

Document No.: ARLATL1080925 / 20251724
 Visit No: 1
 Year: 2025
 Office: Trim

EPA Licence No.: W0004-04
 Licence Holder: South Dublin County Council, F1
 Facility Location: Arthurstown Landfill
 Rev.No: 1



Report Title	Air Emissions Compliance Monitoring Emissions
Company address	Air Scientific Ltd., 32 DeGranville Court, Dublin road, Trim, Co. Meath
Stack Emissions Testing Report Commissioned by	South Dublin County Council
Facility Name	Arthurstown Landfill
Contact Person	Mr. Ben Frost
EPA Licence Number	W0004-04
Licence Holder	South Dublin County Council, F1
Stack Reference Number	F1
Dates of the Monitoring Campaign	08/09/2025
Job Reference Number	ARLATL1080925 / 20251724
Report Written By	Amanda Sheridan
Report Approved by	Dr. Brian Sheridan
Stack Testing Team	Dr. John Casey, Stephen O' Carroll
Report Date	06/10/2025
Report Type	Test Report Compliance Monitoring
Version	1
Signature of Approver	 Brian Sheridan Technical Manager



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Sulphur Dioxide Trend 69

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1. Executive Summary

I. Monitoring Objectives

Overall Aim of the monitoring Campaign

The aim of the monitoring campaign was to demonstrate compliance with a set of emission limit values as specified in the site licence.

Special Requirements

There were no special requirements.

Target Parameters

Carbon Monoxide (CO)
Oxides of Nitrogen (NOx) as NO ₂
Total Volatile Organic Carbon (TOC)
Hydrogen Chloride (HCL)
Hydrogen Fluoride (HF)
Sulphur Dioxide (SO ₂)
Stack Gas Temperature
Volume (m ³ .h ⁻¹)
Oxygen (O ₂)
Carbon Dioxide (CO ₂)

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Emission Limit Values

Emission Limit Values / Mass Emissions Limit Values	mg.m ⁻³	kg.h ⁻¹
CO	50	-
NOx as NO ₂	150	-
TOC	10	-
HCL	50	-
HF	5	-
SO ₂	-	-
Stack Gas Temperature	-	-
Volume (m ³ .h ⁻¹)	-	-

Reference Conditions

Reference Condition	Value
Oxygen Reference %	3
Temperature K	273.15
Total Pressure kPa	101.3
Moisture Correction	Yes

Executive Summary

Overall Results

Parameter	Concentration	Result	MU +/-	Blanks	Limit	Compliant	Mass Emission	Result	Run 1	Dates	Time on	Time off	O2 Ref. (%)	Accreditation	LOD
	Units						Units		Limit						
CO EN15058:2017	mg.m ⁻³	16.42	-	-	50	N/A	kg.h ⁻¹	-	-	08/09/2025	12:20:00	12:51:00	3	Yes	<1.7
NOx EN14792:2017	mg.m ⁻³	75.78	-	-	150	N/A	kg.h ⁻¹	-	-	08/09/2025	12:20:00	12:51:00	3	Yes	<1.8
TVOC EN12619:2013	mg.m ⁻³	3.93	-	-	10	N/A	kg.h ⁻¹	-	-	08/09/2025	12:22:30	12:56:30	3	Yes	<0.8
HCL EN1911:2010	mg.m ⁻³	<0.42	0.02	<0.09	50	N/A	kg.h ⁻¹	-	-	08/09/2025	12:45:00	13:16:00	3	Yes	0.25
HF EN15713:2006	mg.m ⁻³	<0.42	0.02	<0.09	5	N/A	kg.h ⁻¹	-	-	08/09/2025	12:45:00	13:16:00	3	Yes	0.25
SO ₂ CEN/TS 17021:2017	mg.m ⁻³	6.71	-	-	-	N/A	kg.h ⁻¹	-	-	08/09/2025	12:20:00	12:51:00	3	Yes	<6.1
Oxygen (%) EN14789:2017	% v/v	10.19	0.33	-	-	N/A	-	-	-	08/09/2025	12:20:00	12:51:00	3	Yes	-
CO ₂ ISO12039:2001	% v/v	8.5	0.3	-	-	N/A	-	-	-	08/09/2025	12:20:00	12:51:00	3	Yes	-
Stack Gas Temperature	K	1288.15	-	-	-	N/A	-	-	-	08/09/2025	12:34:00	12:37:00	3	Yes	-
Stack Gas Velocity EN16911:2013	m.s ⁻¹	-	-	-	-	N/A	-	-	-	08/09/2025	12:34:00	12:37:00	3	N/A	-
Volumetric Flow Rate	m ³ .h ⁻¹	-	-	-	-	N/A	-	-	-	-	-	-	3	N/A	-
Volumetric Flow Rate (Ref)	m ³ .h ⁻¹	-	-	-	-	N/A	-	-	-	-	-	-	3	N/A	-

Accreditation details

Air Scientific Limited	INAB319T
External Analytical Laboratory	UKAS0605
Other	-



Executive Summary

Monitoring Dates & Times

Parameter	Run	Location ID	Sampling Dates	Sampling Time On	Sampling Time Off	Duration (mins.)
Carbon Monoxide (CO)	Run 1	F1	08/09/2025	12:20:00	12:51:00	00:31:00
	Run 2	-	-	-	-	-
	Run 3	-	-	-	-	-
Oxides of Nitrogen (NOx) as NO ₂	Run 1	F1	08/09/2025	12:20:00	12:51:00	00:31:00
	Run 2	-	-	-	-	-
	Run 3	-	-	-	-	-
Total Volatile Organic Carbon (VOC)	Run 1	F1	08/09/2025	12:22:30	12:56:30	00:34:00
	Run 2	-	-	-	-	-
	Run 3	-	-	-	-	-
Hydrogen Chloride (HCL)	Run 1	F1	08/09/2025	12:45:00	13:16:00	00:31:00
	Run 2	-	-	-	-	-
	Run 3	-	-	-	-	-
Hydrogen Fluoride (HF)	Run 1	F1	08/09/2025	12:45:00	13:16:00	00:31:00
	Run 2	-	-	-	-	-
	Run 3	-	-	-	-	-
Sulphur Dioxide (SO ₂)	Run 1	F1	08/09/2025	12:20:00	12:51:00	00:31:00
	Run 2	-	-	-	-	-
	Run 3	-	-	-	-	-
Oxygen (%)	Run 1	F1	08/09/2025	12:20:00	12:51:00	00:31:00
	Run 2	-	-	-	-	-
	Run 3	-	-	-	-	-
Stack Gas Temperature		F1	08/09/2025	12:34:00	12:37:00	00:03:00
Stack Gas Velocity		F1	08/09/2025	12:34:00	12:37:00	00:03:00
Carbon Dioxide (%)	Run 1	F1	08/09/2025	12:20:00	12:51:00	00:31:00
	Run 2	-	-	-	-	-
	Run 3	-	-	-	-	-

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Monitoring, Equipment & Analytical Methods

Parameter	Monitoring				Analysis	
	Standard	Technical Procedure	Accredited Testing	Testing Lab	Analytical Technique	INAB Analysis
Carbon Monoxide (CO)	EN15058:2017	SOP 2004	Yes	AirSci	NCIR By Horiba PG-250	-
Oxides of Nitrogen (NOx)	EN14792:2017	SOP 2002	Yes	AirSci	Chemiluminescence	-
Total Volatile Organic Carbon (TOC)	EN12619:2013	SOP 2009	Yes	AirSci	Flame Ionisation Detection	-
Hydrogen Chloride (HCL)	EN1911:2010	SOP 2014	Yes	RPS	Ion Chromatography	-
Hydrogen Fluoride (HF)	EN15713:2006	SOP 2024	Yes	RPS	Ion Chromatography	-
Sulphur Dioxide (SO ₂)	CEN/TS 17021:2017	SOP 2046	Yes	AirSci	NDIR Absorption	-
Oxygen (%)	EN14789:2017	SOP 2008	Yes	AirSci	Paramagnetic	-
Carbon Dioxide	ISO12039:2001	SOP 2045	Yes	AirSci	NDIR	-
Stack Gas Temperature	EN16911:2013	SOP 2005	Yes	AirSci	Thermocouple	-
Stack Gas Velocity	EN16911:2013	SOP 2005	N/A	AirSci	Pitot tubes	-

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List of Equipment

ID	Item of Equipment	Manufacturer	Serial No.
ASLTM12EQ511	3010 MiniFID	Signal Instruments	17852
ASLTM12EQ513	Horiba PG2500 Portable Gas Analyser	Horiba	ZVM969TT
ASLTM13EQ509	10 metre industrial heated sample line	Neptech	13B088
ASLTM13EQ510	20 metre heated sample line	Neptech	13C088
ASLTM14EQ511	Buhler Sample Gas Cooler	Buhler Technologies	100094941
ASLTM14EQ519	S TYPE PITOT TUBE	Tecora	33011
ASLTM23EQ503	K type thermocouple	TC Direct	109710/1C
ASLTM22EQ511	Mass flow meter	Siargo	N/A

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Sampling Deviations

Parameter	Deviation
Standard ID	-

Reference Documents

Risk Assessment (RA)	SOP1011
Site Review (SR)	SOP1015
Site Specific Protocol (SSP)	SOP1015

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Suitability of sampling location

General Information	Value
Permanent/Temporary	Temporary
Inside/ Outside	Outside

Platform Details		
Irish EPA Technical Guidance Note AG1 / BS EN 15259 Platform Requirements	Value	Comment
Sufficient Working area to manipulate probe and measuring instruments	Yes	-
Platform has 2 handrails (approx. 0.5m & 1.0 m high)	Yes	-
Platform has vertical base boards (approx. 0.25 m high)	Yes	-
Platform has chains / self closing gates at top of ladders	Yes	-
There are no obstructions present which hamper insertion of sampling equipment	No	-
Safe Access Available	Yes	-
Easy Access Available	Yes	-

Sampling Location / Platform Improvement Recommendations
None

BSEN 15259 Homogeneity Test Requirements
1: There is no requirement to perform a BSEN15259 Homogeneity Test on this stack

Process details

Parameter	
Process status	Normal
Capacity (per/hour) (if applicable)	APN
Continuous or Batch Process	Continuous
Feedstock	Process Air
Abatement System	No
Abatement Systems Running Status	Normal
Fuel	LFG
Plume Appearance	No
Other information	None

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Licensee			
Reg. number	W0004-04	Contractor	Air Scientific Ltd.
Site Contact	Mr. Ben Frost	Contractor's contact	Amanda Sheridan
Role		Role	-
Signature		Signature	-

Emissions point		-				
Type of process		Load of process	Abatement system		List of Solvents used per process	
Rotogravure Printing	-	as normal	Bag filter	-	-	-
Cement Plant	-		Electrostatic precipitator	-	-	-
Electrical generation	-		Cyclone	-	-	-
Steam boiler	-		Thermal oxidiser	-	-	-
Other	Yes		Active carbon bed	-	-	-
			NSCR	-	-	-
			SCR	-	-	-
			Dry scrubber	-	-	-
			Wet scrubber	-	-	-
			Lime injection	-	-	-
			Biofilter	-	-	-
			None	-	-	-
			Other:	-	-	-

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Stack diagram



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2. APPENDICES

II. Appendix I - Monitoring Personnel & Equipment

Stack Emissions Monitoring Personnel

Team Leader	Name	Dr. John Casey
	Qualifications	PhD. (Eng.), MSc. (Agr.), B. Agr. Sc.
	System approval	Air Scientific Limited Approved
		-
Team Leader	Name	Stephen O' Carroll
	Qualifications	Bachelor of Eng. in Manufacturing & Design Eng.
	System approval	Air Scientific Limited Approved
		-
Team Leader	Name	-
	Qualifications	-
	System approval	-
		-

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III. Appendix II - Stack Details & flow characteristics

Preliminary stack survey calculations

General Stack Details		
Stack details	Units	Value
Date of survey		08/09/2025
Time of survey		12:34
Type		Circular
Stack Diameter / Depth, D	m	-
Stack Width, W	m	-
Average Stack Gas Temp., Ta	C	1015
Average Static Pressure, P static	kPa	0.1
Average Barometric Pressure, Pb	kPa	-
Type of Pitot		-
Are Water Droplets Present?		-
Average Pitot Tube Calibration Coeff, Cp		-
Negative flow		-
Highly homogeneous flow stream/gas velocity		Yes

Sample Port Size	mm	20
Initial Pitot Leak Check	Pa	-
Final Pitot Leak Check	Pa	-
Orientation of Duct		Vertical
Pitot Tube Cp		0.998
Number of Lines Available		1
Number of Lines Used		1

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Sampling Line A						
Point	Distance to duct (m)	Pa	Temp °C	Velocity (m/s)	Oxygen (%)	Angle of Swirl
1	-	-	-	-	-	-
2	-	-	-	-	-	-
3	-	-	-	-	-	-
4	-	-	-	-	-	-
5	-	-	-	-	-	-
6	-	-	-	-	-	-
7	-	-	-	-	-	-
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	-	-	-	-	-	-
Average	-	-	-	-	-	-
Min	-	-	-	-	-	-
Max	-	-	-	-	-	-

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Sampling Line B						
Point	Distance to duct (m)	Pa	Temp °C	Velocity (m/s)	Oxygen (%)	Angle of Swirl
1	-	-	-	-	-	-
2	-	-	-	-	-	-
3	-	-	-	-	-	-
4	-	-	-	-	-	-
5	-	-	-	-	-	-
6	-	-	-	-	-	-
7	-	-	-	-	-	-
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	-	-	-	-	-	-
Average	-	-	-	-	-	-
Min	-	-	-	-	-	-
Max	-	-	-	-	-	-

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Component	Conc. ppm	Conc. Dry % v/v	Conc. Wet % v/v	Molar Mass
Carbon Dioxide CO ₂	-	8.49	-	44.01
Oxygen O ₂	-	10.18	-	32
Nitrogen N ₂	-	81.33	-	28.1
Moisture (H ₂ O)	-	-	9.6	18.02
Reference Conditions				
Temperature	°C	273.15		
Total Pressure	kPa	101.3		
Moisture	%	-		
Oxygen (Dry)	%	3		

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Stack Gas Composition & Molecular Weights								
Component	Molar Mass M	Density Kg/m ³ p	Conc. Dry % v/v	Dry Volume Fraction r	Dry Conc. kg/m ³ pi	Conc. wet % v/v	Wet Volume Fraction r	Wet Conc. kg/m ³ pi
Carbon Dioxide CO ₂	44.01	1.96	8.49	0.0849	0.17	7.67	0.08	0.15
Oxygen O ₂	32	1.43	10.18	0.1018	0.15	9.2	0.09	0.13
Nitrogen N ₂	28.1	1.25	81.33	0.8133	1.02	73.52	0.74	0.92
Moisture (H ₂ O)	18.02	0.8	-	-	-	9.6	0.1	0.08
where $p=M/22.41$								
$\pi = r \times p$								

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Calculation of Stack Gas Densities		
Determinant	Units	Result
Dry Density (STP), P STD	kg.m ⁻³	1.332
Wet Density (STP), P STW	kg.m ⁻³	1.286
Dry Density (Actual), P Actual	kg.m ⁻³	-
Average wet Density (Actual), P Actual W	kg.m ⁻³	-
Where		
P STD = sum of component concentrations, kg/m ³ (excluding water vapour)		
$P_{STW} = (P_{STD} + p_{H_2O}) / (1 + (p_{H_2O} / 0.8036))$		
$P_{actual} = P_{STD} \times (T_{STP} / (P_{STP})) \times (P_a / T_a)$		
$P_{actual\ W} \text{ (at each sampling point)} = P_{STW} \times (T_s / P_s) \times (P_a / T_a)$		

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Sampling Plane Validation Criteria	Value	Units	Requirement	Compliance	Method
Lowest Differential Pressure	-	Pa	>5 Pa	N/A	EN16911:2013
Lowest Gas Velocity	-	m/s	-	N/A	-
Highest Gas Velocity	-	m/s	-	N/A	-
Ratio of Above	-	:1	<3:1	N/A	EN16911:2013
Mean Velocity	-	m/s	-	N/A	-
Angle of flow with regard to duct axis	-	degrees	< 15	N/A	EN16911:2013
No local negative flow	-	-	-	N/A	-
Homogeneous flow stream/gas velocity	-	-	-	N/A	-

Calculation of stack Gas Velocity, V	
Velocity at Traverse Point, $V = K_{cp} * \text{Sqrt}((2 * DP) / \text{Density})$	-
Where	
K_{pt} = Pitot tube calibration coefficient	-
Compressibility correction factor, assumed at a constant 0.998	0.998

Gas Volumetric Flowrate	Units	Result
Gas Volumetric Flow Rate (Actual)	$\text{m}^3.\text{h}^{-1}$	-
Gas Volumetric Flow Rate (STP, Wet)	$\text{m}^3.\text{h}^{-1}$	-
Gas Volumetric Flowrate (STP, Dry)	$\text{m}^3.\text{h}^{-1}$	-
Gas Volumetric Flowrate REF to Oxygen	$\text{m}^3.\text{h}^{-1}$	-

Standard uncertainty of velocity (m/s)	-	Expanded uncertainty of velocity (m/s)	-	Volume flow rate expanded uncertainty (m^3/hr)	-
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IV. Appendix 3 - Individual parameter sampling details and results

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Carbon Monoxide Quality Assurance

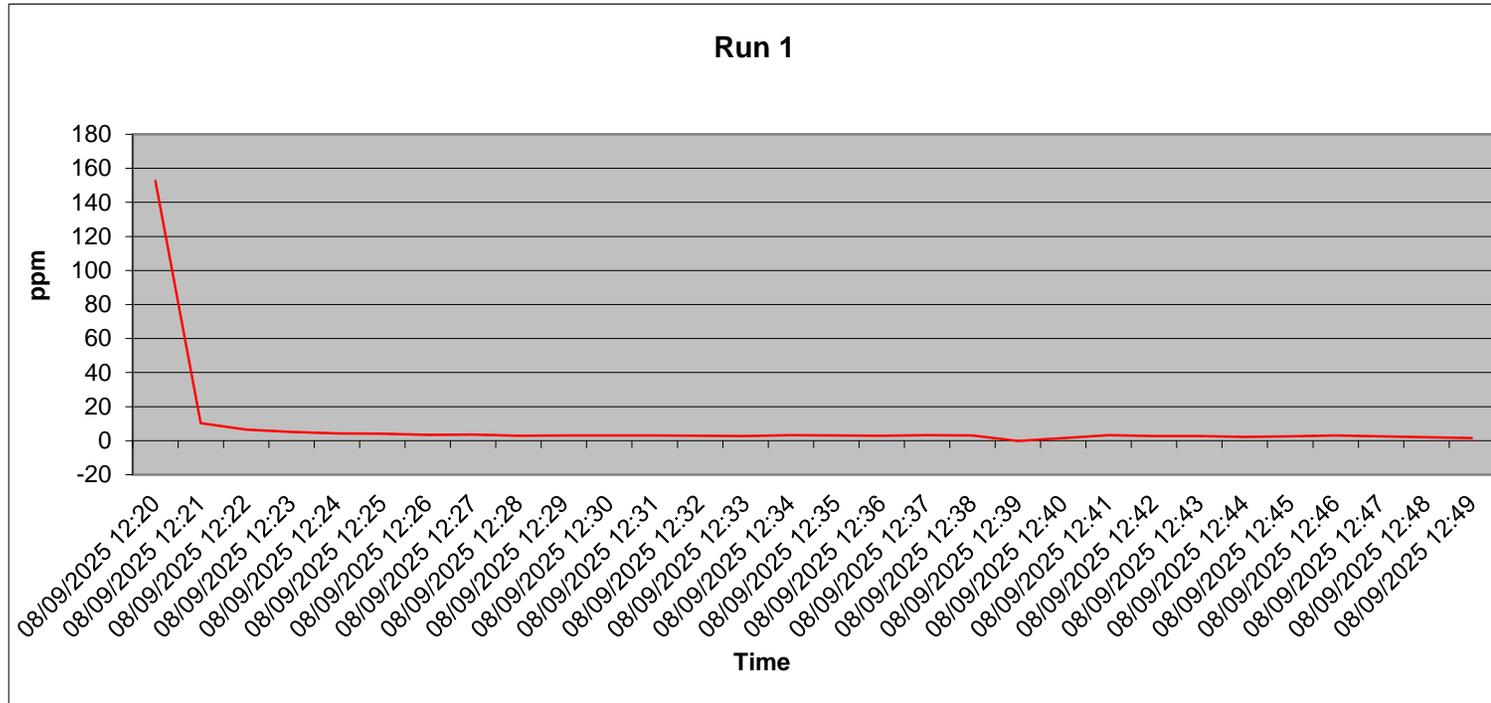
Sampling Details				
Stack ID	F1			
Parameter	Units	Run 1	Run 2	Run 3
Sampling Times	-	12:20	-	-
Sampling Dates	-	08/09/2025	-	-
Instrument Range	ppm	200	-	-
Span Gas Value	ppm	153.2	-	-
Acceptable Gas Range	-	Y	-	-
Quality Assurance	Units	Run 1	Run 2	Run 3
Conditioning Unit Temperature	°C	2	-	-
Average Temperature	< °C	2	-	-
Allowable Temperature	-	4	-	-
Temperature Acceptable	-	Y	-	-
Pump flow rate	l/min	0.5	-	-
Zero Drift	Units	Run 1	Run 2	Run 3
Zero Down Sampling Line (Pre)	ppm	0.1	-	-
Zero Down Sampling Line (Post)	ppm	0.1	-	-
Zero Drift	ppm	0	-	-
Allowable Zero Drift (5%)	ppm	7.66	-	-
Zero Drift Acceptable	Y <2%/Y 2-5%/N>5%	Y <2%	-	-
Zero Drift	%	0	-	-
Span Drift	Units	Run 1	Run 2	Run 3
Span Down Sampling Line (Pre)	ppm	153.2	-	-
Span Down Sampling Line (Post)	ppm	154.8	-	-
Span Drift	ppm	-1.6	-	-
Allowable Span Drift (5%)	ppm	7.66	-	-
Span Drift Acceptable (Y/N)	Y <2%/Y 2-5%/N>5%	Y <2%	-	-
Span Drift	%	-1.04	-	-
Leak Check	Units	Run 1	Run 2	Run 3
Span Gas Conc.	ppm	153.2	-	-
Recorded Conc. down Line	ppm	153.8	-	-
Leak check acceptable (< 2%)	(Y/N)	Y <2%	-	-
Test Conditions	Units	Run 1	Run 2	Run 3
Run Ambient Temperature Range	°C	12	-	-

Carbon Monoxide Results & Sampling Details

Parameter	Units	Run 1	Run 2	Run 3	Mean
Concentration	mg.m ⁻³	9.83	-	-	-
Uncertainty	mg.m ⁻³	-	-	-	-
Mass Emission	kg.h ⁻¹	-	-	-	-

General Sampling Information	
Parameter	Value
Standard	EN15058
Technical Procedure	SOP2004
Probe material	SS
Filtration Type/Size	PTFE
Heated Head Filter Used	Yes
Heated Line Temperature	180
Span Gas Reference Number	ASLTM24ING523
Span Gas Expiry Date	29-Sept
Span Gas Start Pressure (bar)	80
Gas Cylinder Concentration (ppm)	153.2
Span Gas Uncertainty (%)	<2
Zero Gas Type	N
Number of Sampling Lines Used	1
Number of Sampling Points Used	1
Sample Point I.D's	F1
Reference Conditions	
Temperature (K)	273.15
Pressure (kPa)	101.3
Gas (Wet or Dry)	Dry
Oxygen	3

Carbon Monoxide Trend



Carbon Monoxide Measurement Uncertainty

Measured Quantities	Units	Run 1	Run 2	Run 3
Certified Range of Analyser	ppm	1.36-1000	-	-
Operational Range of Analyser	ppm	200	-	-
Measured Reading	ppm	7.86	-	-
Measured Quantities				
Measured Quantities	Units	Run 1	Run 2	Run 3
Nonlinearity	%	0.9	-	-
Temperature Dependent Zero drift	%	0.14	-	-
Temperature Dependent Span drift	%	-0.12	-	-
Cross-sensitivity	%	0.08	-	-
Leak	%	0	-	-
Calibration Gas Uncertainty	%	<2	-	-
Parameter				
Parameter	Units	Run 1	Run 2	Run 3
Combined uncertainty	mg.m ⁻³	0.96	-	-
Expanded uncertainty	mg.m ⁻³	1.91	-	-
Uncertainty corrected to std conds.	mg.m ⁻³	-	-	-
Expanded uncertainty expressed with a level of confidence of 95%	% of ELV	-	-	-
Expanded uncertainty expressed with a level of confidence of 95%	mg.m ⁻³	-	-	-
Expanded uncertainty expressed with a level of confidence of 95%	% of value	-	-	-
Requirement in standard is for uncertainty to be < 10% at ELV at standard conditions				

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Oxides of Nitrogen Quality Assurance

Sampling Details				
Stack ID	F1			
Parameter	Units	Run 1	Run 2	Run 3
Sampling Times	-	12:20	-	-
Sampling Dates	-	08/09/2025	-	-
Instrument Range	ppm	250	-	-
Span Gas Value	ppm	165	-	-
Acceptable Gas Range	-	Yes	-	-
Quality Assurance	Units	Run 1	Run 2	Run 3
Conditioning Unit Temperature	°C	2	-	-
Average Temperature	< °C	2	-	-
Allowable Temperature	-	4	-	-
Temperature Acceptable	-	Y	-	-
Pump flow rate	l/min	0.5	-	-
Zero Drift	Units	Run 1	Run 2	Run 3
Zero Down Sampling Line (Pre)	ppm	0.1	-	-
Zero Down Sampling Line (Post)	ppm	0.1	-	-
Zero Drift	ppm	0	-	-
Allowable Zero Drift (5%)	ppm	8.25	-	-
Zero Drift Acceptable	Y <2%/Y 2-5%/N >5%	Y <2%	-	-
Zero Drift	%	0	-	-
Span Drift	Units	Run 1	Run 2	Run 3
Span Down Sampling Line (Pre)	ppm	165	-	-
Span Down Sampling Line (Post)	ppm	164.2	-	-
Span Drift	ppm	0.8	-	-
Allowable Span Drift (5%)	ppm	8.25	-	-
Span Drift Acceptable (Y/N)	Y <2%/Y 2-5%/N >5%	Y <2%	-	-
Span Drift	%	0.48	-	-
Leak Check	Units	Run 1	Run 2	Run 3
Span Gas Conc.	ppm	165	-	-
Recorded Conc. down Line	ppm	165	-	-
Leak check acceptable (< 2%)	(Y/N)	Y <2%	-	-
Test Conditions	Units	Run 1	Run 2	Run 3
Run Ambient Temperature Range	°C	12	-	-

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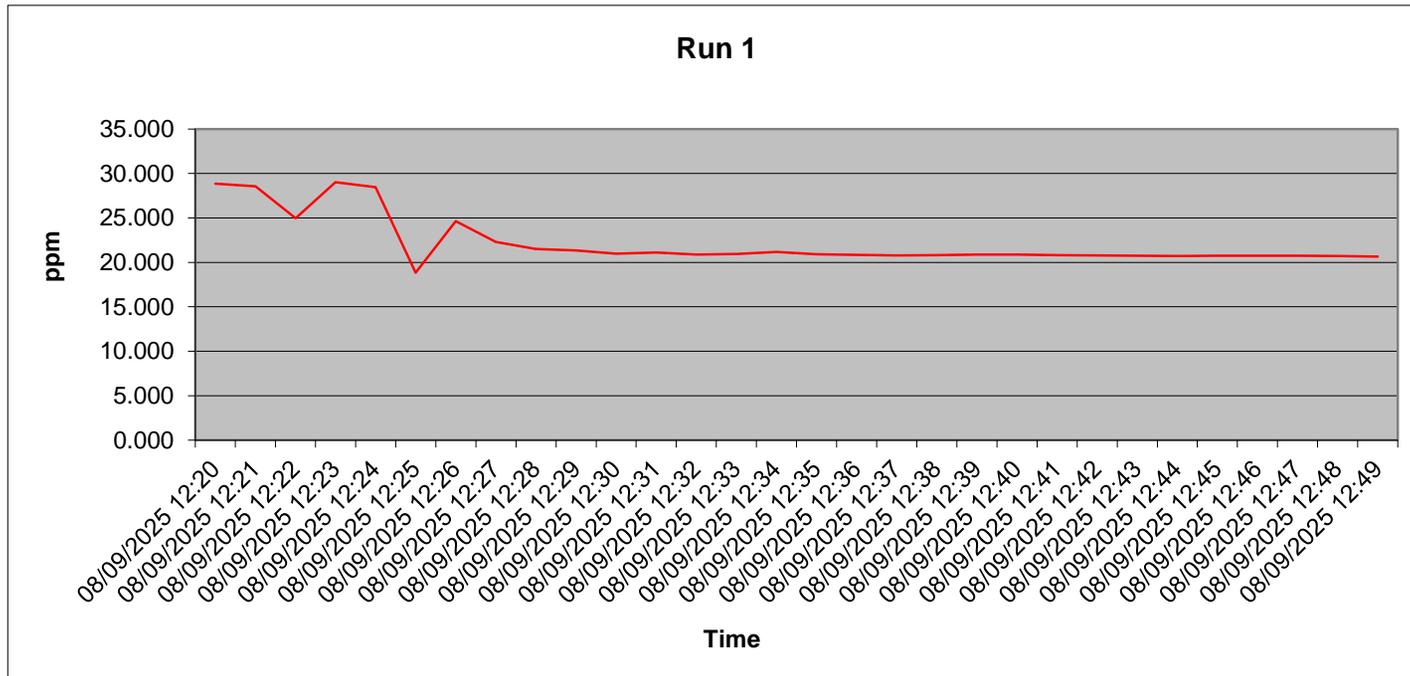
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Oxides of Nitrogen Results & Sampling Details

Parameter	Units	Run 1	Run 2	Run 3	Mean
Concentration	mg.m ⁻³	45.35	-	-	-
Uncertainty	mg.m ⁻³	-	-	-	-
Mass Emission	kg.h ⁻¹	-	-	-	-

General Sampling Information	
Parameter	Value
Standard	EN14792
Technical Procedure	SOP2002
Probe material	SS
Filtration Type/Size	PTFE
Heated Head Filter Used	Yes
Heated Line Temperature	180
Date & Result of last converter check	95.5 18/04/2025
Span Gas Reference Number	ASLTM23ING511
Span Gas Expiry Date	25-Dec
Span Gas Start Pressure (bar)	40
Gas Cylinder Concentration (ppm)	165
Span Gas Uncertainty (%)	<2
Zero Gas Type	N
Number of Sampling Lines Used	1
Number of Sampling Points Used	1
Sample Point I.D's	F1
Reference Conditions	
Temperature (K)	273.15
Pressure (kPa)	101.3
Gas (Wet or Dry)	Dry
Oxygen	3

Oxides of Nitrogen Trend



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Oxides of Nitrogen Measurement Uncertainty

Measured Quantities	Units	Run 1	Run 2	Run 3
Certified Range of Analyser	ppm	0.87-1000	-	-
Operational Range of Analyser	ppm	250	-	-
Measured Reading	ppm	22.09	-	-
Measured Quantities				
Measured Quantities	Units	Run 1	Run 2	Run 3
Nonlinearity	%	1.4	-	-
Temperature Dependent Zero drift	%	-0.04	-	-
Temperature Dependent Span drift	%	-0.25	-	-
Cross-sensitivity	%	0.5	-	-
Leak	%	0	-	-
Calibration Gas Uncertainty	%	<2	-	-
Mass Flow Controllers (Dilution) Uncertainty	%	<1	-	-
NOx Converter Efficiency	%	95.5	-	-
Parameter				
Parameter	Units	Run 1	Run 2	Run 3
Combined uncertainty	mg.m ⁻³	1.39	-	-
Expanded uncertainty	mg.m ⁻³	2.77	-	-
Uncertainty corrected to std conds.				
	mg.m ⁻³	-	-	-
Expanded uncertainty expressed with a level of confidence of 95%				
	% of ELV	-	-	-
Expanded uncertainty expressed with a level of confidence of 95%				
	mg.m ⁻³	-	-	-
Expanded uncertainty expressed with a level of confidence of 95%				
	% of value	-	-	-
Requirement in standard is for uncertainty to be < 10% at ELV at standard conditions				

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Total Volatile Organic Carbon Quality Assurance

Sampling Details				
Stack ID	F1			
Parameter	Units	Run 1	Run 2	Run 3
Sampling Times	-	12:22	-	-
Sampling Dates	-	08/09/2025	-	-
Instrument Range	ppm	100	-	-
Span Gas Value	ppm	81.2	-	-
Acceptable Gas Range	-	Y	-	-
Quality Assurance	Units	Run 1	Run 2	Run 3
Conditioning Unit Temperature	°C	193	-	-
Average Temperature	< °C	193	-	-
Allowable Temperature	-	Yes	-	-
Temperature Acceptable	-	180	-	-
Zero Drift	Units	Run 1	Run 2	Run 3
Zero Down Sampling Line (Pre)	ppm	0.1	-	-
Zero Down Sampling Line (Post)	ppm	0.1	-	-
Zero Drift	ppm	0	-	-
Allowable Zero Drift (5%)	ppm	4.06	-	-
Zero Drift Acceptable (Y/N)	Y <2%/Y 2-5%/N>5%	Y (<2%)	-	-
Zero Drift	%	0	-	-
Span Drift	Units	Run 1	Run 2	Run 3
Span Down Sampling Line (Pre)	ppm	81.2	-	-
Span Down Sampling Line (Post)	ppm	80.8	-	-
Span Drift	ppm	0.4	-	-
Allowable Span Drift (5%)	ppm	4.06	-	-
Span Drift Acceptable (Y/N)	Y <2%/Y 2-5%/N>5%	Y (<2%)	-	-
Span Drift (%)	%	0.49	-	-
Leak Check	Units	Run 1	Run 2	Run 3
Span Gas Conc.	ppm	81.2	-	-
Recorded Conc. down Line	ppm	80.8	-	-
Leak check acceptable (< 2%)	(Y/N)	Y (<2%)	-	-

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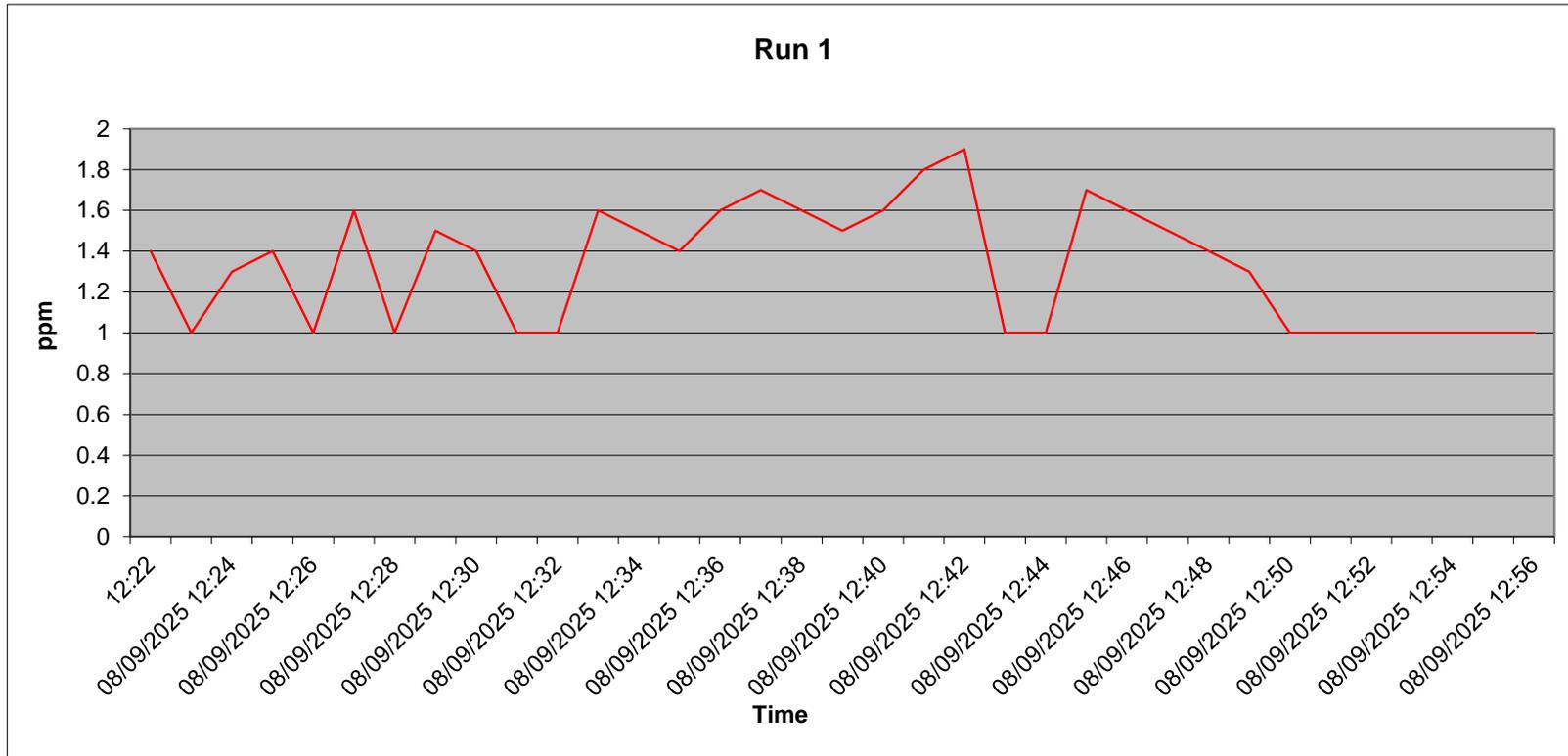
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Total Volatile Organic Carbon Results and Sampling Details

Parameter	Units	Run 1	Run 2	Run 3	Mean
Concentration	mg.m ⁻³	2.35	-	-	-
Uncertainty	mg.m ⁻³	-	-	-	-
Mass Emission	kg.h ⁻¹	-	-	-	-

General Sampling Information	
Parameter	Value
Standard	EN12619
Technical Procedure	SOP2009
Probe material	SS
Filtration Type/Size	PTFE
Heated Head Filter Used	Yes
Heated Line Temperature	180
Span Gas Reference Number	ASLTM23ING513
Span Gas Expiry Date	01/06/2028
Span Gas Start Pressure (bar)	30
Gas Cylinder Concentration (ppm)	81.2
Span Gas Uncertainty (%)	<2
Zero Gas Type	ZA
Number of Sampling Lines Used	1
Number of Sampling Points Used	1
Sample Point I.D's	F1
Reference Conditions	-
Temperature (K)	273.15
Pressure (kPa)	101.3
Gas (Wet or Dry)	Dry
Oxygen	3

Total Volatile Organic Carbon Trend



Total Volatile Organic Carbon Measurement Uncertainty

Measured Quantities	Units	Run 1	Run 2	Run 3
Certified Range of Analyser	ppm	0.5-1680	-	-
Operational Range of Analyser	ppm	100	-	-
Measured Reading	ppm	1.32	-	-
Measured Quantities				
Measured Quantities	Units	Run 1	Run 2	Run 3
Nonlinearity	%	0.068	-	-
Temperature Dependent Zero drift	%	0.3	-	-
Temperature Dependent Span drift	%	0.3	-	-
Cross-sensitivity	%	-	-	-
Leak	%	<2	-	-
Calibration Gas Uncertainty	%	<2	-	-
Parameter				
Parameter	Units	Run 1	Run 2	Run 3
Measurement uncertainty	mg.m ⁻³	-	-	-
Combined uncertainty	mg.m ⁻³	-	-	-
Expanded Uncertainty as % of Limit Value				
Expanded Uncertainty as % of Limit Value	%	-	-	-
Expanded uncertainty expressed with a level of confidence of 95%				
Expanded uncertainty expressed with a level of confidence of 95%	% of value	-	-	-
Expanded uncertainty expressed with a level of confidence of 95%	mg.m ⁻³	-	-	-
Requirement in standard is for uncertainty to be < 10% at ELV at standard conditions				

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Hydrogen Chloride Sampling Details & Results

Stack ID	F1	Run 1
Sample ID	F1 HCL/HF 1+2	mls
<i>Impinger 1 ID</i>	F1 HCL/HF 1+2	200
<i>Impinger 2 ID</i>	-	0
<i>Impinger 3 ID</i>	F1 HCL/HF 3	130
Time on	12:45	
Time off	13:16	
Leak Check Results		
Prior to test:	<0.01	l/min
Post Test:	<0.01	l/min
Sample Volume Flow Rate:	2.2	l/min
Standard Requirement:	<2	%
Test Result:	0	%
Test Status	Pass	
Calibration Details		
Pump Number:	-	
Calibration Unit:	ASLTM22EQ511	
Calibration Rate Before Test:	2.2	l/min
Calibration Rate After Test:	2.2	l/min
Average sample Volume:	2.2	l/min
Sample Test Time:	30	min
Pump Gas Temperature:	0	°C
Pump Sample Pressure:	101.3	kPa
Actual Sample Volume:	0.066	m ³
Normalised Gas Volume:	0.066	Nm ³

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Hydrogen Chloride Quality Assurance

Stack ID	F1	Run 1	Run 2	Run 3
Date	08/09/2025	-	-	-
Start time		12:45:00	-	-
Finish Time		13:16:00	-	-
Leak test results				
	Units	Run 1	Run 2	Run 3
Mean Sampling Rate	l/min	2.2	-	-
Pre-sampling leak rate	l/min	<0.01	-	-
Post-sampling leak rate	l/min	<0.01	-	-
Leak rate	l/min	0	-	-
Acceptable leak rate (<2%)	Y/N	Yes	-	-
Filtration				
Filter Material		N/A	-	-
Filter Size	mm	N/A	-	-
Max. Filter Temp	degrees	N/A	-	-
Absorbers Type	Glass/PTFE/ Other	PTFE	-	-
Absorption Solution		Di H2O	-	-
Absorption Efficiency				
Total Imp1 + Imp 2 + Imp 3	µg	16.5	-	-
Impinger 3	µg	6.5	-	-
Absorption efficiency	%	61	-	-
Acceptable Absorption Eff.	>95% (Y/N)	N	-	-
Blank sample				
Blank sample ID		HCL/HF B	-	-
Blank result	mg.m ⁻³	<0.09	-	-
Acceptable Blank	<10% ELV (Y/N)	Y	-	-
Testing laboratory				
Laboratory Name		UKAS0605	-	-
Test certificate Number		25-08135	-	-

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Hydrogen Chloride Results & Measurement Uncertainty

Stack ID	F1	Run 1
Date	-	
Start time	12:45	
Finish Time	13:16	
Results		
Laboratory Result	16.5	µg
Impinger final Volume	330	ml
Factor	-	
Concentration	0.02	mg
Sample Volume	0.066	Nm ³
Emissions Concentration	0.25	mg.m ⁻³
Mass Emissions	-	kg.h ⁻¹

Parameter	Units	Run 1	Run 2	Run 3	Mean
Combined Uncertainty	mg.m ⁻³	0.01	-	-	-
Expanded uncertainty as percentage of measured value	% of measured value	8	-	-	-
Expanded uncertainty in units of measurement	mg.m ⁻³	0.02	-	-	-
Expanded uncertainty as percentage of limit value	% Of ELV	0.04	-	-	-

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Hydrogen Fluoride Sampling Details & Results

Sampling Details		Run 1
Stack ID	F1	
Time on	12:45	
Time off	13:16	
Leak Check Results		
Prior to test:	0.01	l/min
Post Test:	0.01	l/min
Sample Volume Flow Rate:	2.2	l/min
Standard Requirement:	<2	%
Test Result:	0	%
Test Status	Pass	
Calibration Details		
Pump Number:	-	
Calibration Unit:	ASLTM22EQ511	
Calibration Rate Before Test:	2.2	l/min
Calibration Rate After Test:	2.2	l/min
Average sample Volume:	2.2	l/min
Sample Test Time:	30	min
Pump Gas Temperature:	0	°C
Pump Sample Pressure:	101.3	kPa
Actual Sample Volume:	0.066	m ³
Normalised Gas Volume:	0.066	Nm ³

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Hydrogen Fluoride Quality Assurance

Stack ID	F1	Run 1	Run 2	Run 3
Date	08/09/2025	-	-	-
Start time		12:45:00	-	-
Finish Time		13:16:00	-	-
Leak test results				
	Units	Run 1	Run 2	Run 3
Mean Sampling Rate	l/min	2.2	-	-
Pre-sampling leak rate	l/min	0.01	-	-
Post-sampling leak rate	l/min	0.01	-	-
Leak rate	l/min	0	-	-
Acceptable leak rate (<2%)	Y/N	Yes	-	-
Filtration				
Filter Material		N/A	-	-
Filter Size	mm	N/A	-	-
Max. Filter Temp	degrees	N/A	-	-
Absorbers Type	Glass/PTFE/ Other	Glass	-	-
Absorption Solution		Di-H2O	-	-
Absorption Efficiency				
Total Imp1 + Imp 2 + Imp 3	µg	16.5	-	-
Impinger 3	µg	7	-	-
Absorption efficiency	%	58	-	-
Acceptable Absorption Eff.	>95% (Y/N)	N	-	-
Blank sample				
Blank sample ID		HCL/HF B	-	-
Blank result	mg.m ⁻³	<0.09	-	-
Acceptable Blank	<10% ELV (Y/N)	Y	-	-
Testing laboratory				
Laboratory Name		UKAS0605	-	-
Test certificate Number		25-08135	-	-

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Hydrogen Fluoride Results & Measurement Uncertainty

Stack ID	F1	Run 1
Date	-	
Start time	12:45:00	
Finish Time	13:16:00	
Results		
Laboratory Result	16.5	µg
Impinger final Volume	330	ml
Factor	-	
Concentration	0.02	mg
Sample Volume	0.07	Nm ³
Emissions Concentration	0.25	mg.m ⁻³
Mass Emissions	-	kg.h ⁻¹

Parameter	Units	Run 1	Run 2	Run 3	Mean
Combined Uncertainty	mg.m ⁻³	0.01	-	-	-
Expanded uncertainty as percentage of measured value	% of measured value	8	-	-	-
Expanded uncertainty in units of measurement	mg.m ⁻³	0.02	-	-	-
Expanded uncertainty as percentage of limit value	% Of ELV	0.4	-	-	-

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Sulphur Dioxide Quality Assurance

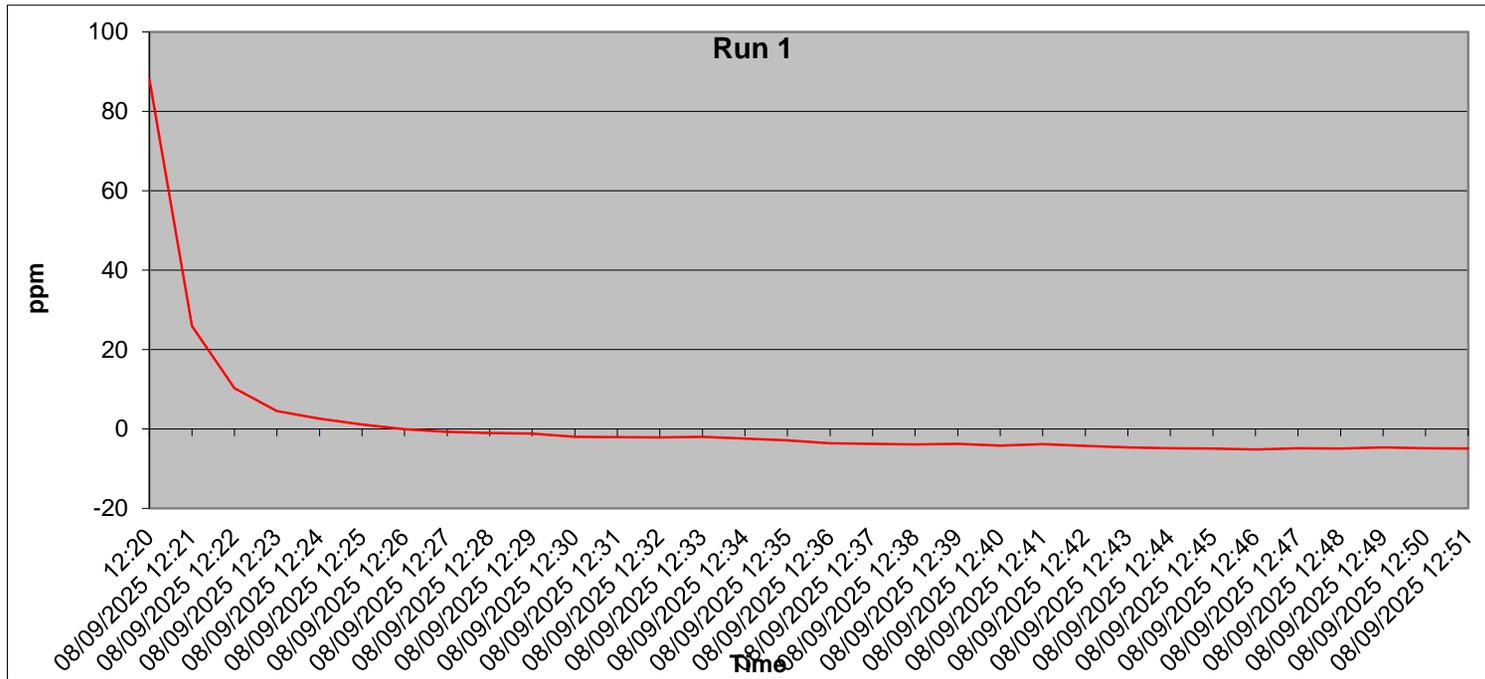
Sampling Details				
Stack ID	F1			
Parameter	Units	Run 1	Run 2	Run 3
Sampling Times	-	12:20	-	-
Sampling Dates	-	08/09/2025	-	-
Instrument Range	ppm	200	-	-
Span Gas Value	ppm	155.4	-	-
Acceptable Gas Range	-	Y	-	-
Quality Assurance	Units	Run 1	Run 2	Run 3
Conditioning Unit Temperature	°C	2	-	-
Average Temperature	< °C	2	-	-
Allowable Temperature	-	4	-	-
Temperature Acceptable	-	Y	-	-
Pump flow rate	l/min	0.5	-	-
Zero Drift	Units	Run 1	Run 2	Run 3
Zero Down Sampling Line (Pre)	ppm	0	-	-
Zero Down Sampling Line (Post)	ppm	0	-	-
Zero Drift	ppm	0	-	-
Allowable Zero Drift (5%)	ppm	7.77	-	-
Zero Drift Acceptable	Y <2%/Y 2-5%/N >5%	Y (<2%)	-	-
Zero Drift	%	0	-	-
Span Drift	Units	Run 1	Run 2	Run 3
Span Down Sampling Line (Pre)	ppm	155.4	-	-
Span Down Sampling Line (Post)	ppm	154.6	-	-
Span Drift	ppm	0.8	-	-
Allowable Span Drift (5%)	ppm	7.77	-	-
Span Drift Acceptable (Y/N)	Y <2%/Y 2-5%/N >5%	Y (<2%)	-	-
Span Drift	%	0.51	-	-
Leak Check	Units	Run 1	Run 2	Run 3
Span Gas Conc.	ppm	155.4	-	-
Recorded Conc. down Line	ppm	155.4	-	-
Leak check acceptable (< 2%)	(Y/N)	Y (<2%)	-	-
Test Conditions	Units	Run 1	Run 2	Run 3
Run Ambient Temperature Range	°C	12	-	-

Sulphur Dioxide Results & Sampling Details

Parameter	Units	Run 1	Run 2	Run 3	Mean
Concentration	mg.m ⁻³	4.02	-	-	-
Uncertainty	mg.m ⁻³	#VALUE!	-	-	-
Mass Emission	kg.h ⁻¹	#DIV/0!	-	-	-

General Sampling Information	
Parameter	Value
Standard	CEN/TS 17021
Technical Procedure	SOP 2046
Probe material	SS
Filtration Type/Size	PTFE
Heated Head Filter Used	Yes
Heated Line Temperature	180
Date & Result of last converter check	-
Span Gas Reference Number	ASLTM25ING507
Span Gas Expiry Date	03./27
Span Gas Start Pressure (bar)	80
Gas Cylinder Concentration (ppm)	155.4
Span Gas Uncertainty (%)	<2
Zero Gas Type	N
Number of Sampling Lines Used	1
Number of Sampling Points Used	1
Sample Point I.D's	F1
Reference Conditions	
Temperature (K)	273.15
Pressure (kPa)	101.3
Gas (Wet or Dry)	Dry
Oxygen	3

Sulphur Dioxide Trend



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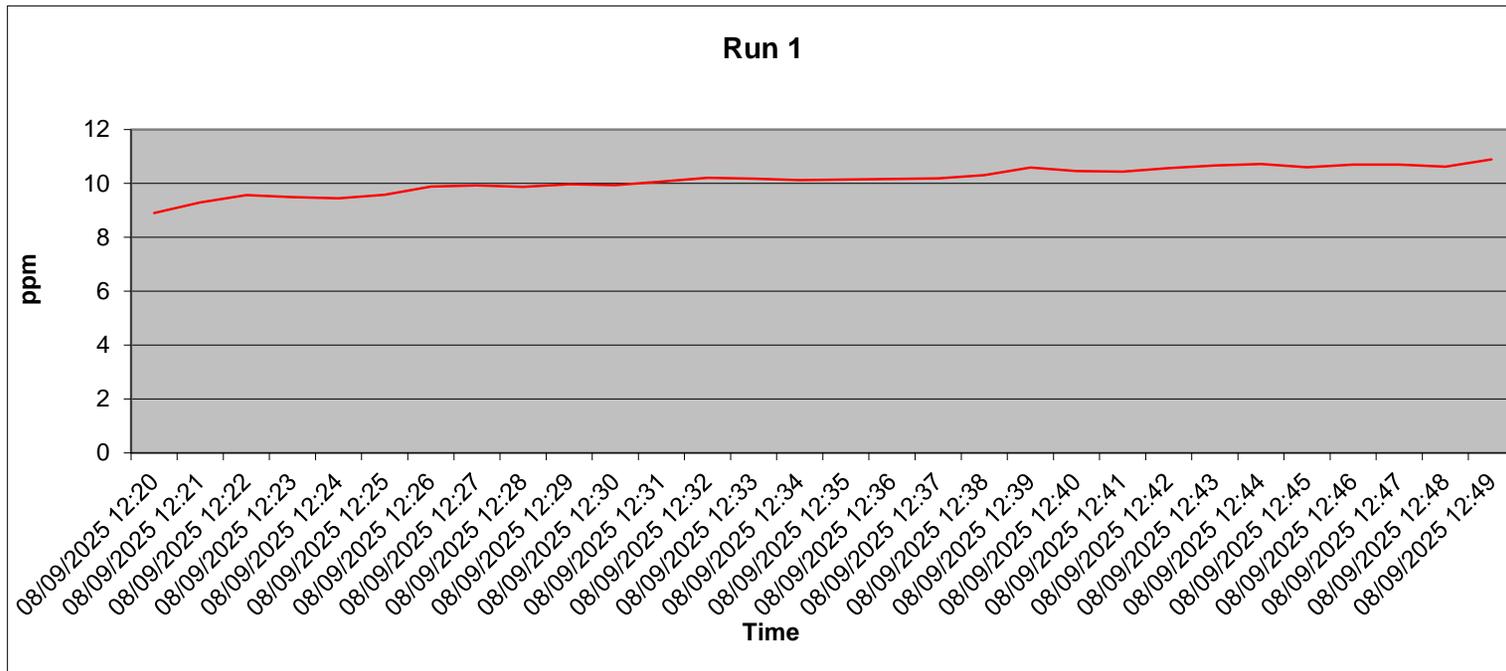
Sulphur Dioxide Measurement Uncertainty

Measured Quantities	Units	Run 1	Run 2	Run 3
Certified Range of Analyser	ppm	2.14 to 1000	-	-
Operational Range of Analyser	ppm	200	-	-
Measured Reading	ppm	1.4	-	-
Measured Quantities				
Measured Quantities	Units	Run 1	Run 2	Run 3
Nonlinearity	%	0.8	-	-
Temperature Dependent Zero drift	%	0.8	-	-
Temperature Dependent Span drift	%	2	-	-
Cross-sensitivity	%	1.5	-	-
Leak	%	0	-	-
Calibration Gas Uncertainty	%	<2 %	-	-
Parameter				
Parameter	Units	Run 1	Run 2	Run 3
Combined uncertainty	mg.m ⁻³	1.08	-	-
Expanded uncertainty	mg.m ⁻³	2.16	-	-
Uncertainty corrected to std conds.	mg.m ⁻³	-	-	-
Expanded uncertainty expressed with a level of confidence of 95%	% of ELV	-	-	-
Expanded uncertainty expressed with a level of confidence of 95%	mg.m ⁻³	-	-	-
Expanded uncertainty expressed with a level of confidence of 95%	% of value	-	-	-
Requirement in standard is for uncertainty to be < 10% at ELV at standard conditions				

Oxygen Quality Assurance

Sampling Details				
Stack ID	F1			
Parameter	Units	Run 1	Run 2	Run 3
Sampling Times	-	12:20	-	-
Sampling Dates	-	08/09/2025	-	-
Instrument Range	ppm	25	-	-
Span Gas Value	ppm	20.9	-	-
Acceptable Gas Range	-	Y	-	-
Quality Assurance	Units	Run 1	Run 2	Run 3
Conditioning Unit Temperature	°C	2	-	-
Average Temperature	< °C	2	-	-
Allowable Temperature	-	4	-	-
Temperature Acceptable	-	Y	-	-
Pump flow rate	l/min	0.5	-	-
Zero Drift	Units	Run 1	Run 2	Run 3
Zero Down Sampling Line (Pre)	%	0.1	-	-
Zero Down Sampling Line (Post)	%	0.1	-	-
Zero Drift	%	0	-	-
Allowable Zero Drift (5%)	%	1.05	-	-
Zero Drift Acceptable (Y/N)	Y <2%/Y 2-5%/N>5%	Y <2%	-	-
Span Drift	Units	Run 1	Run 2	Run 3
Span Down Sampling Line (Pre)	%	20.9	-	-
Span Down Sampling Line (Post)	%	20.8	-	-
Span Drift	%	0.1	-	-
Allowable Span Drift (5%)	%	1.05	-	-
Span Drift Acceptable (Y/N)	Y <2%/Y 2-5%/N>5%	Y <2%	-	-
Leak Check	Units	Run 1	Run 2	Run 3
Span Gas Conc.	%	20.9	-	-
Recorded Conc. down Line	%	20.9	-	-
Leak check acceptable (< 2%)	(Y/N)	Y <2%	-	-
Test Conditions	Units	Run 1	Run 2	Run 3
Run Ambient Temperature Range	°C	12	-	-
Combined uncertainty	% vol	0.17	-	-
% of value	%	1.62	-	-
Expanded uncertainty	% of value	3.25	-	-
Expanded uncertainty	% vol	0.33	-	-

Oxygen trend



Carbon Dioxide Quality Assurance

Sampling Details				
Stack ID	F1			
Parameter	Units	Run 1	Run 2	Run 3
Sampling Times	-	12:20	-	-
Sampling Dates	-	08/09/2025	-	-
Instrument Range	ppm	20	-	-
Span Gas Value	ppm	15.01	-	-
Acceptable Gas Range	-	Y	-	-
Quality Assurance	Units	Run 1	Run 2	Run 3
Conditioning Unit Temperature	°C	2	-	-
Average Temperature	< °C	2	-	-
Allowable Temperature	-	4	-	-
Temperature Acceptable	-	Y	-	-
Pump flow rate	l/min	0.5	-	-
Zero Drift	Units	Run 1	Run 2	Run 3
Zero Down Sampling Line (Pre)	%	0.1	-	-
Zero Down Sampling Line (Post)	%	0.1	-	-
Zero Drift	%	0	-	-
Allowable Zero Drift (4%)	%	0.6	-	-
Zero Drift Acceptable	Y <2%/Y 2-4% /N>4%	Y <2%	-	-
Span Drift	Units	Run 1	Run 2	Run 3
Span Down Sampling Line (Pre)	%	15.01	-	-
Span Down Sampling Line (Post)	%	15	-	-
Span Drift	%	0.01	-	-
Allowable Span Drift (4%)	%	0.6	-	-
Span Drift Acceptable	Y <2%/Y 2-4% /N>4%	Y <2%	-	-
Leak Check	Units	Run 1	Run 2	Run 3
Span Gas Conc.	ppm	15.01	-	-
Recorded Conc. down Line	ppm	15.01	-	-
Leak check acceptable (< 2%)	(Y/N)	Y <2%	-	-
Test Conditions	Units	Run 1	Run 2	Run 3
Run Ambient Temperature Range	°C	12	-	-
Combined uncertainty	% vol	0.15	-	-
% of value	%	1.76	-	-
Expanded uncertainty	% of value	3.52	-	-
Expanded uncertainty	% vol	0.3	-	-

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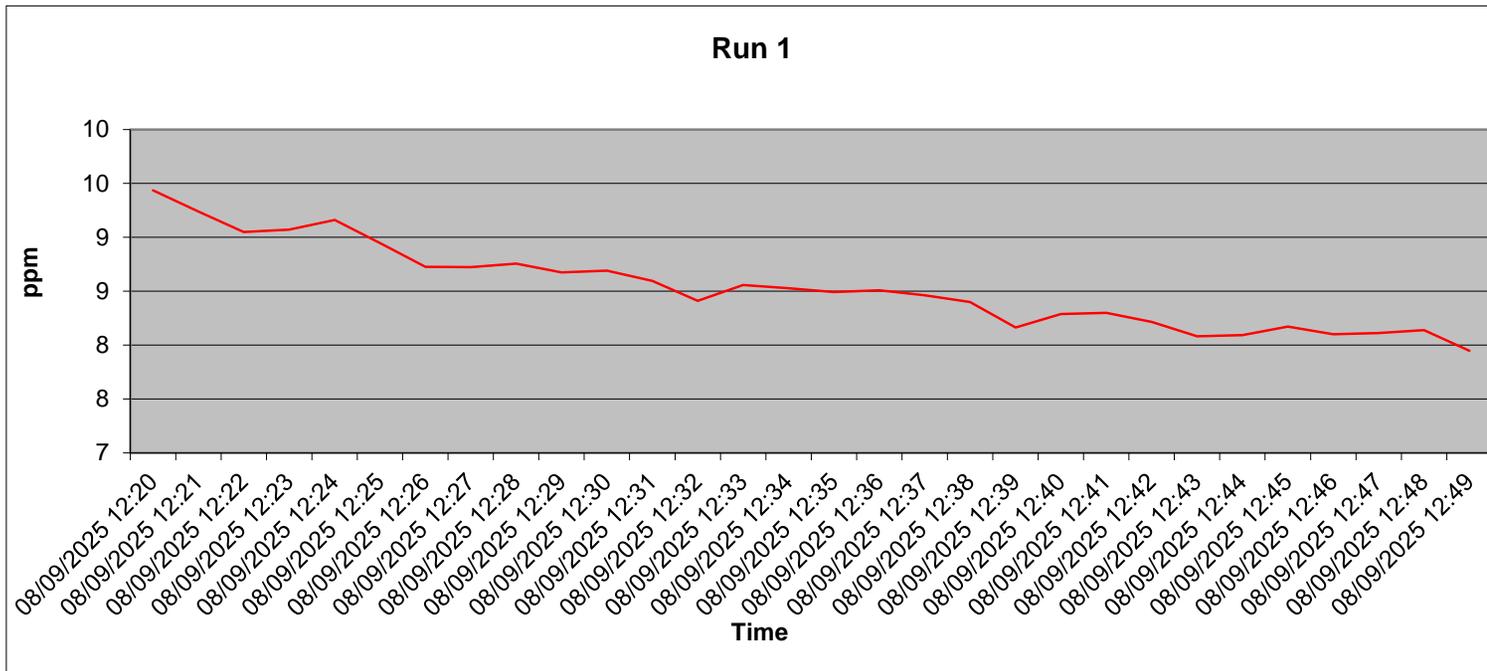
EPA Licence No.: W0004-04
 Licence Holder: South Dublin County Council, F1
 Facility Location: Arthurstown Landfill
 Rev.No: 1

Carbon Dioxide Results & Sampling Details

Parameter	Units	Run 1	Run 2	Run 3	Mean
Concentration	%	8.5	-	-	-
Uncertainty	%	0.3	-	-	-

General Sampling Information	
Parameter	Value
Standard	ISO12039
Technical Procedure	SOP 2045
Probe material	SS
Filtration Type/Size	Ceramic
Heated Head Filter Used	Yes
Heated Line Temperature	180
Span Gas Reference Number	ASLTM23ING505
Span Gas Expiry Date	28-Jun
Span Gas Start Pressure (bar)	40
Gas Cylinder Concentration (ppm)	15.01
Span Gas Uncertainty (%)	<2
Zero Gas Type	N
Number of Sampling Lines Used	1
Number of Sampling Points Used	1
Sample Point I.D's	F1
Reference Conditions	
Temperature (K)	273.15
Pressure (kPa)	101.3
Gas (Wet or Dry)	Dry
Oxygen	3

Carbon Dioxide Trend



Uncert Sheets

CO Uncert

Uncertainty calculation for Gaseous Measurement CO

Limit value	50 mg/m3 (corre Cal gas conc	191.5 mg.m-3
Measured concentration	9.83 mg/m3 Full Scale	200 mg/m3
Measured concentration	16.42 mg/m3 (Corrected)	

Correction for reference conditions					
		O2, %	Moisture,	Pressure, KPa	Temperature, K
	ref	3.00	0.00	101.30	273.00
	measured	10.19	0.00		1288.15
	Uncert	0.35	1.00	0.00	1.00
Factors		1.66	1.00	#VALUE!	4.72
Uncertainty in factor		0.05	0.01	#VALUE!	0.00
Correction Factor		#VALUE!	uf	#VALUE!	

Performance characteristics	Value		specification
Response time	180	seconds	180.000
Logger sampling interval	60	seconds	
Measurement period	32	minutes	
Number of readings in measurement	32		
Repeatability at zero	0.25	% full scale	<1 % range
Repeatability at span level	0.15	% full scale	<2 % range
Deviation from linearity(lack of fit)	0.7	% of value	<2 % range
Zero drift	0	mg/m3	<2% range / 24hr
Span drift	-2	mg/m3	<2% range/24hr
volume or pressure flow dependence	0.02	% of full scale/3 kPa	<2 % / 3 kPa
atmospheric pressure dependence	0.8	% of full scale/2 kPa	<3% / 2 kPa
ambient temperature dependence	0.01	% full scale/10K	<3% range / 10 K
N2O (mg/m3)	20	0.2 mg/m3	
CO2 (% vol)	15	0.2 mg/m3	
CH4 (mg/m3)	40	0.7 mg/m3	
H2O (% vol)	20	0.2 mg/m3	
dependence on voltage	0.1	% full scale/10V	<2% range
losses in the line (leak)	-0.39	% of value	< 0.1%vol /10 volt
Uncertainty of calibration gas	2	% of value	< 2% of value

Effect of drift
-0.10 mg/m3
-0.05 % full scale

	min	max	value at calib	
flow	95.00	105	100	kPa
pressure	100.76	100.92	100.88	kPa
temp	287	288.5	287.5	K
N2O range	0	40	0	mg/m3
CO2 range	0	15	0	%vol
CH4 range	0	57	0	mg/m3
H2O range	0	1	0	%vol
Voltage	93	121	110	V

Performance characteristic	Uncertainty	Value of uncertainty quantity	mg/m3
Standard deviation of repeatability at zero	ur0	for mean	use rep at span
Standard deviation of repeatability at span level	urs	for mean	0.05
Lack of fit	ufit		0.04
Drift	u0dr		-0.06

Uncert Sheets

volume or pressure flow dependence		uspres			0.04		
atmospheric pressure dependence		uapres			0.05		
ambient temperature dependence		utemp			0.00		
N2O (mg/m3)		uinterf			0.23	Use largest of sum of all positive or all negative influences	
CO2 (% vol)		uinterf			0.12		0.93 all +ves
CH4 (mg/m3)		uinterf			0.58		0 all -ves
H2O (% vol)		uinterf			0.01	0.93 largest	Criteria sum <4% range 0.196592882
Dependence on voltage		uvolt			0.17	Value to use for intereference uncertainty	
losses in the line (leak)		uleak			-0.02	uint	0.93
Uncertainty of calibration gas		ucalib			0.11		
Uncertainty in factor		uf			#VALUE!		

Measurement uncertainty			16.42	mg/m3
Combined uncertainty			0.96	mg/m3
Expanded uncertainty	k =	2	1.91	mg/m3
Uncertainty corrected to std conds			#VALUE!	mg/m3
Expanded uncertainty	expressed with a level of		#VALUE!	% ELV
Expanded uncertainty	expressed with a level of		#VALUE!	mg.m-3
Expanded uncertainty	expressed with a level of		#VALUE!	% value

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

Note: Enter values into green boxes
 Dark blue boxes indicate information that can be obtained from MCERTS tests

Developed for the STA by R Robinson, NPL

NOx Uncert

Uncertainty calculation for Gaseous Measurement NOx EN14792

RUN 1				
Limit value	150	mg/m3 (corre Cal gas conc	338.745	mg.m-3 (NO2)
Measured concentration	22	ppm		
Measured concentration	45.35	mg/m3 (101.3 Full Scale	513.25	mg/m3 (NO2)
Measured concentration	75.78	mg/m3 (Corrected)		
NO/NO2 ratio	100.00			
		Gas	NO	
		Full Scale	250	ppm
		Cal gas conc	165	ppm

Correction for reference conditions					
		O2, %	Moisture,	Pressure, KPa	Temperature, K
	ref	3.00	0.00	101.30	273.00
	measured	10.19	0.00	-	1288.00
	Uncert	0.35	0.00	0.00	1.00
Factors		1.66	1.00	#VALUE!	4.72
Uncertainty in factor		0.05	0.00	#VALUE!	0.00

Uncert Sheets

Conversion	2.053
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Correction Factor	#VALUE!	uf	#VALUE!
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Performance characteristics	Value		specification
Response time	180	seconds	180.000
Logger sampling interval	60	seconds	
Measurement period	32	minutes	
Number of readings in measurement	32		
Repeatability at zero	0.03	% full scale	<1 % range
Repeatability at span level	0.06	% full scale	<2 % range
Deviation from linearity(lack of fit)	0.2	% of value	<2 % range
Zero drift	0.00	mg/m3	<2% range / 24hr
Span drift	1.64	mg/m3	<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
NH3 (mg/m3)	20	0.0	mg/m3
CO2 (% vol)	15	0.2	mg/m3
H2O (% vol)	30	0.0	mg/m3
dependence on voltage	0.1	% full scale/10V	<2% range
losses in the line (leak)	0.00	% of value	< 0.1%vol /10 volt
Converter efficiency	95.5	%	>95%
Uncertainty of calibration gas	2	% of value	< 2% of value

Effect of drift
0.37 mg/m3
0.07 % full scale

	min	max	value at calib	
flow	95.00	105	100	kPa
pressure	101.30	101.3	101.3	kPa
temp	289	289	289	K
NH3 range	0	0	0	mg/m3
CO2 range	0	15	0	%vol
H2O range	0	0	0	%vol
Voltage	93	121	110	V

Performance characteristic	Uncertainty	Value of uncertainty quantity	mg/m3
Standard deviation of repeatability at zero	ur0	for mean	use rep at span
Standard deviation of repeatability at span level	urs	for mean	0.05
Lack of fit	ufit		0.05
Drift	u0dr		0.21
volume or pressure flow dependence	uspres		0.00
atmospheric pressure dependence	uapres		0.00
ambient temperature dependence	utemp		0.00
NH3	uintenf		0.00
CO2 (% vol)	uintenf		0.12
H2O (% vol)	uintenf		0.00
Dependence on voltage	uvolt		0.44
losses in the line (leak)	uleak		0.00
Uncertainty of calibration gas	ucalib		0.52
converter efficiency	uceff		1.18
Uncertainty in factor	uf		#VALUE!

Use largest of sum of all positive or all negative influences	
0.12 all +ves	Criteria sum <4% range 0.907094525
0 all -ves	
0.12 largest	
Value to use for intereference uncertainty	
uint	0.12

Measurement uncertainty	75.78	mg/m3
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Uncert Sheets

Combined uncertainty			1.39	mg/m3
Expanded uncertainty	k =	2	2.77	mg/m3
Uncertainty corrected to std conds				
			#VALUE!	mg/m3
Expanded uncertainty	expressed with a level of		#VALUE!	% ELV
Expanded uncertainty	expressed with a level of		#VALUE!	mg.m-3
Expanded uncertainty expressed with a level of				
			#VALUE!	% value

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

Note: Enter values into green boxes
 Dark blue boxes indicate information that can be obtained from MCERTS tests

Developed for the STA by R Robinson, NPL

corrected drift to be based on mg/m3 reading and the correction alert to be based on % full scale

TOC Uncert

QGU-008-2013 Uncertainty calculation for Gaseous Measurement SO2 EA M21

V2 Jul-08

Limit value	10	mg/m3 (corre Cal gas conc	129.92	mg.m-3
Measured concentration	2.35	mg/m3 Full Scale	160	mg/m3
Measured concentration	#VALUE!	mg/m3 (Corrected)		

Correction for reference conditions					
		O2, %	Moisture,	Pressure, KPa	Temperature, K
	ref	3.00	0.00	101.30	273.00
	measured	10.19	0.00	-	1288.00
	Uncert	0.35	1.00	0.00	1.00
Factors		1.66	1.00	#VALUE!	4.72
Uncertainty in factor		0.05	0.01	#VALUE!	0.00
Correction Factor		#VALUE!	uf	#VALUE!	

Performance characteristics	Value		specification
Response time	180	seconds	180.000
Logger sampling interval	60	seconds	
Measurement period	35	minutes	
Number of readings in measurement	35		
Repeatability at zero	0.25	% full scale	<1 % range
Repeatability at span level	0.15	% full scale	<2 % range
Deviation from linearity	0.7	% of value	<2 % range

Effect of drift	
#VALUE!	mg/m3
#VALUE!	% value
#VALUE!	

Uncert Sheets

Zero drift	0	mg/m3	<2% range / 24hr					
Span drift	0.64	mg/m3	<2% range/24hr					
volume or pressure flow dependence	0.02	% of full scale/3 kPa	<2 % / 3 kPa	flow	0.3	0.5	0.4	l/hr
atmospheric pressure dependence	0.8	% of full scale/2 kPa	<3% / 2 kPa	pressure	100.76	100.92	100.88	kPa
ambient temperature dependence	0.01	% full scale/10K	<3% range / 10 K	temp	287	288.5	287.5	K
N2O (mg/m3)	40	9.0	mg/m3	N2O range	0	0	0	mg/m3
CO2 (% vol)	15	9.0	mg/m3	CO2 range	0	40	0	%vol
CH4 (mg/m3)	57	9.0	mg/m3	CH4 range	0	57	0	mg/m3
H2O (% vol)	30	9.0	mg/m3	H2O range	0	1	0	%vol
dependence on voltage	0.1	% full scale/10V	<2% range	Voltage	93	121	110	V
losses in the line (leak)	2	% of value	< 0.1%vol /10 volt					
Uncertainty of calibration gas	1.07	% of value	< 2% of value					

Performance characteristic	Uncertainty	Value of uncertainty quantity
Standard deviation of repeatability at zero	ur0	for mean
Standard deviation of repeatability at span level	urs	for mean
Lack of fit	ufit	
Drift	u0dr	
volume or pressure flow dependence	uspres	
atmospheric pressure dependence	uapres	
ambient temperature dependence	utemp	
N2O (mg/m3)	uinterf	
CO2 (% vol)	uinterf	
CH4 (mg/m3)	uinterf	
H2O (% vol)	uinterf	
Dependence on voltage	uvolt	
losses in the line (leak)	uleak	
Uncertainty of calibration gas	ucalib	
Uncertainty in factor	uf	

0.00	Use largest of sum of all positive or all negative influences Criteria sum <4% range 0.047031669
13.86	
5.20	
0.17	
0.14	Value to use for intereference uncertainty
#VALUE!	uint 19.23
#VALUE!	
#VALUE!	

Measurement uncertainty		#VALUE!	mg/m3
Combined uncertainty		#VALUE!	mg/m3
Expanded uncertainty	k = 2	#VALUE!	mg/m3
Uncertainty corrected to std conds		#VALUE!	mg/m3
Expanded uncertainty	expressed with a level of confidence	#VALUE!	% ELV
Expanded uncertainty	expressed with a level of confidence	#VALUE!	mg.m-3
Expanded uncertainty	expressed with a level of confidence	#VALUE!	% value

HCL Uncert

Uncert Sheets

v2

Limit value (ELV)	50	mg.m-3	Reference oxygen	3	% by volume
Measured concentration	0.25	mg.m-3 (at reference conditions)			

Measurement Equation

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

Measured Quantities	Symbol	Value	Standard uncertainty	Units	Uncertainty as percentage	Uncertainty at lv	Requirement of std
Sampled Volume Gas	Vm	0.066	uVm	0.001 m3	1.52		<=2%
Sampled gas Temperature	Tm	273	uTm	2 k	2.00		<2.5 k
Sampled gas Pressure	pm	101.3	upm	1 kPa	0.99		<=1%
Sampled gas Humidity	Hm	0	uHm	1 % by volume	1.00		<=1%
Oxygen content	O2,m	10.18	uO2,m	0.1 % by volume	0.98		<=5%
Concentration in impinger	C	0.1	uC	0.003 mg/l	3.00		<5%
Impinger solution volume	VS	330	uVS	0.001 l	0.00		<1%
Mass SO2	m	33	um	0.99 mg	3.00	0.02	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter							
Leak	L	2		%	2.00		<=2%

Intermediate calculations					
Factor for std conds	fs	1.00			
uncertainty components	symbol	sensitivity coeff	u (in units of fs)		
	pm	0.010	0.010		
	Hm	0.010	0.010		
	Tm	0.004	0.007		
	ufs		0.016		1.58
Corrected volume	V	0.07	uV	0.001 m3	$V = V_m f_s$ 2.19
Factor for O2 correction	fc	1.66			
uncertainty components	symbol	sensitivity coeff	u		
	O2,m	0.15	0.015		$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$
Factor for O2 Correction	ufc	1.66	0.015		0.92

Parameter	Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %
Corrected Volume (standard conditions)	V	0.07 m3	3.79	0.01 mg.m-3	2.19 %
Mass	m	33.00 mg	0.01	0.01 mg.m-3	3.00 %
Factor for O2 Correction	fc	1.66	0.15	0.00 mg.m-3	0.92 %
Leak	L	0.00 mg.m-3	1.00	0.00 mg.m-3	1.15 %
Combined uncertainty				0.01 mg.m-3	

Expanded uncertainty as percentage of measured value	8.00	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.02	mg.m-3	

Uncert Sheets

Expanded uncertainty as percentqge of limit value 0.04 % ELV

QGU-009-2013 Uncertainty calculation for HF

v2

$$f_s = \frac{(100 - H_m) 273 \rho_m}{100 T_m 101.3}$$

Limit value (ELV)	5	mg.m-3	Reference oxygen	3	% by volume
Measured concentration	0.25	mg.m-3 (at reference conditions)			

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

Measured Quantities	Symbol	Value	Standard uncertainty	Units	Uncertainty as percentage	Uncertainty at lv	Requirement of std
Sampled Volume Gas	Vm	0.066	uVm	0.001 m3	1.52		<=2%
Sampled gas Temperature	Tm	273	uTm	2 k	2.00		<2.5 k
Sampled gas Pressure	pm	101.3	upm	1 kPa	0.99		<=1%
Sampled gas Humidity	Hm	0	uHm	1 % by volume	1.00		<=1%
Oxygen content	O2,m	10.18	uO2,m	0.1 % by volume	0.98		<=5%
Concentration in impinger	C	0.1	uC	0.003 mg/l	3.00		<5%
Impinger solution volume	VS	330	uVS	0.001 l	0.00		<1%
Mass SO2	m	33	um	0.99 mg	3.00	0.15	<5% of limit value
Note - Sampled gas humidity, temperature and pressure are values at the gas meter							
Leak	L	2		%	2.00		<=2%

Intermediate calculations				
Factor for std conds	fs	1.00		
uncertainty components	symbol	sensitivity coeff	u (in units of fs)	
	pm	0.010	0.010	
	Hm	0.010	0.010	
	Tm	0.004	0.007	
	ufs		0.016	1.58
Corrected volume	V	0.07	uV	0.001 m3
				$V = V_m f_s$
				2.19
Factor for O2 correction	fc	1.66		
uncertainty components	symbol	sensitivity coeff	u	
	O2,m	0.15	0.015	
				$f_c = \frac{21 - O_{2,ref}}{21 - O_{2,m}}$
Factor for O2 Correction	ufc	1.66	0.015	0.92

Parameter	Value	Units	Sensitivity c	Uncertainty contribution	Uncertainty as %
Corrected Volume (standard conditions)	V	0.07 m3	3.79	0.01 mg.m-3	2.19 %
Mass	m	33.00 mg	0.01	0.01 mg.m-3	3.00 %
Factor for O2 Correction	fc	1.66	0.15	0.00 mg.m-3	0.92 %
Leak	L	0.00 mg.m-3	1.00	0.00 mg.m-3	1.15 %
Combined uncertainty				0.01 mg.m-3	

Uncert Sheets

Expanded uncertainty as percentage of measured value	8.00	% measured of value	expressed with a level of confidence of 95% (Using a coverage factor k=2)
Expanded uncertainty in units of measurement	0.02	mg.m-3	
Expanded uncertainty as percentqge of limit value	0.40	% ELV	

Uncertainty calculation for Gaseous Measurement SO2 EA M21

$$f_s = \frac{(100 - H_m) 273}{100 T_m} \frac{\rho_m}{101.3}$$

Limit value	-	mg/m3 (corre Cal gas conc	444.444	mg.m-3
Measured concentration	4.02	mg/m3	Full Scale	572
Measured concentration	#VALUE!	mg/m3 (Corrected)		

Correction for reference conditions					
		O2, %	Moisture	Pressure, KPa	Temperature, K
	ref	3.00	0.00	101.30	273.00
	measured	10.19	0.00	-	1288.15
	Uncert	0.35	1.00	0.00	1.00
Factors		1.66	1.00	#VALUE!	4.72
Uncertainty in factor		0.05	0.01	#VALUE!	0.00
Correction Factor		#VALUE!	uf	#VALUE!	

Performance characteristics	Value		specification
Response time	180	seconds	180.000
Logger sampling interval	60	seconds	
Measurement period	32	minutes	
Number of readings in measurement	32		
Repeatability at zero	0.25	% full scale	<1 % range
Repeatability at span level	0.15	% full scale	<2 % range
Deviation from linearity(lack of fit)	0.7	% of value	<2 % range
Zero drift	0.00	mg/m3	<2% range / 24hr
Span drift	2.28	mg/m3	<2% range/24hr
volume or pressure flow dependence	0.02	% of full scale/3 kPa	<2 % / 3 kPa
atmospheric pressure dependence	0.8	% of full scale/2 kPa	<3% / 2 kPa
ambient temperature dependence	0.01	% full scale/10K	<3% range / 10 K
N2O (mg/m3)	20	0.2	mg/m3
CO2 (% vol)	15	0.2	mg/m3
CH4 (mg/m3)	40	0.7	mg/m3
H2O (% vol)	20	0.2	mg/m3
dependence on voltage	0.1	% full scale/10V	<2% range
losses in the line (leak)	0.00	% of value	< 0.1%vol /10 volt
Uncertainty of calibration gas	2	% of value	< 2% of value

Effect of drift
0.02 mg/m3
0.00 % full scale

	min	max	value at calib
flow	95.00	105	100 kPa
pressure	100.76	100.92	100.88 kPa
temp	287	288.5	287.5 K
N2O range	0	40	0 mg/m3
CO2 range	0	15	0 %vol
CH4 range	0	57	0 mg/m3
H2O range	0	1	0 %vol
Voltage	93	121	110 V

Performance characteristic	Uncertainty	Value of uncertainty quantity	mg/m3
Standard deviation of repeatability at zero	ur0	for mean	use rep at span
Standard deviation of repeatability at span level	urs	for mean	0.15

Uncert Sheets

Lack of fit			ufit				0.02		
Drift			u0dr				0.01		
volume or pressure flow dependence			uspres				0.11		
atmospheric pressure dependence			uapres				0.14		
ambient temperature dependence			utemp				0.00		
N2O (mg/m3)			uinterf				0.23	Use largest of sum of all positive or all negative influences	
CO2 (% vol)			uinterf				0.12		0.93 all +ves
CH4 (mg/m3)			uinterf				0.58		0 all -ves
H2O (% vol)			uinterf				0.01	0.93 largest	
Dependence on voltage			uvolt				0.49	Value to use for intereference uncertainty	
losses in the line (leak)			uleak				0.00		uint 0.93
Uncertainty of calibration gas			ucalib				0.05		
Uncertainty in factor			uf				0.00		

Measurement uncertainty			#VALUE!	mg/m3
Combined uncertainty			1.08	mg/m3
Expanded uncertainty	k =	2	2.16	mg/m3
Uncertainty corrected to std conds			#VALUE!	mg/m3
Expanded uncertainty	expressed with a level of		#VALUE!	% ELV
Expanded uncertainty	expressed with a level of		#VALUE!	mg.m-3
Expanded uncertainty	expressed with a level of		#VALUE!	% value

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

Note: Enter values into green boxes
 Dark blue boxes indicate information that can be obtained from MCERTS tests

O₂ Uncert

Run 1

Uncertainty calculation for Gaseous Measurement Oxygen EN14789

Limit value	n/a	%vol	Calibration gas	20.9	%vol
Measured concentration	10.19	%vol	Full Scale	25	%vol

Performance characteristics	Value			specification
Response time	180	seconds		< 200 s

Effect of drift

Uncert Sheets

Note: Enter values into green boxes
 Dark blue boxes indicate information that can be obtained from MCERTS tests
 Purple boxes are from manufacturer specification, or CEN standard as MCERTS data not available

Developed for the STA by R Robinson, NPL

corrected drift alert to be based on % full scale

CO₂ Uncert

Run 1

Uncertainty calculation for Gaseous Measurement Carbon Dioxide

Limit value	n/a	%vol	Calibration gas	15.01	%vol
Measured concentration	8.50	%vol	Full Scale	25	%vol

Performance characteristics	Value			specification	
Response time	180	seconds		< 200 s	
Logger sampling interval	60	seconds			
Measurement period	32	minutes			
Number of readings in measurement	32	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)	0.00	% vol at zero level	+/-	<2% of volume / 24hr	range of variation from conditions at calibration
Span drift (during measurement period)	0.01	% vol at span level	+/-	<2% volume/24hr	
volume or pressure flow dependence	0	% of fs / 10l/h	+ - 5 l/h	<1% range	flow
atmospheric pressure dependence	0.3	% of fs/kPa	+ - 2kPa	< 1.5 % range	pressure
ambient temperature dependence	-0.07	% by volume /10K	+ - 15K	<0.3% volume 10 K	temp
CO2 (% vol)	15	0.07	% by volume per	15	CO2 range
NO (mg/m3)	300	0.02	% by volume per	300	NO range
NO2 (mg/m3)	30	0	% by volume per	30	NO2 range
Combined interference	0.56	% range		<2% range	Voltage
Dependence on voltage	0.1	% by volume /10V	+ 5%	< 0.1%vol /10 volt	
Losses in the line (leak)	0.00	% of value		< 2% of value	
Uncertainty of calibration gas	2	% of value			

Performance characteristic	Uncertainty	Value of uncertainty quantity	% vol
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Effect of drift
0.01 % vol
0.02 % full scale

Uncert Sheets

Standard deviation of repeatability at zero		ur0		for mean		Only use rep at span		
Standard deviation of repeatability at span level		urs		for mean		0.00		
Lack of fit		ufit				0.08		
Drift		u0dr				0.00		
volume or pressure flow dependence		uspres				0.00		
atmospheric pressure dependence		uapres				0.04		
ambient temperature dependence		utemp				-0.02		
CO2						0.05	Use largest of sum of all positive or all negative influences	
NO						0.01		0.06 all +ves
NO2						0.00		0 all -ves
Combined interference (from mcerts)						0.08		0.06 largest
dependence on voltage		uvolt				0.03	Value to use for intereference uncertainty	
losses in the line (leak)		uleak				0.00		uint 0.06
Uncertainty of calibration gas		ucalib				0.10		

Measurement uncertainty			8.50	%vol
Combined uncertainty			0.15	%vol
% of value			1.76	%
Coverage factor k =	2			
Expanded uncertainty	expressed with a level of confidence		3.52 % of value	
Expanded uncertainty	expressed with a level of confidence		0.30 % vol	

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

Note: Enter values into green boxes
 Dark blue boxes indicate information that can be obtained from MCERTS tests
 Purple boxes are from manufacturer specification, or CEN standard as MCERTS data not available

Certificate of Analysis

Report No.: 25-08135-1

Issue No.: 1
Date of Issue 06/10/2025

Customer Details: Air Scientific Ltd, Unit 32, De Granville Court, Dublin Road, Trim, Co. Meath, , Ireland

Customer Contact: Amanda Sheridan

Customer Order No.: ARLATL1080925

Customer Reference: Not Supplied

Quotation Reference: Q25-07740

Description: 3 gas samples, 10 liquid samples, 3 solid samples

Date Received: 25/09/2025

Date Started: 25/09/2025

Date Completed: 06/10/2025

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.: 25-08135-1

Customer Reference: Not Supplied

Customer Order No: ARLATL1080925

Customer Sample No	AR07 - 003589	AR07 W	AR08 - 003003	AR08 W	Blank - 003571	Blank W	AR07 HCL/HF 1+2	AR07 HCL/HF 3	HCL/HF B	AR08 HCL/HF 1+2	AR08 HCL/HF 3	F1 HCL/HF 1+2
RPS Sample No	324199	324200	324201	324202	324203	324204	324205	324206	324207	324208	324209	324210
Sample Matrix	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION	SOLUTION	SOLUTION	SOLUTION	SOLUTION	SOLUTION	SOLUTION
Sampling Date	08/09/2025	08/09/2025	08/09/2025	08/09/2025	08/09/2025	08/09/2025	08/09/2025	08/09/2025	08/09/2025	08/09/2025	08/09/2025	08/09/2025

Determinand	CAS No	Codes	SOP	RL	Units												
volume of sample supplied		U	N/A	n/a	ml							131	106	121	121	95	131
hydrogen chloride	7647-01-0	UM	C27	0.05	ug/mL							< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
particulates		UM	D9	0.04	mg	1.76		0.65		< 0.04							
particulates		UM	D9	0.5	mg		< 0.5		< 0.5		< 0.5						
NMVOCs (low level) FRONT		N	M104	0.5	ug												
NMVOCs (low level) BACK		N	M104	0.5	ug												
hydrogen fluoride	7664-39-3	UM	C27	0.05	ug/mL							< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Results Summary

Report No.: 25-08135-1

Customer Reference: Not Supplied

Customer Order No: ARLATL1080925

Customer Sample No	F1 HCL/HF 3	6624	6633	6627
RPS Sample No	324211	324212	324213	324214
Sample Matrix	SOLUTION	TUBE	TUBE	TUBE
Sampling Date	08/09/2025	08/09/2025	08/09/2025	08/09/2025

Determinand	CAS No	Codes	SOP	RL	Units				
volume of sample supplied		U	N/A	n/a	ml	131			
hydrogen chloride	7647-01-0	UM	C27	0.05	ug/mL	< 0.05			
particulates		UM	D9	0.04	mg				
particulates		UM	D9	0.5	mg				
NMVOCs (low level) FRONT		N	M104	0.5	ug		< 0.5	< 0.5	< 0.5
NMVOCs (low level) BACK		N	M104	0.5	ug		< 0.5	< 0.5	< 0.5
hydrogen fluoride	7664-39-3	UM	C27	0.05	ug/mL	< 0.05			

Deviating Samples

Report No.: 25-08135-1

Customer Reference: Not Supplied

Customer Order No: ARLATL1080925

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
324199	AR07 - 003589		08/09/2025	Container	No	
324200	AR07 W		08/09/2025	Container	No	
324201	AR08 - 003003		08/09/2025	Container	No	
324202	AR08 W		08/09/2025	Container	No	
324203	Blank - 003571		08/09/2025	Container	No	
324204	Blank W		08/09/2025	Container	No	
324205	AR07 HCL/HF 1+2		08/09/2025	Container	No	
324206	AR07 HCL/HF 3		08/09/2025	Container	No	
324207	HCL/HF B		08/09/2025	Container	No	
324208	AR08 HCL/HF 1+2		08/09/2025	Container	No	
324209	AR08 HCL/HF 3		08/09/2025	Container	No	
324210	F1 HCL/HF 1+2		08/09/2025	Container	No	
324211	F1 HCL/HF 3		08/09/2025	Container	No	
324212	6624		08/09/2025	Container	No	
324213	6633		08/09/2025	Container	No	
324214	6627		08/09/2025	Container	No	

Report No.: 25-08135-1

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.: 25-08135-1

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