



Title: Monitoring of Gaseous & Nickel Emissions

Permit Number: TBC
Operator: CBE Plus Limited
Installation: Stripping Line
Monitoring Dates: 5 November 2025

Reference Number: EI/10720

Client Organisation: CBE Plus Limited
Address: Enterprise Drive
Holmewood
Chesterfield
S42 5UZ

Monitoring Organisation: CES Environmental Instruments Ltd
Address: Bretby Business Park
Ashby Road
Burton on Trent
Staffordshire
DE15 0YZ

Date of Report: 1 December 2025

Report Prepared By: Martin Rodgers
MCERTS Registration Number: MM 04 531 (Level 2, TE1, TE2, TE3, TE4)

Signed:

Report Approved By: Robert Allen
MCERTS Registration Number: MM 02 009 (Level 2, TE1, TE2, TE3, TE4)

Signed:

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Part 1: Executive Summary

1.1 Monitoring Objectives

CBE Plus Limited placed a contract with CES Environmental Instruments Ltd for the compliance check monitoring of emissions to air from the Stripping Line.

Stripping Line

Plating Process

CBE+ is a global leader in precision Electroless Nickel Plating (ENP), complemented by precision CNC machining and a range of specialist ancillary services.

The test work was undertaken on 5 November 2025 by CES Environmental Instruments Ltd Engineers and carried out as part of CES Environmental Instruments Ltd job reference EI/10720.

The substances monitored were: -

Oxides of Nitrogen (NO₂)
Nickel (Ni)

On the day of testing there were no special requirements for the monitoring.

1.2 Monitoring Results

Emission Point Reference: Stripping Line

Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Uncertainty of Measurement (95% CI)	Blank Result	Units	Reference Conditions	Emission Rate	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation for use of Method	Operating Status
Oxides of Nitrogen (NO ₂)	To Be Confirmed	1.66	0.27	-	mg/m ³	273K, 101.3kPa	-	5 November 2025	14:20-15:19	BS EN 14792	UKAS & MCERTS	Normal Operation
Nickel	To Be Confirmed	0.0002	0.0011	0.0000*	mg/m ³	273K, 101.3kPa	0.0018g/hr	5 November 2025	14:30-15:30	BS EN 14385	UKAS & MCERTS	Normal Operation

*Indicates where the calculated concentration is below the detection limit of the monitoring standard. Where an analytical result is reported to be below the limit of detection, the limit of detection has been used.

1.3 Operating Information

Emission Point Reference: Stripping Line

Process Type	Batch Sample Details	Fuel	Product	Load	Abatement
Continuous	-	Metal Components / HCl Rinse	Bonderite paint De Lote Striper, S-MA 545 Aero Maskant	8 x Coats @ 20 minute intervals	None

Comparison of Operator Continuous Emissions Monitoring Systems (CEMS) and Periodic Monitoring Results								
Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Uncertainty of Measurement (95% CI)	Units	Reference Conditions	Date of Sampling	Start and End Times	CEMS Results
No CEMS Installed								

1.4 Monitoring Deviations

The sample plane does not comply upstream and downstream as per the requirements of BS EN 15259.

Part 2: Supporting Information

Appendix 1 General Information

CES Environmental Instruments Ltd staff details

Name	Role	MCERT Registration Number	Level 1	Level 2	TE1	TE2	TE3	TE4	At site
Paul Broxham	Team Leader	MM 13 1254		✓	✓	✓	✓	✓	T
				Feb 2030	Feb 2030	Feb 2030	Nov 2029	Nov 2029	
Derek Harvey	Team Leader	MM 06 686		✓	✓				✓
				June 2027	June 2027				

T = Nominated Team Leader on Site

CES Environmental Instruments Ltd method details

Pollutant	Method	CES Procedure
Oxides of Nitrogen	BS EN 14792	WI 4/32
Nickel	BS EN 14385	WI4/30

Monitoring Equipment Used

Horiba PG250
Pump Box

CES Environmental Instruments Ltd Reference: C153
CES Environmental Instruments Ltd Reference: C286

Appendix 2

Diagrams of Emission Point

Sampling Location

Dimensions	Cross Sectional Area	Orientation	Sample Ports Available/Used	Sampling Positions Per Plane	Standard
Dia = 800mm	0.283m ²	Vertical	Nickle (Ni) -2/2 Gas – 2/1	4 1	BS EN 15259
Comments: Sample ports: 2 off 4" BSP sockets Single Point Sampling					
				Yes	No
Has homogeneity test been carried out?					✓
If Yes - Is stack gas homogenous?					
Any physical or regulatory restrictions regarding usage of equipment? N/A					

Compliance with BS EN 15259 / EA TGN M1	Yes	No
Does the sample plane comply upstream?		✓*
Does the sample plane comply downstream?		✓*
Are the appropriate sample ports fitted?	✓	
Do the stack gas velocity / temperature profiles comply?	✓	
Minimum platform area >5m²	✓	

*BS 15259 has a general requirement that the sampling plane shall be in a straight section of duct at least 5 hydraulic diameters downstream and 2 hydraulic diameters upstream of any bend or obstruction which could produce turbulent flow.



Appendix 3
Gas (Instrument Measured Values & Results)

Site	CBE Plus Ltd
Date	05/11/2025
Plant	Stripping Line
File Ref	10720

Date & Time		O ₂	CO ₂	CO		SO ₂		NO _x (NO ₂)	
Start	End	dry vol%	dry vol%	dry ppm	dry mg/Nm ³	dry ppm	dry mg/Nm ³	dry ppm	dry mg/Nm ³
05/11/2025 14:20	05/11/2025 15:19	20.79	0.10	0.88	1.10	0.69	1.98	0.81	1.66
Mean		20.79	0.10	0.88	1.10	0.69	1.98	0.81	1.66
Max		20.85	0.12	8.91	11.14	0.85	2.44	1.22	2.49
Min		20.76	0.08	-1.27	-1.58	0.31	0.89	0.34	0.70

Results Correct to

Temperature °C/K	0/273	Pressure mbar/kPa	1013/101.3	Oxygen %	No Correction	Gas Wet/Dry	Dry
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Date/Time	O ₂	CO ₂	CO	SO ₂	NO _x			
	dry vol%	dry vol%	dry ppm	dry ppm	dry ppm	CO dry mg/Nm ³	SO ₂ dry mg/Nm ³	NO _x dry mg/Nm ³
1 min log								
05/11/2025 14:20	20.77	0.09	0.72	0.70	0.34	0.90	2.00	0.70
05/11/2025 14:21	20.77	0.08	0.40	0.85	0.38	0.50	2.44	0.77
05/11/2025 14:22	20.78	0.08	1.61	0.79	0.48	2.01	2.26	0.97
05/11/2025 14:23	20.78	0.08	0.52	0.80	0.49	0.65	2.29	1.01
05/11/2025 14:24	20.78	0.08	0.32	0.80	0.40	0.40	2.28	0.82
05/11/2025 14:25	20.78	0.08	2.57	0.65	0.44	3.22	1.86	0.91
05/11/2025 14:26	20.78	0.08	2.12	0.76	0.38	2.65	2.19	0.77
05/11/2025 14:27	20.79	0.08	-0.21	0.65	0.37	-0.26	1.87	0.75
05/11/2025 14:28	20.79	0.08	1.85	0.56	0.42	2.31	1.60	0.85
05/11/2025 14:29	20.79	0.08	0.25	0.51	0.48	0.32	1.45	0.97
05/11/2025 14:30	20.79	0.09	1.61	0.61	0.42	2.01	1.73	0.85
05/11/2025 14:31	20.79	0.09	0.01	0.84	0.42	0.01	2.40	0.85
05/11/2025 14:32	20.79	0.09	1.04	0.71	0.41	1.30	2.04	0.84
05/11/2025 14:33	20.79	0.09	0.95	0.72	0.43	1.19	2.07	0.89
05/11/2025 14:34	20.79	0.09	1.47	0.76	0.46	1.83	2.18	0.94
05/11/2025 14:35	20.79	0.09	-0.33	0.80	0.41	-0.42	2.28	0.84
05/11/2025 14:36	20.76	0.09	8.91	0.77	0.74	11.14	2.20	1.52
05/11/2025 14:37	20.78	0.10	1.68	0.67	1.03	2.09	1.92	2.12
05/11/2025 14:38	20.78	0.09	-0.44	0.57	0.89	-0.55	1.64	1.83
05/11/2025 14:39	20.78	0.09	1.63	0.55	0.82	2.04	1.56	1.67
05/11/2025 14:40	20.79	0.09	-0.25	0.72	0.83	-0.31	2.05	1.71
05/11/2025 14:41	20.79	0.09	1.63	0.69	0.81	2.04	1.96	1.66
05/11/2025 14:42	20.79	0.09	-0.32	0.63	0.79	-0.40	1.80	1.62
05/11/2025 14:43	20.79	0.09	0.00	0.71	0.78	0.00	2.04	1.59
05/11/2025 14:44	20.79	0.10	0.68	0.59	0.79	0.84	1.69	1.62
05/11/2025 14:45	20.79	0.10	0.20	0.63	0.74	0.25	1.80	1.52
05/11/2025 14:46	20.79	0.10	1.42	0.68	0.82	1.77	1.93	1.67
05/11/2025 14:47	20.79	0.10	0.42	0.71	0.86	0.52	2.02	1.76
05/11/2025 14:48	20.79	0.10	0.33	0.72	0.93	0.41	2.06	1.91
05/11/2025 14:49	20.79	0.10	0.46	0.68	0.89	0.57	1.94	1.83
05/11/2025 14:50	20.79	0.10	0.43	0.66	0.98	0.54	1.89	2.02
05/11/2025 14:51	20.79	0.10	1.52	0.59	1.01	2.40	1.69	2.07
05/11/2025 14:52	20.79	0.10	0.42	0.74	1.10	0.53	2.11	2.26
05/11/2025 14:53	20.79	0.10	0.93	0.68	1.11	1.16	1.94	2.27
05/11/2025 14:54	20.79	0.10	1.33	0.70	1.11	1.66	2.00	2.27
05/11/2025 14:55	20.79	0.10	-0.06	0.67	1.16	-0.07	1.92	2.37
05/11/2025 14:56	20.79	0.10	2.00	0.67	1.22	2.50	1.91	2.49
05/11/2025 14:57	20.80	0.10	0.90	0.68	1.21	1.13	1.93	2.48
05/11/2025 14:58	20.80	0.10	0.85	0.67	1.21	1.06	1.92	2.48
05/11/2025 14:59	20.80	0.10	0.97	0.66	1.13	1.21	1.90	2.32
05/11/2025 15:00	20.80	0.10	-0.27	0.76	1.19	-0.33	2.16	2.44
05/11/2025 15:01	20.80	0.10	0.54	0.75	1.17	0.68	2.13	2.39
05/11/2025 15:02	20.80	0.10	0.94	0.77	1.17	1.18	2.20	2.39
05/11/2025 15:03	20.81	0.10	0.80	0.73	1.13	1.00	2.08	2.31
05/11/2025 15:04	20.81	0.10	1.44	0.70	1.06	1.80	2.00	2.17
05/11/2025 15:05	20.81	0.10	0.90	0.76	1.03	1.13	2.16	2.12
05/11/2025 15:06	20.81	0.10	1.87	0.59	0.99	2.34	1.68	2.03
05/11/2025 15:07	20.81	0.10	0.82	0.73	1.03	1.02	2.09	2.10
05/11/2025 15:08	20.81	0.10	0.69	0.75	1.00	0.86	2.15	2.05
05/11/2025 15:09	20.81	0.10	0.88	0.72	0.97	1.10	2.06	1.98
05/11/2025 15:10	20.81	0.10	0.44	0.76	0.97	0.55	2.17	2.00
05/11/2025 15:11	20.82	0.10	0.67	0.76	0.99	0.83	2.17	2.03
05/11/2025 15:12	20.82	0.10	0.89	0.76	0.98	1.11	2.18	2.02
05/11/2025 15:13	20.82	0.10	0.81	0.75	0.96	1.01	2.16	1.96
05/11/2025 15:14	20.84	0.10	0.47	0.78	1.03	0.58	2.21	2.12
05/11/2025 15:15	20.85	0.10	0.65	0.74	1.01	0.81	2.10	2.07
05/11/2025 15:16	20.84	0.10	-0.23	0.67	0.72	-0.29	1.90	1.49
05/11/2025 15:17	20.77	0.11	0.72	0.57	0.45	0.90	1.63	0.92
05/11/2025 15:18	20.77	0.11	-1.27	0.64	0.48	-1.58	1.81	0.97
05/11/2025 15:19	20.77	0.12	0.37	0.31	0.52	0.46	0.89	1.06
Min	20.76	0.08	-1.27	0.31	0.34	-1.58	0.89	0.70
Max	20.85	0.12	8.91	0.85	1.22	11.14	2.44	2.49
Mean	20.79	0.10	0.88	0.69	0.81	1.10	1.98	1.66

Appendix 4
Trace Species (Sampling Measurement & Results)

Appendix 5
Trace Species (Sampling Measurement & Results)

Certificate of Analysis

Report No.: 25-09824-1

Issue No.: 1

Date of Issue: 21/11/2025

Customer Details: CES Environmental Instruments Ltd, Bretby Business Park, Ashby Road, Burton on Trent, Staffordshire, DE15 0YZ

Customer Contact: Jane Fowkes

Customer Order No.: 12622

Customer Reference: Not Supplied

Quotation Reference: Q25-07745

Description: 5 liquid samples, 2 solid samples

Date Received: 10/11/2025

Date Started: 11/11/2025

Date Completed: 21/11/2025

Test Methods: Details available on request (refer to SOP code against relevant result/s)

Notes: None



Approved By: Joanne Dewhurst, Operational Manager

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service.

This certificate shall not be reproduced except in full without the prior written approval of the laboratory.

Observations and interpretations are outside of the scope of UKAS accreditation.

Results reported herein relate only to the items supplied to the laboratory for testing.

Results on an Interim Report are not dry-weight corrected.

Where the laboratory is not responsible for the sampling, results apply to the sample(s) as they were received.

The laboratory shall not be responsible for any information that is supplied by the customer that may affect the validity of results.



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Results Summary

Report No.: 25-09824-1

Customer Reference: Not Supplied

Customer Order No: 12622

Customer Sample No	10720/45	10720/46	10720/47	10720/48	10720/49	10720/50A	10720/50B
RPS Sample No	333305	333306	333307	333308	333309	333310	333311
Sample Matrix	SOLUTION	SOLUTION	FILTER	SOLUTION	SOLUTION	SOLUTION	FILTER
Sampling Date	05/11/2025	05/11/2025	05/11/2025	05/11/2025	05/11/2025	05/11/2025	05/11/2025

Determinand	CAS No	Codes	SOP	RL	Units						
volume of sample supplied		U	N/A	n/a	ml	203	101		207	101	88
nickel	7440-02-0	UM	M31	0.5	ug			< 0.5			< 0.5
nickel	7440-02-0	UM	M31	0.1	ug						< 0.1
nickel	7440-02-0	UM	M31	0.3	ug/L	< 0.3	< 0.3		1.0	< 0.3	

Deviating Samples

Report No.: 25-09824-1

Customer Reference: Not Supplied

Customer Order No: 12622

Our policy on Deviating Samples has been implemented in accordance with UKAS Policy on Deviating Samples (TPS63). RPS is not responsible for the integrity of samples as received, unless RPS personnel performed the sampling. Samples submitted may be declared to be deviating. Where applicable the analysis method remains UKAS accredited, however results reported for a deviating sample may be compromised. Where no sampling date was supplied, samples have been declared to be deviating. If the date can be supplied, results may be reissued if assessed not deviating. Where the sample container used was unsuitable or broken, the sample is flagged as deviating and re-sampling/re-submission may be required.

RPS No.	Customer No.	Customer ID	Date Sampled	Containers Received	Deviating	Reason for Deviation
333305	10720/45		05/11/2025	Container	No	
333306	10720/46		05/11/2025	Container	No	
333307	10720/47		05/11/2025	Container	No	
333308	10720/48		05/11/2025	Container	No	
333309	10720/49		05/11/2025	Container	No	
333310	10720/50A		05/11/2025	Container	No	
333311	10720/50B		05/11/2025	Container	No	

Report No.: 25-09824-1

Key Code	Description
N	Not Accredited Test
U	UKAS Accredited Test - UKAS accreditation is only implied if the report carries the UKAS logo
UF	UKAS Flexible Scope Test
M	MCERTS Accredited Test - MCERTS accreditation is only implied if the report carries the MCERTS logo
O	Marine Management Organisation (MMO) Validated
SN	Subcontracted to approved laboratory not accredited for the test
SU	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
SIN	Subcontracted to internal RPS Group laboratory not accredited for the test
SIU	Subcontracted to internal RPS Group laboratory UKAS Accredited for the test
SIM	Subcontracted to internal RPS Group laboratory MCERTS/UKAS Accredited for the test
I/S (in results)	Insufficient Sample
U/S (in results)	Unsuitable Sample
S/C (in results)	See Comments
ND (in results)	Not Detected
L (in results)	Result is outside normal limits

Please note that all samples will be destroyed 4 WEEKS after the report has been issued.

Note: Sample retention may be subject to agreement with the customer for particular projects

Certificate Notes	Description
Note 1	This test report shall not be reproduced except in full, without written approval of the Laboratory.
Note 2	Unless otherwise stated, results are not corrected for analytical recoveries.
Note 3	Samples were taken by the customer and, unless otherwise stated, sampling locations were not supplied.
Note 4	Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
Note 5	Unless otherwise stated, method D9 conditioning temperatures are 180°C for pre-weigh and 160°C for re-weigh. The PDF version of the certificate is the definitive copy and the Excel version is uncontrolled and provided for information only.
Note 6	

Note: Where the following information is included in this certificate, it has usually been supplied by the customer: Customer Sample ID, Sample Location, Sampling Date and Sample Air Volumes. The laboratory shall not be responsible for any information that is supplied by the customer that may affect the validity of results.

Report No.: 25-09824-1

Determinand	CAS No	Media	SOP	% Recovery	% Uncertainty
acetaldehyde	75-07-0	tube	A40	98	16.2
benzaldehyde	100-52-7	tube	A40	100	19.4
butyraldehyde	123-72-8	tube	A40	92	11.5
formaldehyde	50-00-0	tube	A40	97	12.8
hexanal	66-25-1	tube	A40	89	11
propionaldehyde	123-38-6	tube	A40	96	12.6
valeraldehyde	110-62-3	tube	A40	93	12.3
ammonia	7664-41-7	sulphuric acid solution	A6	n/a	8.9
chlorine	7782-50-5	sodium hydroxide solution	C27	n/a	15.2
hydrogen bromide	10035-10-6	sulphuric acid solution	C27	n/a	10.9
hydrogen chloride	7647-01-0	deionised water	C27	n/a	7.9
hydrogen chloride	7647-01-0	sulphuric acid solution	C27	n/a	13.3
hydrogen fluoride	7664-3-3	sodium hydroxide solution	C27	n/a	7.9
sulphur dioxide	7446-09-5	hydrogen peroxide solution	C27	n/a	7.7
nitrogen oxide	10102-43-9	potassium permanganate solution	C27	n/a	11.7
particulates	n/a	filter	D9	n/a	12.2
particulates	n/a	wash solution	D9	n/a	14.8
formaldehyde	50-00-0	deionised water	M103	n/a	23.7
2,4- & 2,6-toluene diisocyanate (TDI)	n/a	filter	M119	n/a	8.6
hexamethylene diisocyanate (HDI)	822-06-0	filter	M119	n/a	5.6
methylene diphenyl diisocyanate (MDI)	101-68-8	filter	M119	n/a	11.8
hydrogen sulphide	7783-06-4	zinc acetate solution	M120	n/a	4.2
antimony	7440-36-0	filter	M31	n/a	10.3
arsenic	7440-38-2	filter	M31	n/a	17.1
cadmium	7440-43-9	filter	M31	n/a	12.1
chromium	7440-47-3	filter	M31	n/a	17.1
cobalt	7440-48-4	filter	M31	n/a	13.1
copper	7440-50-8	filter	M31	n/a	14
lead	7439-92-1	filter	M31	n/a	9.8
manganese	7439-96-5	filter	M31	n/a	17.5
nickel	7440-02-0	filter	M31	n/a	14.4
thallium	7440-28-0	filter	M31	n/a	15.3
tin	7440-31-5	filter	M31	n/a	18.5
vanadium	7440-62-2	filter	M31	n/a	12.1
zinc	7440-66-6	filter	M31	n/a	15.2
antimony	7440-36-0	nitric acid wash	M31	n/a	10.3
arsenic	7440-38-2	nitric acid wash	M31	n/a	17.1
cadmium	7440-43-9	nitric acid wash	M31	n/a	12.1
chromium	7440-47-3	nitric acid wash	M31	n/a	17.1
cobalt	7440-48-4	nitric acid wash	M31	n/a	13.1
copper	7440-50-8	nitric acid wash	M31	n/a	14
lead	7439-92-1	nitric acid wash	M31	n/a	9.8
manganese	7439-96-5	nitric acid wash	M31	n/a	17.5
nickel	7440-02-0	nitric acid wash	M31	n/a	14.4
selenium	7782-49-2	nitric acid wash	M31	n/a	15.1
thallium	7440-28-0	nitric acid wash	M31	n/a	15.3
tin	7440-31-5	nitric acid wash	M31	n/a	18.5
vanadium	7440-62-2	nitric acid wash	M31	n/a	12.1
zinc	7440-66-6	nitric acid wash	M31	n/a	15.2
antimony	7440-36-0	nitric/peroxide solution	M31	n/a	5.9
arsenic	7440-38-2	nitric/peroxide solution	M31	n/a	6.8
cadmium	7440-43-9	nitric/peroxide solution	M31	n/a	6.3
chromium	7440-47-3	nitric/peroxide solution	M31	n/a	7.2
cobalt	7440-48-4	nitric/peroxide solution	M31	n/a	5.2
copper	7440-50-8	nitric/peroxide solution	M31	n/a	6.8
lead	7439-92-1	nitric/peroxide solution	M31	n/a	8.6
manganese	7439-96-5	nitric/peroxide solution	M31	n/a	9.6
nickel	7440-02-0	nitric/peroxide solution	M31	n/a	5.5
selenium	7782-49-2	nitric/peroxide solution	M31	n/a	8.7
thallium	7440-28-0	nitric/peroxide solution	M31	n/a	7.7
tin	7440-31-5	nitric/peroxide solution	M31	n/a	5.8
vanadium	7440-62-2	nitric/peroxide solution	M31	n/a	6.7
zinc	7440-66-6	nitric/peroxide solution	M31	n/a	11.9
1,2,4-trimethylbenzene	95-63-6	tube	O8	88	8.1
1,3,5-trimethylbenzene	108-67-8	tube	O8	92	7.7
2-ethyltoluene	611-14-3	tube	O8	91	8.4
3- & 4-ethyltoluene	n/a	tube	O8	91	8.4
benzene	71-43-2	tube	O8	90	13.9
butyl acetate	123-86-4	tube	O8	90	10.3
decane	124-18-5	tube	O8	97	6.7
dichloromethane	75-09-2	tube	O8	88	24
ethyl acetate	141-78-6	tube	O8	n/a	n/a
ethyl benzene	100-41-4	tube	O8	92	9.8
heptane	142-82-5	tube	O8	94	10.5
hexane	110-54-3	tube	O8	n/a	n/a
limonene	138-86-3	tube	O8	93	13
m- & p-xylene	n/a	tube	O8	90	9.3
methyl isobutyl ketone (MIBK)	108-10-1	tube	O8	86	10
methyl tert-butyl ether (MTBE)	1634-04-4	tube	O8	92	15
o-xylene	95-47-6	tube	O8	86	9.9
propylbenzene	103-65-1	tube	O8	92	7.5
tetrachloroethylene	127-18-4	tube	O8	91	9.3
tetrahydrofuran (THF)	109-99-9	tube	O8	87	14.7
toluene	108-88-3	tube	O8	89	10.7
trichloroethylene	79-01-6	tube	O8	91	10.6
m- & p-cresol	n/a	tube	P1	n/a	11
m- & p-xylenol	n/a	tube	P1	n/a	11.9
o-cresol	95-48-7	tube	P1	n/a	10.8
o-xylenol	526-75-0	tube	P1	n/a	12
phenol	108-95-2	tube	P1	n/a	10.4

Certificate of Analysis

Report No.: 25-09825-1

Issue No.: 1

Date of Issue: 21/11/2025

Customer Details: CES Environmental Instruments Ltd, Bretby Business Park, Ashby Road, Burton on Trent, Staffordshire, DE15 0YZ

Customer Contact: Jane Fowkes

Customer Order No.: 12623

Customer Reference: Not Supplied

Quotation Reference: Q25-07745

Description: 1 liquid sample, 1 solid sample

Date Received: 10/11/2025

Date Started: 11/11/2025

Date Completed: 21/11/2025

Test Methods: Details available on request (refer to SOP code against relevant result/s)

Notes: None



Approved By: Joanne Dewhurst, Operational Manager

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service.

This certificate shall not be reproduced except in full without the prior written approval of the laboratory.

Observations and interpretations are outside of the scope of UKAS accreditation.

Results reported herein relate only to the items supplied to the laboratory for testing.

Results on an Interim Report are not dry-weight corrected.

Where the laboratory is not responsible for the sampling, results apply to the sample(s) as they were received.

The laboratory shall not be responsible for any information that is supplied by the customer that may affect the validity of results.



0605



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Unit 12, Waters Edge Business Park, Modwen Road, Salford, M5 3EZ. T +44 161 872 2443

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Results Summary

Report No.: 25-09825-1

Customer Reference: Not Supplied

Customer Order No: 12623

Customer Sample No	10720/S51	10720/S52
RPS Sample No	333312	333313
Sample Matrix	SOLUTION	FILTER
Sampling Date	05/11/2025	05/11/2025

Determinand	CAS No	Codes	SOP	RL	Units		
volume of sample supplied		U	N/A	n/a	ml	117	
nickel	7440-02-0	UM	M31	0.5	ug		< 0.5
nickel	7440-02-0	UM	M31	0.3	ug/L	< 0.3	

Deviating Samples

Report No.: 25-09825-1

Customer Reference: Not Supplied

Customer Order No: 12623

Our policy on Deviating Samples has been implemented in accordance with UKAS Policy on Deviating Samples (TPS63). RPS is not responsible for the integrity of samples as received, unless RPS personnel performed the sampling. Samples submitted may be declared to be deviating. Where applicable the analysis method remains UKAS accredited, however results reported for a deviating sample may be compromised. Where no sampling date was supplied, samples have been declared to be deviating. If the date can be supplied, results may be reissued if assessed not deviating. Where the sample container used was unsuitable or broken, the sample is flagged as deviating and re-sampling/re-submission may be required.

RPS No.	Customer No.	Customer ID	Date Sampled	Containers Received	Deviating	Reason for Deviation
333312	10720/S51		05/11/2025	Container	No	
333313	10720/S52		05/11/2025	Container	No	

Report No.: 25-09825-1

Key Code	Description
N	Not Accredited Test
U	UKAS Accredited Test - UKAS accreditation is only implied if the report carries the UKAS logo
UF	UKAS Flexible Scope Test
M	MCERTS Accredited Test - MCERTS accreditation is only implied if the report carries the MCERTS logo
O	Marine Management Organisation (MMO) Validated
SN	Subcontracted to approved laboratory not accredited for the test
SU	Subcontracted to approved laboratory UKAS Accredited for the test
SM	Subcontracted to approved laboratory MCERTS/UKAS Accredited for the test
SIN	Subcontracted to internal RPS Group laboratory not accredited for the test
SIU	Subcontracted to internal RPS Group laboratory UKAS Accredited for the test
SIM	Subcontracted to internal RPS Group laboratory MCERTS/UKAS Accredited for the test
I/S (in results)	Insufficient Sample
U/S (in results)	Unsuitable Sample
S/C (in results)	See Comments
ND (in results)	Not Detected
L (in results)	Result is outside normal limits

Please note that all samples will be destroyed 4 WEEKS after the report has been issued.

Note: Sample retention may be subject to agreement with the customer for particular projects

Certificate Notes	Description
Note 1	This test report shall not be reproduced except in full, without written approval of the Laboratory.
Note 2	Unless otherwise stated, results are not corrected for analytical recoveries.
Note 3	Samples were taken by the customer and, unless otherwise stated, sampling locations were not supplied.
Note 4	Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
Note 5	Unless otherwise stated, method D9 conditioning temperatures are 180°C for pre-weigh and 160°C for re-weigh. The PDF version of the certificate is the definitive copy and the Excel version is uncontrolled and provided for information only.
Note 6	

Note: Where the following information is included in this certificate, it has usually been supplied by the customer: Customer Sample ID, Sample Location, Sampling Date and Sample Air Volumes. The laboratory shall not be responsible for any information that is supplied by the customer that may affect the validity of results.

Report No.: 25-09825-1

Determinand	CAS No	Media	SOP	% Recovery	% Uncertainty
acetaldehyde	75-07-0	tube	A40	98	16.2
benzaldehyde	100-52-7	tube	A40	100	19.4
butyraldehyde	123-72-8	tube	A40	92	11.5
formaldehyde	50-00-0	tube	A40	97	12.8
hexanal	66-25-1	tube	A40	89	11
propionaldehyde	123-38-6	tube	A40	96	12.6
valeraldehyde	110-62-3	tube	A40	93	12.3
ammonia	7664-41-7	sulphuric acid solution	A6	n/a	8.9
chlorine	7782-50-5	sodium hydroxide solution	C27	n/a	15.2
hydrogen bromide	10035-10-6	sulphuric acid solution	C27	n/a	10.9
hydrogen chloride	7647-01-0	deionised water	C27	n/a	7.9
hydrogen chloride	7647-01-0	sulphuric acid solution	C27	n/a	13.3
hydrogen fluoride	7664-3-3	sodium hydroxide solution	C27	n/a	7.9
sulphur dioxide	7446-09-5	hydrogen peroxide solution	C27	n/a	7.7
nitrogen oxide	10102-43-9	potassium permanganate solution	C27	n/a	11.7
particulates	n/a	filter	D9	n/a	12.2
particulates	n/a	wash solution	D9	n/a	14.8
formaldehyde	50-00-0	deionised water	M103	n/a	23.7
2,4- & 2,6-toluene diisocyanate (TDI)	n/a	filter	M119	n/a	8.6
hexamethylene diisocyanate (HDI)	822-06-0	filter	M119	n/a	5.6
methylene diphenyl diisocyanate (MDI)	101-68-8	filter	M119	n/a	11.8
hydrogen sulphide	7783-06-4	zinc acetate solution	M120	n/a	4.2
antimony	7440-36-0	filter	M31	n/a	10.3
arsenic	7440-38-2	filter	M31	n/a	17.1
cadmium	7440-43-9	filter	M31	n/a	12.1
chromium	7440-47-3	filter	M31	n/a	17.1
cobalt	7440-48-4	filter	M31	n/a	13.1
copper	7440-50-8	filter	M31	n/a	14
lead	7439-92-1	filter	M31	n/a	9.8
manganese	7439-96-5	filter	M31	n/a	17.5
nickel	7440-02-0	filter	M31	n/a	14.4
thallium	7440-28-0	filter	M31	n/a	15.3
tin	7440-31-5	filter	M31	n/a	18.5
vanadium	7440-62-2	filter	M31	n/a	12.1
zinc	7440-66-6	filter	M31	n/a	15.2
antimony	7440-36-0	nitric acid wash	M31	n/a	10.3
arsenic	7440-38-2	nitric acid wash	M31	n/a	17.1
cadmium	7440-43-9	nitric acid wash	M31	n/a	12.1
chromium	7440-47-3	nitric acid wash	M31	n/a	17.1
cobalt	7440-48-4	nitric acid wash	M31	n/a	13.1
copper	7440-50-8	nitric acid wash	M31	n/a	14
lead	7439-92-1	nitric acid wash	M31	n/a	9.8
manganese	7439-96-5	nitric acid wash	M31	n/a	17.5
nickel	7440-02-0	nitric acid wash	M31	n/a	14.4
selenium	7782-49-2	nitric acid wash	M31	n/a	15.1
thallium	7440-28-0	nitric acid wash	M31	n/a	15.3
tin	7440-31-5	nitric acid wash	M31	n/a	18.5
vanadium	7440-62-2	nitric acid wash	M31	n/a	12.1
zinc	7440-66-6	nitric acid wash	M31	n/a	15.2
antimony	7440-36-0	nitric/peroxide solution	M31	n/a	5.9
arsenic	7440-38-2	nitric/peroxide solution	M31	n/a	6.8
cadmium	7440-43-9	nitric/peroxide solution	M31	n/a	6.3
chromium	7440-47-3	nitric/peroxide solution	M31	n/a	7.2
cobalt	7440-48-4	nitric/peroxide solution	M31	n/a	5.2
copper	7440-50-8	nitric/peroxide solution	M31	n/a	6.8
lead	7439-92-1	nitric/peroxide solution	M31	n/a	8.6
manganese	7439-96-5	nitric/peroxide solution	M31	n/a	9.6
nickel	7440-02-0	nitric/peroxide solution	M31	n/a	5.5
selenium	7782-49-2	nitric/peroxide solution	M31	n/a	8.7
thallium	7440-28-0	nitric/peroxide solution	M31	n/a	7.7
tin	7440-31-5	nitric/peroxide solution	M31	n/a	5.8
vanadium	7440-62-2	nitric/peroxide solution	M31	n/a	6.7
zinc	7440-66-6	nitric/peroxide solution	M31	n/a	11.9
1,2,4-trimethylbenzene	95-63-6	tube	O8	88	8.1
1,3,5-trimethylbenzene	108-67-8	tube	O8	92	7.7
2-ethyltoluene	611-14-3	tube	O8	91	8.4
3- & 4-ethyltoluene	n/a	tube	O8	91	8.4
benzene	71-43-2	tube	O8	90	13.9
butyl acetate	123-86-4	tube	O8	90	10.3
decane	124-18-5	tube	O8	97	6.7
dichloromethane	75-09-2	tube	O8	88	24
ethyl acetate	141-78-6	tube	O8	n/a	n/a
ethyl benzene	100-41-4	tube	O8	92	9.8
heptane	142-82-5	tube	O8	94	10.5
hexane	110-54-3	tube	O8	n/a	n/a
limonene	138-86-3	tube	O8	93	13
m- & p-xylene	n/a	tube	O8	90	9.3
methyl isobutyl ketone (MIBK)	108-10-1	tube	O8	86	10
methyl tert-butyl ether (MTBE)	1634-04-4	tube	O8	92	15
o-xylene	95-47-6	tube	O8	86	9.9
propylbenzene	103-65-1	tube	O8	92	7.5
tetrachloroethylene	127-18-4	tube	O8	91	9.3
tetrahydrofuran (THF)	109-99-9	tube	O8	87	14.7
toluene	108-88-3	tube	O8	89	10.7
trichloroethylene	79-01-6	tube	O8	91	10.6
m- & p-cresol	n/a	tube	P1	n/a	11
m- & p-xylenol	n/a	tube	P1	n/a	11.9
o-cresol	95-48-7	tube	P1	n/a	10.8
o-xylenol	526-75-0	tube	P1	n/a	12
phenol	108-95-2	tube	P1	n/a	10.4

Appendix 6
Analysis (Laboratory Results)

CES Environmental Instruments Ltd						
GAS ANALYSER CALIBRATION SHEET						
Gas Analyser Calibration		Client	CBE Plus Ltd		Date	05/11/2025
Instrument Type	Horiba	Job Number	10720		Test	Auth
Quality No.	C153	Site	Stripping Line		Test Period	1 hour

Range - Nitrogen (N2)	%
Range - Carbon Dioxide (CO2)	20.00 %
Range - Oxygen (O2)	25.00 %
Range - Carbon Monoxide (CO)	ppm
Range - Nitric Oxide (NO)	100.00 ppm
Range - Sulphur Dioxide (SO2)	ppm
Range - C ₃ H ₈	ppm

Zero Gas - Nitrogen (N ₂)	99.999 %	Certificate Number:	VC2772779
Span Gas 1 - Carbon Dioxide (CO ₂)	17.94 %	Certificate Number:	40-92544-002
Span Gas 1 - Oxygen (O ₂)	19.97 %	Certificate Number:	40-92544-002
Span Gas 1 - Carbon Monoxide (CO)	ppm	Certificate Number:	
Span Gas 1 - Nitric Oxide (NO)	82.9 ppm	Certificate Number:	40-05364-002
Span Gas 1 - Sulphur Dioxide (SO ₂)	ppm	Certificate Number:	
Span Gas 1 - C ₃ H ₈	ppm	Certificate Number:	

Span Gas 2 - Carbon Dioxide (CO ₂)	%	Certificate Number:	
Span Gas 2 - Oxygen (O ₂)	%	Certificate Number:	
Span Gas 2 - Carbon Monoxide (CO)	ppm	Certificate Number:	
Span Gas 2 - Nitric Oxide (NO)	ppm	Certificate Number:	
Span Gas 2 - Sulphur Dioxide (SO ₂)	ppm	Certificate Number:	
Span Gas 2 - C ₃ H ₈	ppm	Certificate Number:	

Date	05/11/2025	Time	14:00:00	Amb Press (mbar)	992	Amb Temp. (°C)	13
Calibration Check - Pre-Sampling							
Test Gas Entered - Instrument	CO ₂	O ₂	CO	NO	SO ₂	C3H8	
Zero Reading	0.00	0.00		0.00			
Span Gas 1 Reading	17.94	19.97		82.90			
Zero Reading	0.01	0.01		0.10			
Ambient Air							
Analyser T ₉₀ Response (sec)				38.00			
<2x Repeatability @ zero	0.01	0.01	0.00	0.10	0.00	0.00	
Leak Check - Pre-Sampling							
Test Gas Entered - Probe	CO ₂	O ₂	CO	NO	SO ₂	C3H8	
Zero Reading	0.01	0.02		0.10			
Span Gas 1 Reading	17.96	19.98		83.00			
Span Gas 2 Reading							
Ambient Air							
Zero Drift (%)	0.05	0.08		0.10			
Span Drift (%)	0.10	0.04		0.10			
Date	05/11/2025	Time	15:30:00	Amb Press (mbar)	992	Amb Temp. (°C)	14
Calibration Check - Mid / Post Sampling							
Test Gas Entered - Instrument	CO ₂	O ₂	CO	NO	SO ₂	C3H8	
Zero Reading	0.03	0.02		0.20			
Span Gas 1 Reading	17.98	20.00		83.00			
Span Gas 2 Reading							
Ambient Air							
Zero Drift (%)	0.15	0.08		0.20			
Span Drift (%)	0.20	0.12		0.10			

Checks completed by: P.Broxham Page 1 of 1

Appendix 7
Calibration Certificates

Certificate of Calibration

Date of Issue: 9th September 2024

Certificate No. CES2673

Page 1 of 2

CES Environmental Instruments Ltd
Bretby Business Park, Ashby Road
Burton-on-Trent, Staffordshire, DE15 0YZ
Tel: 01283 216334 Fax: 01283 550939



Certified By

Instrument Details

Instrument Type	Manual Sample Train
Instrument Make	Apex
Instrument Serial No.	1303012
Dry Gas Meter Serial No.	2012-014440
Quality No.	C286
Calibration Date	09 09 25
Calibrated By Name	D.Woolley

Ambient Conditions

Air Temperature (°C)	23
Relative Humidity (%)	65
Barometric Pressure P_b	752.3 mm Hg 1003 mbar

Instruments used to undertake calibration

Manometer Type FC012	UKAS Certificate No. 29299	(Qu. No. C082)
Manometer Type FC012	UKAS Certificate No. 27300	(Qu. No. C081)
Barometer Type 104	UKAS Certificate No. K55933P	(Qu. No. C138)
RIS Supercal XT	UKAS Certificate No. 10345	(Qu. No. C014)
Gallus Dry Gas Meter	UKAS Certificate No. N039726	(Qu. No. C333)

Pressure Measurement

The instrument under test provides an indication by means of a liquid manometer corresponding to an applied pressure. The liquid manometer was calibrated against a FCO12 Digital Micromanometer whose calibration is traceable to UKAS standards. The readings of the reference instrument and the instrument under test were taken simultaneously and compared.

Dry Gas Meter Calibration

A calibrated dry gas meter was connected to the sampling inlet of the Control Unit. A volume of air is pulled through the sampling system. The measured value shown on the calibrated dry gas meter is then compared to the indicated value on the dry gas meter contained within the control unit.

Temperature Calibration

The instrument under test provides an indication by means of an Electronic Display corresponding to an applied simulated temperature. The Display was calibrated against a reference temperature instrument whose calibration is traceable to UKAS standards. The readings of the reference instrument and the instrument under test were taken simultaneously and compared.

Certificate of Calibration

Date of Issue: 9th September 2025

Certificate No. CES2673

CES Environmental Instruments Ltd
Bretby Business Park, Ashby Road
Burton-on-Trent, Staffordshire, DE15 0YZ
Tel: 01283 216334 Fax: 01283 550939

page 2 of 2

Certified By

Instrument Details

Instrument Type
Instrument Make
Instrument Serial No
Dry Gas Meter Serial No
Quality No
Calibration Date

Manual Sample Train
Andersen
1303012
2012-014440
C286
09 09 25

Ambient Conditions

Air Temperature (°C) 23
Relative Humidity (%) 65
Barometric Pressure (P_b) 752.3 mm Hg
1003 mbar

Calibration Details

Orifice manometer setting	Calibrated Dry Gas Meter	Dry Gas Meter (UUT) Volume	Uncertainty Volume (l) ±	Temperatures				Time min
				Calibrated Gas Meter Temp	Inlet t _i	Dry Gas Outlet t _o	Average t _m	
0.3	35.0	35.2	0.7	24.0	24.0	24.0	24.0	20.0
15	242.8	259.2	4.6	22.0	25.0	25.0	25.0	20.0
25	314.0	335.4	5.9	22.0	24.0	24.0	24.0	20.0
50	440.9	470.2	8.3	23.0	28.0	28.0	28.0	20.0
100	654.2	680.4	12.3	24.0	28.0	28.0	28.0	20.0

ΔH setting mm H2O @ 5"Hg	V		ΔH@	
	V _w P _b (t _m + 273)	[P _b + (ΔH + 13.6)] (t _w + 273)	1170 ΔH P _b (t _b + 273)	$\left[\frac{(T_w + 273)}{V_w} \right]^2$
0.3	0.9943			45.2470
15	0.9853			46.2242
25	0.9894			46.2186
50	0.9667			46.5752
100	0.9775			42.5964
Average	0.9826			45.3723
As Found	0.9773			44.8958

Manometer 1 (ΔH)					Manometer 2 (ΔP)				
Required Pressure mmH ₂ O/Pa	Reference Pressure Pa	Reference Pressure mmH ₂ O	Display Pressure mmH ₂ O (ΔH)	Uncertainty mmH ₂ O =	Required Pressure mmH ₂ O/Pa	Reference Pressure Pa	Reference Pressure mmH ₂ O	Display Pressure mmH ₂ O (ΔP)	Uncertainty mmH ₂ O =
0.0 / 0.0	0.0	0.0	0.0	0.00	0.0 / 0.0	0.0	0.0	0.0	0.00
5.0 / 49.0	49.0	5.0	5.0	0.60	5.0 / 49.0	49.0	5.0	5.0	0.60
10.0 / 98.1	98.1	10.0	10.0	0.76	10.0 / 98.1	98.1	10.0	10.0	0.76
15.0 / 147.1	147.1	15.0	15.0	1.06	15.0 / 147.1	147.1	15.0	15.0	1.06
20.0 / 196.1	196.1	20.0	20.0	1.10	20.0 / 196.1	196.1	20.0	20.0	1.10
25.0 / 245.2	245.2	25.0	25.0	1.50	25.0 / 245.2	245.2	25.0	25.0	1.50
50.0 / 490.3	490.3	50.0	50.0	2.20	50.0 / 490.3	490.3	50.0	50.0	2.20
100.0 / 980.1	980.1	100.0	100.0	2.20	100.0 / 980.1	980.1	100.0	100.0	2.20
150.0 / 1471.0	1471.0	150.0	150.0	3.60	150.0 / 1471.0	1471.0	150.0	150.0	3.60
200.0 / 1961.3	1961.3	200.0	200.0	4.50	200.0 / 1961.3	1961.3	200.0	200.0	4.50
250.0 / 2451.1	2451.1	250.0	250.0	4.70	250.0 / 2451.1	2451.1	250.0	250.0	4.70

Test °C	Display 1 °C	Display 2 °C	Display 3 °C	Display 4 °C	Display 5 °C	Display 6 °C	Display 7 °C	Uncertainty °C
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00
20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	0.37
50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	0.93
100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	2.13
200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	4.05
300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	5.80
700.0	700.0	700.0	700.0	700.0	700.0	700.0	700.0	13.13

Appendix 8

Uncertainty Calculations

Uncertainty calculation for Gaseous Measurement Oxygen EN14789

V2.2 Jul-08

Limit value	n/a	%vol	Calibration gas	19.97%vol
Measured concentration	20.79	%vol	Full Scale	25%vol

Performance characteristics	Value			specification
Response time	38.00	seconds		< 200 s
Logger sampling interval	60	seconds		
Measurement period	60	minutes		
Number of readings in measurement	60	Assuming 1 minute collected over 1 hour		
Repeatability at zero	0.015	% by volume	stdev	<0.2 % range
Repeatability at span level	0.014	% by volume	stdev	<0.4 % range
Deviation from linearity	0.13	% vol	+/-	<0.3 % volume
Zero drift (during measurement period)	0.08	% vol at zero level	+/-	<2% of volume / 24hr
Span drift (during measurement period)	0.12	% vol at span level	+/-	<2% volume/24hr
volume or pressure flow dependence	0	% of fs / 10l/h	+ 5 l/h	<1% range
atmospheric pressure dependence	0.3	% of fs/kPa	+ 2kPa	< 1.5 % range
ambient temperature dependence	-0.07	% by volume /10K	+ 15K	<0.3% volume 10 K
CO ₂ (% vol)	15	0.07	% by volume per 15	
NO (mg/m3)	300	0.02	% by volume per 300	
NO ₂ (mg/m3)	30	0	% by volume per 30	
Combined interference	0.56	% range		<2% range
Dependence on voltage	0.1	% by volume /10V	+ - 5%	< 0.1%vol /10 volt
Losses in the line (leak)	2	% of value		< 2% of value
Uncertainty of calibration gas	1	% of value		

Effect of drift
0.04 % vol
0.14 % value

	range of variation from conditions at calibration		
	min	max	value at calib
flow	18	30	24 l/h
pressure	99.20	99.20	99.20 kPa
temp	286.00	287.00	286.00 K
CO ₂ range	0.1	0.1	0 % vol
NO range	0.5	1.6	0 mg/m3
NO ₂ range	0.0	0.1	0 mg/m3
Voltage	108	112	110 V

Performance characteristic	Uncertainty	Value of uncertainty quantity	% vol
Standard deviation of repeatability at zero	u _{r0}	for mean	Only use rep at span
Standard deviation of repeatability at span level	u _{rs}	for mean	0.00
Lack of fit	u _{fit}		0.02
Drift	u _{odr}		0.02
volume or pressure flow dependence	u _{spres}		0.00
atmospheric pressure dependence	u _{apres}		0.00
ambient temperature dependence	u _{temp}		0.00
CO ₂			0.00
NO			0.00
NO ₂			0.00
Combined interference (from mcerts)			0.08
dependence on voltage	u _{volt}		0.01
losses in the line (leak)	u _{leak}		0.24
Uncertainty of calibration gas	u _{calib}		0.12

Use largest of sum of all positive or all negative influences		
0.00 all +ves	Criteria sum <2% value 0.415884163	
0 all -ves		
0.00 largest		
Value to use for interference uncertainty		
u _{int}	0.00	

Measurement uncertainty	20.79	%vol
Combined uncertainty	0.27	%vol
% of value	1.30	%
Coverage factor k =	2	
Expanded uncertainty	expressed with a level of confidence of 95%	2.60 % of value
Expanded uncertainty	expressed with a level of confidence of 95%	0.54 % vol

Requirement for SRM is that Uncertainty should be < 6% of value, on a dry gas basis

Verified

Uncertainty calculation for Gaseous Measurement NOx EN14792

Limit value		mg/m ³ (corrected) NOx	Cal gas conc	170.1937 mg.m ⁻³ (NO ₂)
Measured concentration	0.81	ppm		
Measured concentration	1.66	mg/m ³ (101.3kPa, 273K)	Full Scale	205.3 mg/m ³ (NO ₂)
Measured concentration	1.67	mg/m ³ (Corrected)		
NO/NO ₂ ratio	100.00		Gas	NO
			Full Scale	100 ppm
			Cal gas conc	82.9 ppm
			Conversion	2.053

Correction for reference conditions					
	ref	O ₂ , %	Moisture, %	Pressure, KPa	Temperature, K
	measured	0.00	0.00	101.30	273.00
	Uncert	0.05	0.80	101.30	273.00
Factors		1.00	1.01	1.00	1.00
Uncertainty in factor		0.00	0.00	0.00	0.00
Correction Factor		1.01	uf	0.004	

Effect of drift	0.20 mg/m ³
	0.10 % full scale

Performance characteristics	Value		specification
Response time	38.00	seconds	180.000
Logger sampling interval	60	seconds	
Measurement period	60	minutes	
Number of readings in measurement	60	Assuming 1 minute collected over 1 hour	
Repeatability at zero	0.05	% full scale	<1 % range
Repeatability at span level	0.0623	% full scale	<2 % range
Deviation from linearity(lack of fit)	0.7	% of value	<2 % range
Zero drift	0.20	mg/m ³	<2% range / 24hr
Span drift	0.10	mg/m ³	<2% range/24hr
volume or pressure flow dependence	0	%of full scale/kPa	<2 % / kPa
atmospheric pressure dependence	0	%of value /kPa	<3% / kPa
ambient temperature dependence	0.3	% full scale/10K	<3% range / 10 K
NH ₃ (mg/m ³)	20	0.0	mg/m ³
CO ₂ (% vol)	15	0.2	mg/m ³
H ₂ O (% vol)	30	0.0	mg/m ³
dependence on voltage	0.1	% full scale/10V	<2% range
losses in the line (leak)	1	% of value	< 0.1%vol /10 volt
Converter efficiency	98.72	%	>95%
Uncertainty of calibration gas	1	% of value	< 2% of value

	min	max	value at calib
flow	18	30	24 l/hr
pressure	99.20	99.20	99.20 kPa
temp	286.00	287.00	286.00 K
NH ₃ range	0	0	0 mg/m ³
CO ₂ range	0.1	0.1	0 %vol
H ₂ O range	0	0	0 %vol
Voltage	104.5	115.5	110 V

Performance characteristic	Uncertainty	Value of uncertainty quantity	mg/m ³
Standard deviation of repeatability at zero	u ₀	for mean	use rep at span
Standard deviation of repeatability at span level	u _{rs}	for mean	0.02
Lack of fit	u _{fit}		0.01
Drift	u _{odr}		0.12
volume or pressure flow dependence	u _{apres}		0.00
atmospheric pressure dependence	u _{apres}		0.00
ambient temperature dependence	u _{temp}		0.00
NH ₃	u _{interf}		0.00
CO ₂ (% vol)	u _{interf}		0.00
H ₂ O (% vol)	u _{interf}		0.00
Dependence on voltage	u _{volt}		0.07
losses in the line (leak)	u _{leak}		0.01
Uncertainty of calibration gas	u _{calib}		0.01
converter efficiency	u _{coeff}		0.01
Uncertainty in factor	uf		0.01

Use largest of sum of all positive or all negative influences	0.00 all +ves	Criteria sum <4% range 0.033190167
	0 all -ves	
	0.00 largest	
Value to use for interference uncertainty	u _{int}	0.00

Measurement uncertainty			
Combined uncertainty		0.14	mg/m ³
Expanded uncertainty	k = 2	0.27	mg/m ³
Uncertainty corrected to std conds		0.27	mg/m ³
Expanded uncertainty	expressed with a level of confidence of 95%	#VALUE!	% ELV
Expanded uncertainty	expressed with a level of confidence of 95%	0.27	mg.m ⁻³
Expanded uncertainty	expressed with a level of confidence of 95%	16.36	% value

Requirement in standard is for uncertainty to be < 10% at ELV at standard conditions

Verified

Uncertainty calculation for BS EN 14385 Determination of mass concentration of metal, Reference method

Measurement Equation

$$c = \frac{m}{V} f_c$$

Limit value (ELV)		mg.m ⁻³	Reference oxygen		% by volume
Measured concentration	0.0008	mg.m ⁻³	(at reference conditions)		

Measured Quantities	Symbol	Value	Standard uncertainty	Units	Uncertainty as percentage	Uncertainty at lv	Requirement of std
Sampled Volume Gas	V _m	1.1390	uV _m	0.001 m ³	0.09		<=2%
Sampled gas Temperature	T _m	297.00	uT _m	2 k	2.00		<2.5 k
Sampled gas Pressure	p _m	99.2	uρ _m	1.0 kPa	1.00		<=1%
Sampled gas Humidity	H _m	0	uH _m	1 % by volume	1.00		<=1%
Oxygen content	O _{2,m}		uO _{2,m}	0.1 % by volume	#DIV/0!		<=5%
Concentration in impinger 1+2	C	1.000	uC	0.028 µg/l	2.81		<=15%
Impinger solution volume 1+2	VS	0.207	uVS	0.001 l	0.48		<2%
Concentration in impinger 3	C	0.300	uC	0.008 µg/l	2.81		<=15%
Impinger solution volume 3	VS	0.101	uVS	0.001 l	0.99		<2%
Concentration Filter	C	0.600	uC	0.044 µg	7.35		<=15%
Mass Metal	m	0.8373	um	0.054 mg	6.40	#DIV/0!	<10% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter							
Leak	L	2 %			2.00		<=2%
Analytical Uncertainty (P)	Ua	7.35 %					
Analytical Uncertainty (V)	Ua	2.81 %					

Intermediate calculations

Factor for std cond	fs	0.90			
uncertainty components	symbol	sensitivity coeff	u	(in units of fs)	
	p _m	0.009	0.009		
	H _m	0.009	0.009		
	T _m	0.003	0.006		
	ufs		0.014		1.57
Corrected volume	V	1.03	uV	0.016 m ³	V = V _m f _s 1.57
Factor for O2 correction	fc	1.00			
uncertainty components	symbol	sensitivity coeff	u		
	O _{2,m}	0.05	0.005		f _c = $\frac{21 - O_{2,ref}}{21 - O_{2,m}}$
Factor for O2 Correction	ufc	1.00	0.005		0.48

Parameter	Value	Units	Sensitivity coeff	Uncertainty contribution	Uncertainty as %
Corrected Volume (standard conditi	V	1.025 m ³	0.00	0.00001 mg.m ⁻³	1.57 %
Mass	m	0.000837 mg	0.98	0.00005 mg.m ⁻³	6.40 %
Factor for O2 Correction	fc	1.00	0.00	0.00000 mg.m ⁻³	0.48 %
Leak	L	0.00 mg.m ⁻³	1.00	0.00001 mg.m ⁻³	1.15 %
Combined uncertainty				0.00 mg.m⁻³	

Expanded uncertainty as percentage of measured value	13.41	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.0001	mg.m ⁻³	
Expanded uncertainty as percentage of limit value	#DIV/0!	% ELV	

Verified

Note - Sampled gas humidity, temp Uncertainty at lv