Site Visit Report

The site visit process is a sample on a particular day of an installation's compliance with some of its licence conditions. Where non-compliance against a particular condition has not been reported, this should not be construed to mean that there is full compliance with that condition of the licence.

Instructions and actions arising from the visit shall be addressed, or where applicable noted, by the licensee in order to ensure compliance, to improve the environmental performance of the installation and to provide clarification on certain issues.

The licensee shall take the actions specified to close out the non-compliances and observations raised in this Site Visit Report.

The licensee may also be requested to provide a response to the Environmental Protection Agency (hereafter referred to as the Agency) in relation to the site visit report findings.

Licensee

Name of Installation	Runways Information Services Limited
Licensee	Runways Information Services Limited
Licence Register No.	P1192-1
CRO Number	553841
Site Address	Slí Na Cháirde, Portan, Clonee, Meath, D15 NN9V
Site Visit Reference No.	SV28571

Report Detail

Issue Date	14/01/2025
Prepared By	Niall Stenson

Site Visit Detail

Date Of Inspection	09/12/2024		
Time In	09:00	**Time Out**	17:00
EPA Inspector(s)			
Additional Visitors	Element		
Licensee Personnel and Role	n/a		

Summary

This site visit was conducted as part of the Agency’s routine air emissions monitoring programme. The monitoring report is attached.

Site Areas Inspected

See Report.

Documents Inspected

See Report.

EPA AIR EMISSIONS COMPLIANCE MONITORING EMISSIONS REPORT

(Prepared on behalf of the EPA by Element Ireland - EPA Contract No. OEE24-AEMP)

Element Ireland, Unit D8 North City Business Park, North Road, Finglas, Dublin 11
Your Element Ireland Contact: Dónal Ó Faogáin (+353 861 746 367)
E: donal.ofaogain@element.com

Stack Emissions Testing Report Commissioned by
EPA Office of Environmental Enforcement

Installation Name & Address
Runways Information Services Limited
Clonee

Industrial Emissions Licence: P1192-01

Stack Reference
CLN2 EG-N3

Dates of the Monitoring Campaign
9th December 2024

Job Reference Number
P1192-01CAR24-01

Report Written by
John Glennon Senior Team Leader MCERTS Level 2 MM 10 1074 TE1 TE2 & TE3

Report Checked by	Report Approved by
Darragh Long Reporting Manager MCERTS Level 2 MM18 1494 TE1 TE2 TE3 TE4	Donal O Faogain Technical Report Writer MCERTS Level 2 MM13 1259 TE1 TE2 TE3 TE4

Report Date
18th December 2024

Version
Version 1

Signature of Report Checker	Signature of Report Approver
	

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APPENDIX 1 - Monitoring Personnel & List of Equipment

APPENDIX 2 - Raw Data, Sampling Equations & Charts

Opinions and interpretations expressed herein are outside the scope of Element Ireland's ISO 17025 accreditation.

This test report shall not be reproduced, except in full, without the written approval of Element Ireland.

The testing performed fully meets the technical requirements in Irish EPA Guidance Note, AG2.

MONITORING OBJECTIVES

Runways Information Services Limited, Clonee
CLN2 EG-N3
9th December 2024

Overall Aim of the Monitoring Campaign

Element Ireland were commissioned by the EPA Office of Environmental Enforcement to carry out stack emissions testing at Runways Information Services Limited on the CLN2 EG-N3 at Clonee.

The aim of the monitoring campaign was to demonstrate compliance with a set of emission limit values (ELVs) as specified in the Site's Permit.

Special Requirements

There were no special requirements.

Target Parameters

Oxides of Nitrogen (as NO_2), Carbon Monoxide

Executive Summary

MONITORING RESULTS

Runways Information Services Limited, Clonee

CLN2 EG-N3

9th December 2024

where MU = Measurement Uncertainty associated with the Result

	Concentration				Mass Emission			
Parameter	**Units**	**Result**	**MU +/-**	**Limit**	**Units**	**Result**	**MU +/-**	**Limit**
Oxides of Nitrogen (as NO_2) [1]	mg/m³	838.20	32.84	-	g/hr	16714.6	1060.1	-
Carbon Monoxide [1]	mg/m³	44.98	2.11	-	g/hr	897.0	61.5	-
Carbon Dioxide	% v/v	**Dry** 6.42	0.31					
Oxygen	% v/v	**Dry** 12.29	0.34					
Water Vapour	% v/v	10.8	0.5					
Stack Gas Temperature	°C	356.7						
Stack Gas Velocity	m/s	37.9	0.79					
Volumetric Flow Rate (ACTUAL)	m³/hr	36036	1797	**Limit**				
Volumetric Flow Rate (REF) [1]	m³/hr	19941	995	-				

NOTE: VOLUMETRIC FLOW RATE & VELOCITY DATA TAKEN FROM THE PRELIMINARY VELOCITY TRAVERSE.

[1] Reference Conditions (REF) are: 273K, 101.3kPa, dry gas, 15% oxygen.

MONITORING DATE(S) & TIMES

Runways Information Services Limited, Clonee
CLN2 EG-N3
9th December 2024

Parameter		Units	Concentration	Units	Mass Emission	Sampling Date(s)	Sampling Times	Duration mins
Oxides of Nitrogen (as NO_2)	R1	mg/m^3	838.2	g/hr	16714.6	09/12/2024	12:40 - 13:40	60
Carbon Monoxide	R1	mg/m^3	45.0	g/hr	897.0	09/12/2024	12:40 - 13:40	60
Carbon Dioxide	R1	% v/v	6.42			09/12/2024	12:40 - 13:40	60
Oxygen	R1	% v/v	12.29			09/12/2024	12:40 - 13:40	60
Water Vapour	R1	% v/v	10.8			09/12/2024	13:30 - 14:00	30
Velocity Traverse	R1					09/12/2024	13:45 - 13:55	

All results are expressed at the respective reference conditions.

PROCESS DETAILS

Runways Information Services Limited, Clonee
CLN2 EG-N3
9th December 2024

Standard Operating Conditions

Parameter	Value
Process Status	Generator
Capacity (of 100%) and Tonnes / Hour	N/A
Continuous or Batch Process	Batch, as required
Feedstock (if applicable)	N/A
Abatement System	N/A
Abatement System Running Status	N/A
Fuel	Natural Gas
Plume Appearance	None

MONITORING & ANALYTICAL METHODS

Runways Information Services Limited, Clonee
CLN2 EG-N3
9th December 2024

	Monitoring				Analysis					
Parameter	**Standard**	**Technical Procedure**	**Sampling Status**	**Testing Lab**	**Analytical Procedure**	**Analytical Technique**	**Analysis Status**	**Analysis Lab**	**Overall Status**	**LOD (Average)**
Water Vapour	EN 14790	MD 005	MCERTS	EDU	MD 005	Gravimetric	MCERTS	EDU	MCERTS	0.10 % v/v
Oxides of Nitrogen (as NO_2)	EN 14792	MD 039	MCERTS	EDU	Chemiluminescence by Horiba PG-350E				MCERTS	0.41 mg/m³
Carbon Monoxide	EN 15058	MD 039	MCERTS	EDU	NDIR by Horiba PG-350E				MCERTS	0.65 mg/m³
Carbon Dioxide	CEN/TS 17405	MD 039	MCERTS	EDU	NDIR by Horiba PG-350E				MCERTS	0.1 %
Oxygen	EN 14789	MD 039	MCERTS	EDU	Dry Paramagnetic Cell by Horiba PG-350E				MCERTS	0.1 %
Velocity & Vol. Flow Rate	EN 16911-1 (MID)	MD 041	MCERTS	EDU	Pitot Tube and Thermocouple				MCERTS	3.0 m/s

ANALYSIS LABORATORIES

(with short name reference as appears in the table above)

Element (Dublin Lab - EDU)	ISO 17025 Accreditation Number: INAB 393T

SUMMARY OF SAMPLING DEVIATIONS

Parameter	Run	Deviation
All	1	There are no deviations associated with the sampling employed.

SUITABILITY OF SAMPLING LOCATION

Duct Characteristics

Parameter	Units	Value
Type	-	Circular
Depth	m	0.58
Width	m	-
Area	m²	0.26
Port Depth	cm	8
Orientation of Duct	-	Vertical
Number of Ports	-	2
Sample Port Size	-	4" BSP

Location of Sampling Platform

General Platform Information	Value
Permanent / Temporary Platform	Temporary
Inside / Outside	Outside

Platform Details

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

Sampling Location / Platform Improvement Recommendations

Although this platform does not meet the requirements in the Environment Agency's Technical Guidance Note M1 and EN 15259, it is adequate for the testing carried out on this stack. Ports are beyond the handrail, so some drop protection would be required.

EN 15259 Homogeneity Test Requirements

There is no requirement to perform a EN 15259 Homogeneity Test on this Stack.

Sampling Plane Validation Criteria (from EN 15259)

Criteria in EN 15259	Units	Traverse 1	Required	Compliant
Lowest Differential Pressure	Pa	494.0	> 5 Pa	Yes
Mean Velocity	m/s	37.89	-	-
Lowest Gas Velocity	m/s	36.22	-	-
Highest Gas Velocity	m/s	39.69	-	-
Ratio of Above	: 1	1.10	< 3 : 1	Yes
Maximum Angle of Swirl	°	6.00	< 15°	Yes
No Local Negative Flow	-	Yes	-	Yes

PLANT PHOTOS

Photo 1



Photo 2



Photo 3

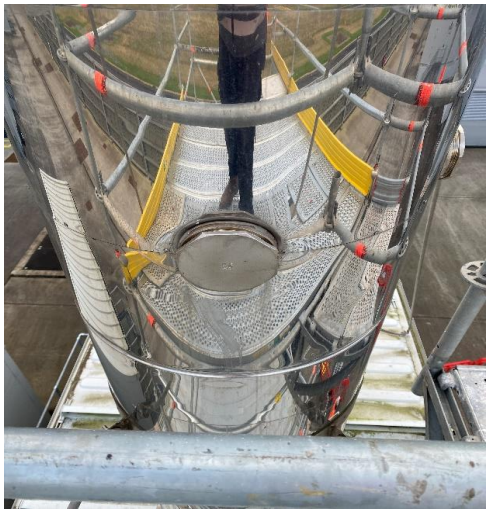
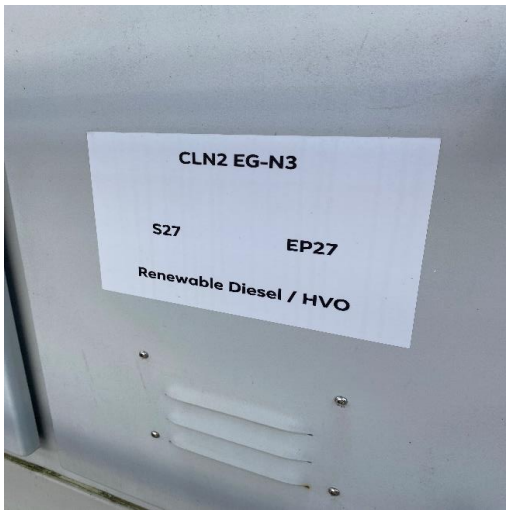
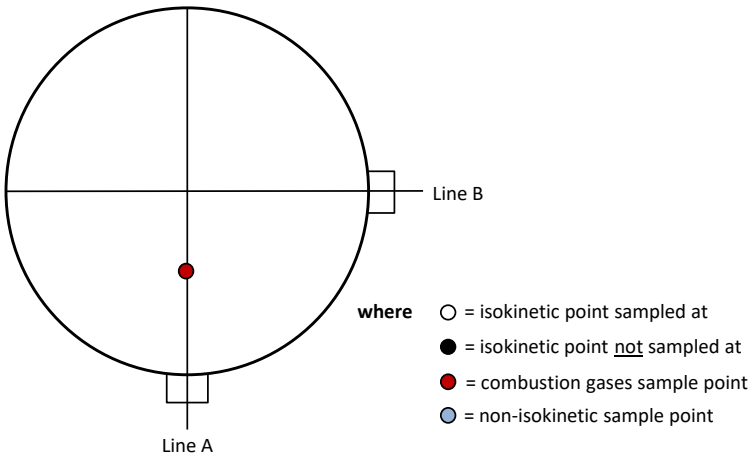


Photo 4



SAMPLE POINTS



APPENDIX CONTENTS

APPENDIX 1 - Stack Emissions Monitoring Personnel, List of Equipment & Methods and Technical Procedures Used

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

APPENDIX 1

STACK EMISSIONS MONITORING PERSONNEL

Position	Name	MCERTS Accreditation	MCERTS Number	Technical Endorsements
Team Leader	John Glennon	MCERTS Level 2	MM 10 1074	TE1 TE2 & TE3
Team Leader	Radek Chromik	MCERTS Level 2	MM 23 1801	TE1 TE3 TE4

LIST OF EQUIPMENT

Extractive Sampling	
Equipment Type	**Equipment I.D.**
Control Box DGM (1)	-
Control Box DGM (2)	-
Box Thermocouples (1)	-
Box Thermocouples (2)	-
Umbilical (1)	-
Umbilical (2)	-
Oven Box (1)	-
Oven Box (2)	-
Heated Probe (1)	-
Heated Probe (2)	-
Heated Probe (3)	-
S-Pitot (1)	CAT 21P.188
S-Pitot (2)	-
L-Pitot	-
Site Balance	CAT 17.24
500g / 1Kg Check Weights	CAT 17.24
Last Impinger Arm	-
Callipers	-
Tubes Kit Thermocouple	-

Instrumental Analysers	
Equipment Type	**Equipment I.D.**
Horiba PG-350E	CAT 39.14
SELECT Horiba Model (2)	-
SELECT Servomex Model	-
SELECT NOX Analyser/Convertor	-
ABB AO2020-URAS26	-
Testo 350 XL	-
JCT JCC P1 Cooler	CAT 4.1618
SELECT FTIR	-
Gasmet Sampling System	-
SELECT FID Model	-
M&C PSS	CAT 12.134
Mass Flow Controller (1)	CAT 6.1
Mass Flow Controller (2)	CAT 6.103
Mass View (1)	-
Mass View (2)	CAT 25.37
SELECT Logger 1	-
SELECT Logger 2	-
Bioaerosols Temperature Logger	-
Electronic Refrigerator	-

Miscellaneous Items	
Equipment Type	**Equipment I.D.**
Digital Manometer (1)	CAT 3.260
Digital Manometer (2)	-
Digital Temperature Meter	CAT 3.260
Stopwatch	CAT 14.53
Barometer	CAT 13.27
Stack Thermocouple (1)	CAT 4.1691
Stack Thermocouple (2)	-
Stack Thermocouple (3)	-
1m Heated Line (1)	-
1m Heated Line (2)	-
1m Heated Line (3)	-
5m Heated Line (1)	-
15m Heated Line (1)	-
20m Heated Line (1)	CAT 20.248
20m Heated Line (2)	-
Dual Channel Heater Controller	-
Single Channel Heater Controller	CAT 20.248
Laboratory Balance	
Tape Measure	CAT 16.35

METHODS & TECHNICAL PROCEDURES USED

Parameter	Standard	Technical Procedure
Water Vapour	EN 14790	MD 005
Oxides of Nitrogen (as NO_2)	EN 14792	MD 039
Carbon Monoxide	EN 15058	MD 039
Carbon Dioxide	CEN/TS 17405	MD 039
Oxygen	EN 14789	MD 039
Velocity & Vol. Flow Rate	EN 16911-1 (MID)	MD 041

PRELIMINARY STACK SURVEY: CALCULATIONS

General Stack Details

Stack Details (from Traverse)	Units	Value
Stack Diameter / Depth, D	m	0.58
Stack Width, W	m	-
Stack Area, A	m²	0.26
Average Stack Gas Temperature, T_a	°C	356.7
Average Stack Gas Pressure	Pa	541.3
Average Stack Static Pressure, P_{static}	kPa	-0.434
Average Barometric Pressure, P_b	kPa	100.3
Average Pitot Tube Calibration Coefficient, C_p	-	0.85

Stack Gas Composition & Molecular Weights

Component	Conc ppm	Conc Dry % v/v	Conc Wet % v/v	Volume Fraction r	Molar Mass M	Density kg/m³ p	Conc kg/m³ p_i
CO_2	-	6.42	5.72	0.0642	44.01	1.9635	0.12598
O_2	-	12.29	10.96	0.1229	32.00	1.4277	0.17544
N_2	-	81.30	72.49	0.8130	28.01	1.2498	1.01606
Moisture (H_2O)	-	-	10.83	0.1083	18.02	0.8037	0.08707

Where: $p = M / 22.41$

$p_i = r \times p$

Calculation of Stack Gas Densities

Determinand	Units	Result
Dry Density (STP), P_{STD}	kg/m³	1.317
Wet Density (STP), P_{STW}	kg/m³	1.262
Dry Density (Actual), P_{Actual}	kg/m³	0.563
Average Wet Density (Actual), $P_{ActualW}$	kg/m³	0.539

Where: P_{STD} = sum of component concentrations, kg/m³ (not including water vapour)

P_{STW} = sum of all wet concentrations / 100 x density, kg/m³ (including water vapour)

$P_{Actual} = P_{STD} \times (T_{STP} / (P_{STP})) \times ((P_{static} + P_b) / T_a)$

$P_{ActualW}$ (at each sampling point) $= P_{STW} \times (T_s / P_s) \times (P_a / T_a)$

Calculation of Stack Gas Volumetric Flowrate, Q

Duct gas flow conditions	Units	Actual	REF [1]
Temperature	°C	356.7	0.0
Total Pressure	kPa	99.9	101.3
Moisture	%	10.83	0.00
Oxygen (Dry)	%	12.3	15.0

Gas Volumetric Flowrate (from Traverse)	Units	Result
Gas Volumetric Flowrate (Actual)	m³/hr	36036
Gas Volumetric Flowrate (STP, Wet)	m³/hr	15403
Gas Volumetric Flowrate (STP, Dry)	m³/hr	13735
Gas Volumetric Flowrate REF [1]	m³/hr	19941

APPENDIX 2

PRELIMINARY STACK SURVEY: VELOCITY TRAVERSE TO EN 16911-1 (MID)

(1 of 1)

Parameter	Units	Value
Date of Survey	-	09/12/2024
Time of Survey	-	13:45 - 13:55
Atmospheric Pressure	kPa	100.3
Average Stack Static Pressure	Pa	-434
Result of Pitot Stagnation Test	-	Pass
Are Water Droplets Present?	-	No
Device Used	S-Type Pitot with KIMO MP 200 (10000Pa)	

Parameter	Units	Value
Initial Pitot Leak Check	-	Pass
Final Pitot Leak Check	-	Pass
Orientation of Duct	-	Vertical
Pitot Tube, C_p	-	0.85
Number of Lines Available	-	2
Number of Lines Used	-	2

		Sampling Line A					Sampling Line B				
Traverse Point	**Depth m**	**ΔP Pa**	**Temp °C**	**Wet Density kg/m³**	**Velocity m/s**	**Swirl °**	**ΔP Pa**	**Temp °C**	**Wet Density kg/m³**	**Velocity m/s**	**Swirl °**
STATIC (Units: Pa)		*-438.0*					*-430.0*				
Mean		**501.5**	**356.6**	**0.539**	**36.49**		**581.0**	**356.7**	**0.539**	**39.28**	
1	0.08	494.0	356.6	0.539	36.22	6.0	569.0	356.7	0.539	38.88	4.0
2	0.50	509.0	356.6	0.539	36.77	5.0	593.0	356.7	0.539	39.69	6.0

APPENDIX 2

PRELIMINARY STACK SURVEY: VELOCITY TRAVERSE TO EN 16911-1 (MID) - MEASUREMENT UNCERTAINTY

(1 of 1)

Performance characteristics (Uncertainty Components)	Uncertainty	Value	Units
Standard Uncertainty on the coefficient of the Pitot Tube	u(k)	0.005	-
Standard Uncertainty associated with the mean local dynamic pressures	u(Δpi)	11.734	Pa
- Resolution	u(res)	0.08677	
- Calibration	u(cal)	30.503	
- Drift	u(drift)	33.333	
- Lack of Fit	u(fit)	72.767	
- Overall corrections to dynamic measurements	u(Cf)	136.690	
Standard uncertainty associated with the molar mass of the gas	u(M)	0.00006	-
- $\varphi O_2,w$	-	10.958	
- $\varphi CO_2,w$	-	5.721	
- Oxygen, dry	u(ϕO_2,d)	0.376	
- Carbon Dioxide, dry	u(ϕCO_2,d)	0.196	
- Water Vapour	u(ϕH_2O)	0.553	
- Oxygen, wet	u(ϕO_2,w)	0.342	
- Carbon Dioxide, wet	u(ϕCO_2,w)	0.179	
Standard uncertainty associated with the stack temperature	u(Tc)	3.213	K
Standard uncertainty associated with the absolute pressure in the duct	u(pc)	175.888	Pa
- Atmospheric Pressure	u(patm)	175.692	
- Static Pressure	u(pstat)	8.297	
Standard uncertainty associated with the density in the duct	u(ρ)	0.00291	-
Standard uncertainty associated with the local velocities	u(vi)	0.540	Pa
Standard uncertainty associated with the mean velocity	u(v)	0.405	m/s
Standard uncertainty associated with the mean velocity (95% Confidence)	Uc(v)	0.794	m/s
Standard uncertainty associated with the mean velocity (95% Confidence), relative	Uc,rel(v)	2.10	%
Standard uncertainty associated with the volume flow rate (95% Confidence)	Uc(qV,w)	1797.4	m^3/hr
- $u^2(a)/a^2$	-	0.00053	
- $u^2(qV,w)/q^2V,w$	-	0.00065	
- $u^2(qV,w)$	-	840966	
- $u(qV,w)$	-	917.0	
Standard uncertainty associated with the volume flow rate (95% Confidence), relative	Uc,rel(qV,w)	4.99	%

APPENDIX 2

WATER VAPOUR: RESULTS SUMMARY

Runways Information Services Limited, Clonee

CLN2 EG-N3

Sample Runs

Parameter	Units	Run 1		Mean
Concentration	% v/v	10.83		10.83
Uncertainty	±% v/v	0.47		0.47

General Sampling Information

Parameter	Value
Standard	EN 14790
Technical Procedure	MD 005

WATER VAPOUR: SAMPLING DETAILS

Sample Runs

Parameter	Units	Run 1
Sampling Times	-	13:30 - 14:00
Sampling Dates	-	09/12/2024
Sampling Device	-	MFC / MV
Duration	mins	30
Volume Sampled (STP, Dry)	m^3	0.2892
Volume Sampled (STP, Wet)	m^3	0.3244
Sample Flow Rate	l/min	9.44
Liquid Trap Start Mass	g	3468.8
Liquid Trap End Mass	g	3493.6
Silica Trap Start Mass	g	1102.8
Silica Trap End Mass	g	1106.2
Total Mass Of Water Vapour	g	28.2
Calculated Water Vapour	% v/v	10.83

Where: MFC stands for Mass Flow Controller, MV stands for Mass View Flowmeter

WATER VAPOUR: QUALITY ASSURANCE

Sample Runs

Leak Test Results	Units	Run 1
Mean Sampling Rate	l/min	9.4
Pre-Sampling Leak Rate	l/min	0.10
Post-Sampling Leak Rate	l/min	0.10
Allowable Leak Rate	l/min	0.19
Leak Test Acceptable	-	Yes

Water Droplets	Units	Run 1
Are Water Droplets Present	-	No

Measurement Uncertainty	Units	Run 1
Measurement Uncertainty (MU)	%	4.3
Allowable MU	%	20.0
MU Acceptable	%	Yes

Silica Gel	Units	Run 1
Less than 50% Faded	%	Yes

Test Conditions	Units	Run 1
Ambient Temperature Recorded?	-	Yes

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

WATER VAPOUR: MEASUREMENT UNCERTAINTY CALCULATIONS

	Value			Standard uncertainty			
Measured Quantities	**Symbol**	**Run 1**		**Symbol**	**Units**	**Run 1**	
Sampled Volume (STP)	V_m	0.2892		uV_m	m^3	0.0058	
Repeatability of Weighing	R_w	28.20		uR_w	g	0.12	
Reading of Balance	R_b	28.20		uR_b	g	0.14	
Leak	L	1.06			%	-	

	Uncertainty as a Percentage			
Measured Quantities	**Units**	**Run 1**		**Requirement of Standard**
Sampled Volume (STP)	%	2.00		≤2%
Repeatability of Weighing	%	0.43		No Requirement
Reading of Balance	%	0.50		No Requirement
Leak	%	1.06		≤2%

	Uncertainty in Measurement Units				Sensitivity Coefficient
Measured Quantities	**Symbol**	**Units**	**Run 1**		**Run 1**
Sampled Volume (STP)	V_m	m^3	0.2892		37.45
Repeatability of Weighing	R_w	g	28.20		0.38
Reading of Balance	R_b	g	28.20		0.38
Leak	L	% v/v	0.07		1.00

	Uncertainty in Result		
Measured Quantities	**Units**	**Run 1**	
Sampled Volume (STP)	% v/v	0.217	
Repeatability of Weighing	% v/v	0.046	
Reading of Balance	% v/v	0.054	
Leak	% v/v	0.066	

Parameter	**Units**	**Run 1**
Combined uncertainty	% v/v	0.24
Expanded uncertainty (95% confidence)	% v/v	0.47
Expanded uncertainty (95% confidence), estimated with Method Deviations	% v/v	0.47
Uncertainty if Water Droplets are present	% v/v	N/A
Reported Uncertainty	% v/v	0.47
Expanded uncertainty (95% confidence)	%	4.3
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	4.3
Uncertainty if Water Droplets are present	%	N/A
Reported Uncertainty	%	4.3

APPENDIX 2

OXIDES OF NITROGEN (as NO_2): RESULTS SUMMARY

Runways Information Services Limited, Clonee
CLN2 EG-N3

Sample Runs

Parameter	Units	Run 1		Mean
Concentration	mg/m³	838.20		838.20
Uncertainty	±mg/m³	32.84		32.84
Mass Emission	g/hr	16714.6		16714.6
Uncertainty	±g/hr	1060.1		1060.1

General Sampling Information

Parameter	Value	
Standard	EN 14792	
Technical Procedure	MD 039	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
Date & Result of Last Converter Check	28/08/2024 - 95%	
Span Gas Type	Nitrogen Monoxide	
Span Gas Reference Number	12.0632	
Span Gas Expiry Date	22/03/2026	
Span Gas Start Pressure (bar)	20	
Gas Cylinder Concentration (ppm)	416.5	NOTE: Dilution performed to achieve correct span value
Span Gas Uncertainty (%)	2	
Zero Gas Type	Nitrogen (5 Grade)	
Number of Sampling Lines Used	1 / 2	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 4	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

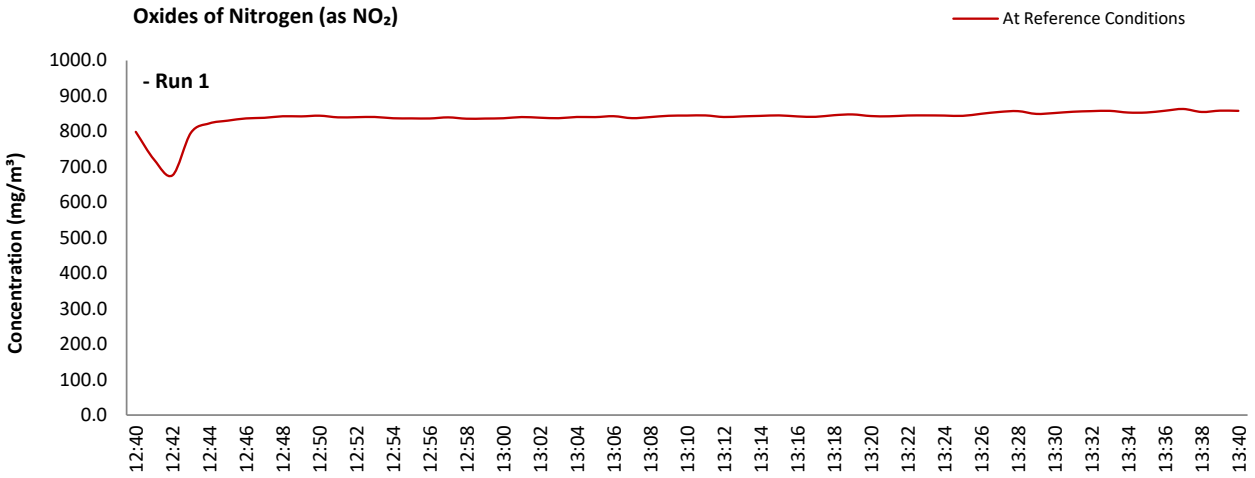
Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 15% oxygen.

APPENDIX 2

OXIDES OF NITROGEN (as NO_2): DATA TREND

Graphical Trend of Data



OXIDES OF NITROGEN (as NO_2): SAMPLING DETAILS & QUALITY ASSURANCE

Sampling Details

Parameter	Units	Run 1
Sampling Times	-	12:40 - 13:40
Sampling Dates	-	09/12/2024
Instrument Range	ppm	100
Span Gas Value	ppm	80.0

Quality Assurance

Conditioning Unit Temperature	Units	Run 1
Average Temperature	°C	1.9
Allowable Temperature	< °C	4.0
Temperature Acceptable	-	Yes

	Zero Drift	Units	Run 1
CAL 1	Zero at Analyser (Pre)	ppm	0.00
CAL 1	Zero at Analyser (Post)	ppm	2.80
CAL 1	Zero Drift	ppm	2.80
CAL 1	Zero Drift	%	3.50
CAL 1	Drift Correction Applied	2-5%	Yes
	Allowable Zero Drift	± %	5.00
	Zero Drift Acceptable	-	Yes

	Span Drift	Units	Run 1
CAL 1	Span at Analyser (Pre)	ppm	80.00
CAL 1	Span at Analyser (Post)	ppm	80.00
CAL 1	Span Drift	ppm	0.00
CAL 1	Zero Adj. Span Drift	%	3.50
CAL 1	Drift Correction Applied	2-5%	Yes
	Allowable Span Drift	± %	5.00
	Span Drift Acceptable	-	Yes

Test Conditions	Units	Run 1
Run Ambient Temperature Range	°C	9

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

APPENDIX 2

OXIDES OF NITROGEN (as NO_2): MEASUREMENT UNCERTAINTY CALCULATIONS

Performance characteristics	RUN 1		Units
Limit value	-		mg/m³ (REF)
Allowable MU	10.0		%
Measured concentration	1216.97		mg/m³ (STP, dry)
Ratio NO / NO_2	5		%
Range Used	100.0		ppm
Range Used [A]	205.2		mg/m³
Cal gas conc.	80.0		ppm
Conversion	2.05		ppm to mg/m³
MCERTS Range [B]	205.0		mg/m³
Lower of [A] or [B]	205.0		mg/m³
Cal gas conc.	164.2		mg/m³

Performance characteristics	RUN 1		Units
Response time	31		seconds
Number of readings in measurement	60		-
Repeatability at zero	0.00		% full scale
Repeatability at span level	0.10		% full scale
Deviation from linearity	0.18		% of value
Zero drift	0.00		% full scale
Span drift	0.00		% full scale
Volume or pressure flow dependence	0.10		% of full scale
Atmospheric pressure dependence	0.10		% of value/kPa
Ambient temperature dependence	0.04		% full scale/10K
Combined interference	0.63		% range
Dependence on voltage	-0.23		% full scale/10V
Converter efficiency	95.0		%
Losses in the line (leak)	0.37		% of value
Uncertainty of calibration gas blending	1.40		% of value
Uncertainty of calibration gas	2.00		% of value

Performance characteristic	RUN 1		Units
Standard deviation of repeatability at zero	use rep at span		mg/m³
Standard deviation of repeatability at span level	0.01		mg/m³
Lack of fit	0.21		mg/m³
Drift	0.00		mg/m³
Volume or pressure flow dependence	0.00		mg/m³
Atmospheric pressure dependence	0.06		mg/m³
Ambient temperature dependence	0.01		mg/m³
Combined interference (from MCERTS Certificate)	0.75		mg/m³
Dependence on voltage	-0.03		mg/m³
Converter efficiency	1.76		mg/m³
Losses in the line (leak)	2.63		mg/m³
Uncertainty of calibration gas blending	9.84		mg/m³
Uncertainty of calibration gas	14.05		mg/m³

			RUN 1		Units
Measurement uncertainty		**Result**	1216.97		mg/m³
Combined uncertainty			17.46		mg/m³
Expanded uncertainty	k =	1.96	34.22		mg/m³
Uncertainty corrected to std conds. (O_2)			23.57		mg/m³ (REF)

	RUN 1		Units
Expanded uncertainty (no O_2) - at 95% Confidence	2.81		% of Value
Expanded uncertainty (no O_2) - at 95% Confidence	N/A		% at ELV
Overall Allowable uncertainty (no O_2) - at 95% Confidence	N/A		% at ELV
Result of Compliance with Uncertainty Requirement	**N/A**		-

	RUN 1		Units
Expanded uncertainty (with O_2) - at 95% Confidence	3.92		% of Value
Expanded uncertainty (with O_2) - at 95% Confidence	N/A		% at ELV
Overall Allowable uncertainty (with O_2) - at 95% Confidence	N/A		% at ELV
Result of Compliance with Uncertainty Requirement	**N/A**		-

Requirement for SRM is that Uncertainty should be <10% of the value at the ELV, on a dry gas basis, or if O_2 correction is applied less than 10% + the uncertainty associated with the O_2 correction (using sqrt of sum squares to add uncertainty components).

APPENDIX 2

CARBON MONOXIDE: RESULTS SUMMARY

Runways Information Services Limited, Clonee
CLN2 EG-N3

Sample Runs

Parameter	Units	Run 1		Mean
Concentration	mg/m³	44.98		44.98
Uncertainty	±mg/m³	2.11		2.11
Mass Emission	g/hr	897.0		897.0
Uncertainty	±g/hr	61.5		61.5

General Sampling Information

Parameter	Value	
Standard	EN 15058	
Technical Procedure	MD 039	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
Span Gas Type	Carbon Monoxide	
Span Gas Reference Number	12.0632	
Span Gas Expiry Date	22/03/2026	
Span Gas Start Pressure (bar)	20	
Gas Cylinder Concentration (ppm)	418.5	NOTE: Dilution performed to achieve correct span value
Span Gas Uncertainty (%)	2	
Zero Gas Type	Nitrogen (5 Grade)	
Number of Sampling Lines Used	1 / 2	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 4	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

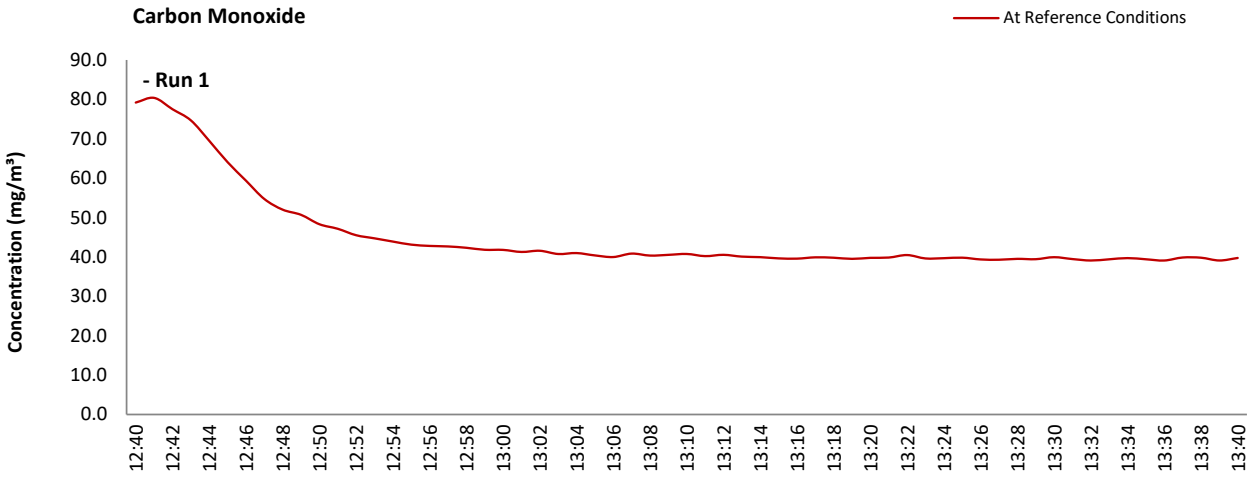
Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 15% oxygen.

APPENDIX 2

CARBON MONOXIDE: DATA TREND

Graphical Trend of Data



APPENDIX 2

CARBON MONOXIDE: SAMPLING DETAILS & QUALITY ASSURANCE

Sampling Details

Parameter	Units	Run 1
Sampling Times	-	12:40 - 13:40
Sampling Dates	-	09/12/2024
Instrument Range	ppm	100
Span Gas Value	ppm	80.0

Quality Assurance

Conditioning Unit Temperature	Units	Run 1
Average Temperature	°C	1.9
Allowable Temperature	< °C	4.0
Temperature Acceptable	-	Yes

	Zero Drift	Units	Run 1
CAL 1	Zero at Analyser (Pre)	ppm	0.00
CAL 1	Zero at Analyser (Post)	ppm	0.10
CAL 1	Zero Drift	ppm	0.10
CAL 1	Zero Drift	%	0.13
CAL 1	Drift Correction Applied	2-5%	No
	Allowable Zero Drift	± %	5.00
	Zero Drift Acceptable	-	Yes

	Span Drift	Units	Run 1
CAL 1	Span at Analyser (Pre)	ppm	80.00
CAL 1	Span at Analyser (Post)	ppm	78.70
CAL 1	Span Drift	ppm	-1.30
CAL 1	Zero Adj. Span Drift	%	1.75
CAL 1	Drift Correction Applied	2-5%	No
	Allowable Span Drift	± %	5.00
	Span Drift Acceptable	-	Yes

Test Conditions	Units	Run 1
Run Ambient Temperature Range	°C	9

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

CARBON MONOXIDE: MEASUREMENT UNCERTAINTY CALCULATIONS

Performance characteristics	RUN 1		Units
Limit value	-		mg/m³ (REF)
Allowable MU	6.0		%
Measured concentration	65.31		mg/m³ (STP, dry)
Range Used	100.0		ppm
Range Used [A]	124.9		mg/m³
Cal gas conc.	80.0		ppm
Conversion	1.25		ppm to mg/m³
MCERTS Range [B]	75.0		mg/m³
Lower of [A] or [B]	75.0		mg/m³
Cal gas conc.	99.9		mg/m³

Performance characteristics	RUN 1		Units
Response time	28		seconds
Number of readings in measurement	60		-
Repeatability at zero	0.10		% full scale
Repeatability at span level	0.20		% full scale
Deviation from linearity	0.57		% of value
Zero drift	0.13		% full scale
Span drift	-1.75		% full scale
Volume or pressure flow dependence	0.10		% of full scale
Atmospheric pressure dependence	0.22		% of value/kPa
Ambient temperature dependence	-0.20		% full scale/10K
Combined interference	-0.48		% range
Dependence on voltage	-0.35		% full scale/10V
Losses in the line (leak)	1.50		% of value
Uncertainty of calibration gas blending	1.40		% of value
Uncertainty of calibration gas	2.00		% of value

Performance characteristic	RUN 1		Units
Standard deviation of repeatability at zero	use rep at span		mg/m³
Standard deviation of repeatability at span level	0.03		mg/m³
Lack of fit	0.25		mg/m³
Drift	-0.59		mg/m³
Volume or pressure flow dependence	0.00		mg/m³
Atmospheric pressure dependence	0.05		mg/m³
Ambient temperature dependence	-0.03		mg/m³
Combined interference (from MCERTS Certificate)	-0.21		mg/m³
Dependence on voltage	-0.04		mg/m³
Losses in the line (leak)	0.57		mg/m³
Uncertainty of calibration gas blending	0.53		mg/m³
Uncertainty of calibration gas	0.75		mg/m³

			RUN 1		Units
Measurement uncertainty		**Result**	65.31		mg/m³
Combined uncertainty			1.27		mg/m³
Expanded uncertainty	k =	1.96	2.50		mg/m³
Uncertainty corrected to std conds. (O_2)			1.72		mg/m³ (REF)

	RUN 1		Units
Expanded uncertainty (no O_2) - at 95% Confidence	3.82		% of Value
Expanded uncertainty (no O_2) - at 95% Confidence	N/A		% at ELV
Overall Allowable uncertainty (no O_2) - at 95% Confidence	N/A		% at ELV
Result of Compliance with Uncertainty Requirement	**N/A**		-

	RUN 1		Units
Expanded uncertainty (with O_2) - at 95% Confidence	4.70		% of Value
Expanded uncertainty (with O_2) - at 95% Confidence	N/A		% at ELV
Overall Allowable uncertainty (with O_2) - at 95% Confidence	N/A		% at ELV
Result of Compliance with Uncertainty Requirement	**N/A**		-

Requirement for SRM is that Uncertainty should be <6% of the value at the ELV, on a dry gas basis, or if O_2 correction is applied less than 6% + the uncertainty associated with the O_2 correction (using sqrt of sum squares to add uncertainty components).

APPENDIX 2

CARBON DIOXIDE: RESULTS SUMMARY

Runways Information Services Limited, Clonee
CLN2 EG-N3

Sample Runs

Parameter	Units	Run 1		Mean
Concentration	% v/v	6.42		6.42
Uncertainty	±% v/v	0.31		0.31

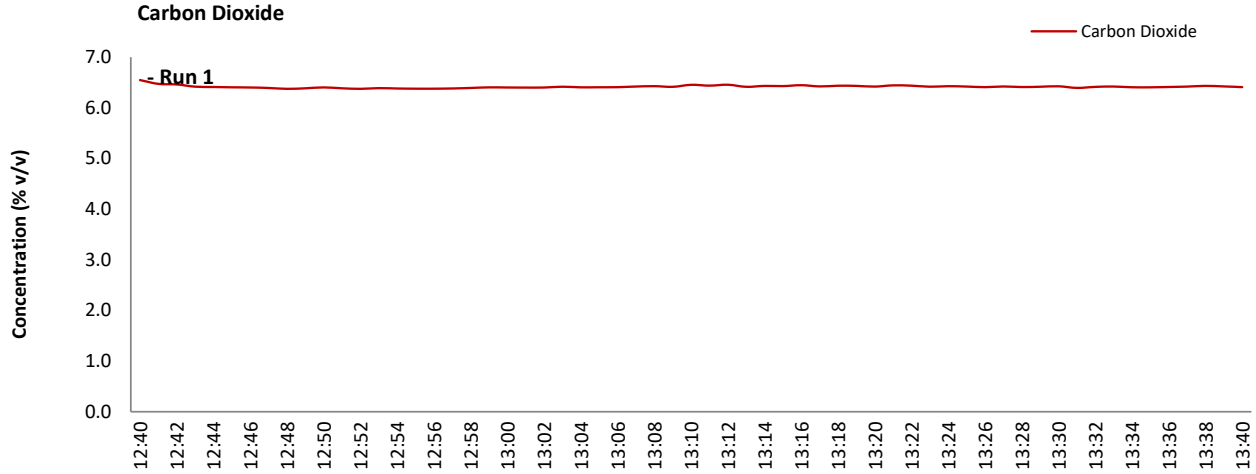
General Sampling Information

Parameter	Value	
Standard	CEN/TS 17405	
Technical Procedure	MD 039	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
Span Gas Type	Carbon Dioxide	
Span Gas Reference Number	6.0098	
Span Gas Expiry Date	29/09/2028	
Span Gas Start Pressure (bar)	100	
Gas Cylinder Concentration (% v/v)	16.30	
Span Gas Uncertainty (%)	2.00	
Zero Gas Type	Nitrogen (5 Grade)	
Number of Sampling Lines Used	1 / 2	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 4	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

APPENDIX 2

CARBON DIOXIDE: DATA TREND

Graphical Trend of Data



APPENDIX 2

CARBON DIOXIDE: SAMPLING DETAILS & QUALITY ASSURANCE

Sampling Details

Parameter	Units	Run 1
Sampling Times	-	12:40 - 13:40
Sampling Dates	-	09/12/2024
Instrument Range	% v/v	20
Span Gas Value	% v/v	16.3

Quality Assurance

Conditioning Unit Temperature	Units	Run 1
Average Temperature	°C	1.9
Allowable Temperature	< °C	4.0
Temperature Acceptable	-	Yes

	Zero Drift	Units	Run 1
CAL 1	Zero Down Sampling Line (Pre)	% v/v	0.00
CAL 1	Zero Down Sampling Line (Post)	% v/v	0.07
CAL 1	Zero Drift	% v/v	0.07
CAL 1	Zero Drift	%	0.43
CAL 1	Drift Correction Applied	2-5%	No
	Allowable Zero Drift	± %	5.00
	Zero Drift Acceptable	-	Yes

	Span Drift	Units	Run 1
CAL 1	Span Down Sampling Line (Pre)	% v/v	16.13
CAL 1	Span Down Sampling Line (Post)	% v/v	16.56
CAL 1	Span Drift	% v/v	0.43
CAL 1	Zero Adj. Span Drift	%	1.17
CAL 1	Drift Correction Applied	2-5%	No
	Allowable Span Drift	± %	5.00
	Span Drift Acceptable	-	Yes

Test Conditions	Units	Run 1
Run Ambient Temperature Range	°C	9

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

APPENDIX 2

CARBON DIOXIDE: MEASUREMENT UNCERTAINTY CALCULATIONS

Performance characteristics	RUN 1		Units
Limit value	N/A		%vol
Allowable MU	25.0		%
Measured concentration	6.42		%vol
Range Used	20.0		%vol
Cal gas conc.	16.3		%vol

Performance characteristics	RUN 1		Units
Response time	29		seconds
Number of readings in measurement	60		-
Repeatability at zero	0.00		% full scale
Repeatability at span level	0.10		% full scale
Deviation from linearity	0.74		% of value
Zero drift	0.43		% full scale
Span drift	1.17		% full scale
Volume or pressure flow dependence	0.10		% of full scale
Atmospheric pressure dependence	0.30		% of value/kPa
Ambient temperature dependence	-0.20		% full scale/10K
Combined interference	0.00		% range
Dependence on voltage	0.40		% full scale/10V
Losses in the line (leak)	1.04		% of value
Uncertainty of calibration gas	2.00		% of value

Performance characteristic	RUN 1		Units
Standard deviation of repeatability at zero	use rep at span		%vol
Standard deviation of repeatability at span level	0.01		%vol
Lack of fit	0.09		%vol
Drift	0.08		%vol
Volume or pressure flow dependence	0.00		%vol
Atmospheric pressure dependence	0.02		%vol
Ambient temperature dependence	-0.03		%vol
Combined interference (from MCERTS Certificate)	0.00		%vol
Dependence on voltage	0.05		%vol
Losses in the line (leak)	0.04		%vol
Uncertainty of calibration gas	0.07		%vol

			RUN 1		Units
Measurement uncertainty		**Result**	6.42		%vol
Combined uncertainty			0.16		%vol
Expanded uncertainty	k =	1.96	0.31		%vol

	RUN 1		Units
Expanded uncertainty (no O_2) - at 95% Confidence	4.80		% of Value

APPENDIX 2

OXYGEN: RESULTS SUMMARY

Runways Information Services Limited, Clonee
CLN2 EG-N3

Sample Runs

Parameter	Units	Run 1		Mean
Concentration	% v/v	12.29		12.29
Uncertainty	±% v/v	0.34		0.34

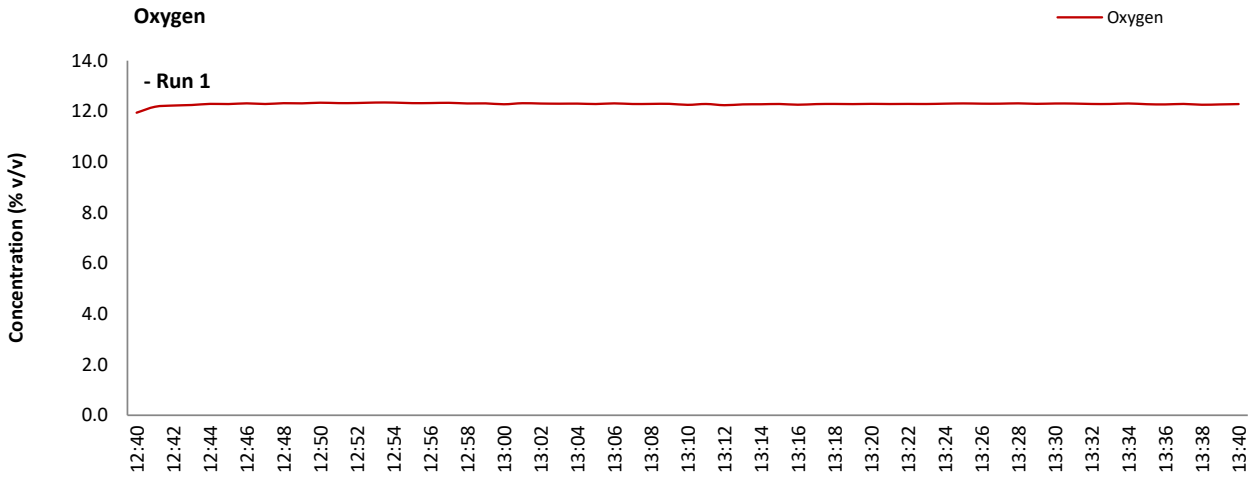
General Sampling Information

Parameter	Value	
Standard	EN 14789	
Technical Procedure	MD 039	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
Span Gas Type	Synthetic Air (5 Grade)	
Span Gas Reference Number	11.0532	
Span Gas Expiry Date	01/07/2027	
Span Gas Start Pressure (bar)	100	
Gas Cylinder Concentration (% v/v)	21.01	NOTE: Dilution performed to achieve correct span value
Span Gas Uncertainty (%)	2	
Zero Gas Type	Nitrogen (5 Grade)	
Number of Sampling Lines Used	1 / 2	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 4	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

APPENDIX 2

OXYGEN: DATA TREND

Graphical Trend of Data



APPENDIX 2

OXYGEN: SAMPLING DETAILS & QUALITY ASSURANCE

Sampling Details

Parameter	Units	Run 1
Sampling Times	-	12:40 - 13:40
Sampling Dates	-	09/12/2024
Instrument Range	% v/v	25.0
Span Gas Value	% v/v	15.0

Quality Assurance

Conditioning Unit Temperature	Units	Run 1
Average Temperature	°C	1.9
Allowable Temperature	< °C	4.0
Temperature Acceptable	-	Yes

	Zero Drift	Units	Run 1
CAL 1	Zero at Analyser (Pre)	% v/v	0.00
CAL 1	Zero at Analyser (Post)	% v/v	-0.07
CAL 1	Zero Drift	% v/v	-0.07
CAL 1	Zero Drift	%	0.46
CAL 1	Drift Correction Applied	2-5%	No
	Allowable Zero Drift	± %	5.00
	Zero Drift Acceptable	-	Yes

	Span Drift	Units	Run 1
CAL 1	Span at Analyser (Pre)	% v/v	15.10
CAL 1	Span at Analyser (Post)	% v/v	14.96
CAL 1	Span Drift	% v/v	-0.14
CAL 1	Zero Adj. Span Drift	%	0.47
CAL 1	Drift Correction Applied	2-5%	No
	Allowable Span Drift	± %	5.00
	Span Drift Acceptable	-	Yes

Test Conditions	Units	Run 1
Run Ambient Temperature Range	°C	9

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
There are no deviations associated with the sampling employed.	x	

APPENDIX 2

OXYGEN: MEASUREMENT UNCERTAINTY CALCULATIONS

Performance characteristics	RUN 1		Units
Limit value	N/A		%vol
Allowable MU	6.0		%
Measured concentration	12.29		%vol
Range Used	25.0		%vol
Cal gas conc.	21.0		%vol

Performance characteristics	RUN 1		Units
Response time	41		seconds
Number of readings in measurement	60		-
Repeatability at zero	0.02		% full scale
Repeatability at span level	0.02		% full scale
Deviation from linearity	0.02		% of value
Zero drift	-0.46		% full scale
Span drift	-0.47		% full scale
Volume or pressure flow dependence	0.10		% of full scale
Atmospheric pressure dependence	0.19		% of value/kPa
Ambient temperature dependence	-0.21		% full scale/10K
Combined interference	0.00		% range
Dependence on voltage	0.02		% full scale/10V
Losses in the line (leak)	0.00		% of value
Uncertainty of calibration gas	2.00		% of value

Performance characteristic	RUN 1		Units
Standard deviation of repeatability at zero	use rep at span		%vol
Standard deviation of repeatability at span level	0.00		%vol
Lack of fit	0.00		%vol
Drift	-0.09		%vol
Volume or pressure flow dependence	0.00		%vol
Atmospheric pressure dependence	0.01		%vol
Ambient temperature dependence	-0.03		%vol
Combined interference (from MCERTS Certificate)	0.00		%vol
Dependence on voltage	0.00		%vol
Losses in the line (leak)	0.00		%vol
Uncertainty of calibration gas	0.14		%vol

			RUN 1		Units
Measurement uncertainty		**Result**	12.29		%vol
Combined uncertainty			0.17		%vol
Expanded uncertainty	k =	1.96	0.34		%vol

	RUN 1		Units
Expanded uncertainty (no O_2) - at 95% Confidence	2.73		% of Value
Result of Compliance with Uncertainty Requirement	**COMPLIANT**		-

Requirement for SRM is that Uncertainty should be 0.3% vol absolute or 6% relative whichever is the lower, on a dry gas basis. Source, EN 14789.

VERSION HISTORY

Version Number	Record of changes made within this version of the document
V1	The original document issued to the client

FOLLOW-UP ACTIONS

The licensee is required to complete the actions outlined in this site visit report within the specified timeframes. Where required, the licensee shall also respond to actions specified in Compliance Investigations and/or submit a response to this site visit report via the EDEN system. The licensee shall maintain a documentary evidence, for review by the Agency, that the prescribed actions were completed within the required timeframe.

(i) Compliance Investigations

The Agency may generate a Compliance Investigation through the EDEN system and issue instructions and actions to the licensee. The licensee will receive notification when an instruction or action is issued and the licensee must respond to the actions within the Compliance Investigation within the specified timeframe.

(ii) Response to Site Visit Report

Where the licensee is requested to (or wishes to) respond to the Agency in relation to this site visit report, the licensee may select the 'Make a Response' link on the Site Visits page in EDEN where a .pdf document containing the response can be attached and submitted. The response should include details of the actions taken by the licensee to address the issues raised in this site visit report and the target completion dates. This Licensee Public Response provides the licensee with an opportunity to inform both the Agency and the public about the implementing of actions set out in the Agency site visit report. The response must be submitted **within 21 calendar days** of the issue date of this site visit report.

(iii) Publication of Reports

This site visit report will be published on the EPA's website, www.epa.ie, 30 calendar days after the site visit report issue date.

Any licensee response to this site visit report will be published on the EPA's website simultaneously (i.e. 30 calendar days after the site visit report issue date).

Please note that licensees are required to comply with the conditions of the licence at all times, and where non-compliance occurs, compliance must be restored within the shortest possible time. These actions will be verified during subsequent Agency visits. Please quote the above Inspection Reference Number in any correspondence in relation this Report.