0.000835	0.00277	0.0001	0.0000835	0.000277	...	...	...	...	...	...
2,3,7,8 - TCDF	0.1	0.0489	0.162	0.1	0.0489	0.162	0.05	0.0244	0.0811	1	0.489	1.621
1,2,3,7,8 - PCDF	0.05	0.0236	0.0784	0.05	0.0236	0.0784	0.05	0.0236	0.0784	0.1	0.0472	0.157
2,3,4,7,8 - PCDF	0.5	0.377	1.250	0.5	0.377	1.250	0.5	0.377	1.250	1	0.754	2.500
1,2,3,4,7,8 - HxCDF	0.1	0.0468	0.155	0.1	0.0468	0.155	0.1	0.0468	0.155	0.1	0.0468	0.155
1,2,3,6,7,8 - HxCDF	0.1	0.0542	0.180	0.1	0.0542	0.180	0.1	0.0542	0.180	0.1	0.0542	0.180
2,3,4,6,7,8 - HxCDF	0.1	0.0534	0.177	0.1	0.0534	0.177	0.1	0.0534	0.177	0.1	0.0534	0.177
1,2,3,7,8,9 - HxCDF	0.1	0.00529	0.0176	0.1	0.00529	0.0176	0.1	0.00529	0.0176	0.1	0.00529	0.0176
1,2,3,4,6,7,8 - HpCDF	0.01	0.0117	0.0389	0.01	0.0117	0.0389	0.01	0.0117	0.0389	0.01	0.0117	0.0389
1,2,3,4,7,8,9 - HpCDF	0.01	0.00212	0.00704	0.01	0.00212	0.00704	0.01	0.00212	0.00704	0.01	0.00212	0.00704
OCDF	0.001	0.000570	0.00189	0.0001	0.0000570	0.000189	0.0001	0.0000570	0.000189	0.0001	0.0000570	0.000189
TOTAL	...	0.411	2.807	...	0.449	3.150	...	0.450	3.101	...	0.930	5.850
% Uncertainty	...	...	14.648	...	...	14.266	...	...	14.520	...	...	15.9

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Light Medical Waste

Stack Reference Incinerator Exhaust

Measurement Uncertainty Calculations - Velocity at Stack Conditions

Contribution From	Standard u/c (mm H_2O)	
Pitot Calibration Uncertainty Contribution	0.054	A
Manometer Calibration Uncertainty Contribution	0.054	B
Variation in Actual Pitot reading at sample points	0.20	C
Combined u/c (mm H_2O) =	**Combined u/c (mm H_2O)**	
SQRT $(A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.12	
Expanded Uncertainty of Flow Measurements (mm H_2O)	**0.25**	
	Standard u/c (K)	
Temperature Calibration (K)	3.18	D
Variation in Actual Temp reading at sample points	1.50	E
Combined u/c of Temp (K)	**Combined u/c (K)**	
SQRT $((D/\sqrt{3^2}) + (E/\sqrt{3})^2)$	2.03	
Expanded Uncertainty of Temp Measurements (K)	**4.06**	
Measured Average Velocity (m/s) at Stack Conds	16.48	
Maximum Average Velocity (m/s) at Stack Conds	16.72	
Standard Uncertainty Velocity at Stack Conditions (%)	1.46	
Expanded Uncertainty Velocity (at Stack Conditions)	**2.92 (%)**	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m^2)
Area (m2)	0.00071
Measured Average Flowrate (m^3/s) at Stack Conds	1.17
Maximum Average Flowrate (m^3/s) at Stack Conds	1.19
Standard Uncertainty Flowrate (m^3/s) at Stack Conditions (%)	2.47
Expanded Uncertainty Flowrate (m^3/s) at Stack Conditions	**4.95 (%)**

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m^3/s) at STP Wet	0.50
Maximum Average Flowrate (m^3/s) at STP Wet	0.51
Standard Uncertainty Flowrate (m^3/s) at STP Wet	2.69
Expanded Uncertainty Flowrate (m^3/s) at STP Wet	**5.39 (%)**

Measurement Uncertainty Calculations - Flowrate at STP & Dry Gas

Contribution From	Standard u/c (%)
Moisture Uncertainty (% v/v)	0.10
Measured Average Flowrate (m^3/s) at STP Dry	0.48
Maximum Average Flowrate (m^3/s) at STP Dry	0.49
Standard Uncertainty Flowrate (m^3/s) at STP Dry	2.80
Expanded Uncertainty Flowrate (m^3/s) at STP Dry	**5.59 (%)**

Measurement Uncertainty Calculations - Flowrate at STP, Dry Gas & Ref Oxygen

Contribution From	Standard u/c (%)
Oxygen Uncertainty (% v/v)	0.341
Measured Average Flowrate (m^3/s) at STP Dry & Ref Oxygen	0.11
Maximum Average Flowrate (m^3/s) at STP Dry & Ref Oxygen	0.12
Standard Uncertainty Flowrate (m^3/s) at STP Dry & Ref Oxygen	11.62
Expanded Uncertainty Flowrate (m^3/s) at STP Dry & Ref O_2	**23.23 (%)**

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Medium Bin Medical Waste

Stack Reference Incinerator Exhaust

Measurement Uncertainty Calculations - Velocity at Stack Conditions

Contribution From	Standard u/c (mm H_2O)	
Pitot Calibration Uncertainty Contribution	0.277	A
Manometer Calibration Uncertainty Contribution	0.277	B
Variation in Actual Pitot reading at sample points	3.00	C
Combined u/c (mm H_2O) =	**Combined u/c (mm H_2O)**	
SQRT $(A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	1.75	
Expanded Uncertainty of Flow Measurements (mm H_2O)	**3.49**	
	Standard u/c (K)	
Temperature Calibration (K)	4.21	D
Variation in Actual Temp reading at sample points	4.50	E
Combined u/c of Temp (K)	**Combined u/c (K)**	
SQRT $((D/\sqrt{3^2}) + (E/\sqrt{3})^2)$	3.56	
Expanded Uncertainty of Temp Measurements (K)	**7.11**	
Measured Average Velocity (m/s) at Stack Conds	42.90	
Maximum Average Velocity (m/s) at Stack Conds	44.42	
Standard Uncertainty Velocity at Stack Conditions (%)	3.54	
Expanded Uncertainty Velocity (at Stack Conditions)	**7.09 (%)**	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m^2)
Area (m2)	0.00071
Measured Average Flowrate (m^3/s) at Stack Conds	3.03
Maximum Average Flowrate (m^3/s) at Stack Conds	3.17
Standard Uncertainty Flowrate (m^3/s) at Stack Conditions (%)	4.58
Expanded Uncertainty Flowrate (m^3/s) at Stack Conditions	**9.16 (%)**

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m^3/s) at STP Wet	0.99
Maximum Average Flowrate (m^3/s) at STP Wet	1.03
Standard Uncertainty Flowrate (m^3/s) at STP Wet	4.75
Expanded Uncertainty Flowrate (m^3/s) at STP Wet	**9.50 (%)**

Measurement Uncertainty Calculations - Flowrate at STP & Dry Gas

Contribution From	Standard u/c (%)
Moisture Uncertainty (% v/v)	0.09
Measured Average Flowrate (m^3/s) at STP Dry	0.94
Maximum Average Flowrate (m^3/s) at STP Dry	0.99
Standard Uncertainty Flowrate (m^3/s) at STP Dry	4.85
Expanded Uncertainty Flowrate (m^3/s) at STP Dry	**9.69 (%)**

Measurement Uncertainty Calculations - Flowrate at STP, Dry Gas & Ref Oxygen

Contribution From	Standard u/c (%)
Oxygen Uncertainty (% v/v)	0.171
Measured Average Flowrate (m^3/s) at STP Dry & Ref Oxygen	0.20
Maximum Average Flowrate (m^3/s) at STP Dry & Ref Oxygen	0.22
Standard Uncertainty Flowrate (m^3/s) at STP Dry & Ref Oxygen	9.49
Expanded Uncertainty Flowrate (m^3/s) at STP Dry & Ref O_2	**18.97 (%)**

Selibon N.V.			Installation Name	: Incinerator Exhaust
Permit No	: ...		Visit Details	: Emissions Survey – February 2024
Variation No	: ...		Survey Dates	: 12th – 16th February 2024
Report Ref	: P5632	: R001	Report Issue Date.	: 20th December 2024

Dead Animal Waste

Stack Reference Incinerator Exhaust

Measurement Uncertainty Calculations - Velocity at Stack Conditions

Contribution From	Standard u/c (mm H_2O)	
Pitot Calibration Uncertainty Contribution	0.380	A
Manometer Calibration Uncertainty Contribution	0.380	B
Variation in Actual Pitot reading at sample points	4.00	C
Combined u/c (mm H_2O) =	**Combined u/c (mm H_2O)**	
SQRT $(A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$)	2.33	
Expanded Uncertainty of Flow Measurements (mm H_2O)	**4.66**	
	Standard u/c (K)	
Temperature Calibration (K)	3.21	D
Variation in Actual Temp reading at sample points	3.50	E
Combined u/c of Temp (K)	**Combined u/c (K)**	
SQRT $((D/\sqrt{3^2}) + (E/\sqrt{3})^2)$	2.74	
Expanded Uncertainty of Temp Measurements (K)	**5.48**	
Measured Average Velocity (m/s) at Stack Conds	44.32	
Maximum Average Velocity (m/s) at Stack Conds	45.85	
Standard Uncertainty Velocity at Stack Conditions (%)	3.46	
Expanded Uncertainty Velocity (at Stack Conditions)	**6.92 (%)**	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m^2)
Area (m2)	0.00071
Measured Average Flowrate (m^3/s) at Stack Conds	3.13
Maximum Average Flowrate (m^3/s) at Stack Conds	3.27
Standard Uncertainty Flowrate (m^3/s) at Stack Conditions (%)	4.49
Expanded Uncertainty Flowrate (m^3/s) at Stack Conditions	**8.99 (%)**

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m^3/s) at STP Wet	1.34
Maximum Average Flowrate (m^3/s) at STP Wet	1.40
Standard Uncertainty Flowrate (m^3/s) at STP Wet	4.72
Expanded Uncertainty Flowrate (m^3/s) at STP Wet	**9.43 (%)**

Measurement Uncertainty Calculations - Flowrate at STP & Dry Gas

Contribution From	Standard u/c (%)
Moisture Uncertainty (% v/v)	0.16
Measured Average Flowrate (m^3/s) at STP Dry	1.17
Maximum Average Flowrate (m^3/s) at STP Dry	1.23
Standard Uncertainty Flowrate (m^3/s) at STP Dry	4.91
Expanded Uncertainty Flowrate (m^3/s) at STP Dry	**9.81 (%)**

Measurement Uncertainty Calculations - Flowrate at STP, Dry Gas & Ref Oxygen

Contribution From	Standard u/c (%)
Oxygen Uncertainty (% v/v)	0.134
Measured Average Flowrate (m^3/s) at STP Dry & Ref Oxygen	0.50
Maximum Average Flowrate (m^3/s) at STP Dry & Ref Oxygen	0.53
Standard Uncertainty Flowrate (m^3/s) at STP Dry & Ref Oxygen	6.76
Expanded Uncertainty Flowrate (m^3/s) at STP Dry & Ref O_2	**13.51 (%)**