UKAS ISO/IEC 17025 Accredited Testing Laboratory No. 4279
Exova Environmental (UK) Ltd trading as Exova Catalyst & Exova Catalyst Ireland
Unit C5, Emery Court, The Embankment Business Park, Stockport, SK4 3GL

Exova Catalyst, Unit 37, Evans Business Centre, Western Industrial Estate, Caerphilly, CF83 1BE
E: paul.martin@exova.com
Your Exova Catalyst Contact: Paul Martin (07827 332 630)

Stack Emissions Testing Report Commissioned by
Inbev UK Ltd

Installation Name & Address
Inbev UK Ltd
The Brewery
Magor
Newport
NP26 3RA

EPR Permit: BX 728IS

Stack Reference
A1- Boiler-1

Dates of the Monitoring Campaign
9th November 2018

Job Reference Number
CSW-3416

Report Written by
Darren Price Team Leader MCERTS Level 2 MM 03 176 TE1 TE2 TE3 TE4

Report Approved by
Martin Futter Team Leader MCERTS Level 2 MM 05 670 TE1 TE2 TE3 TE4

Report Date
23rd November 2018

Version
Version 1

Signature of Report Approver


CONTENTS

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

MONITORING OBJECTIVES

Inbev UK Ltd, Magor
A1- Boiler-1
9th November 2018

Overall Aim of the Monitoring Campaign

Exova Catalyst were commissioned by Inbev UK Ltd to carry out stack emissions testing on the A1- Boiler-1 at Magor.

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

Inbev UK Ltd, Magor
A1- Boiler-1
9th November 2018

where MU = Measurement Uncertainty associated with the Result

		Concentration			
Parameter	**Units**	**Result**		**MU +/-**	**Limit**
Oxides of Nitrogen (as NO_2) [1]	mg/m³	152		459	220
Carbon Monoxide [1]	mg/m³	>4524		13636	-
Oxygen	% v/v	**Dry**	0.16	0.49	

[1] Reference Conditions (REF) are: 273K, 101.3kPa, dry gas, 3% oxygen.

MONITORING DATE(S) & TIMES

Inbev UK Ltd, Magor
A1- Boiler-1
9th November 2018

Parameter		Units	Concentration		Sampling Date(s)	Sampling Times	Duration mins
Oxides of Nitrogen (as NO_2)	R1	mg/m^3	152.4		09/11/2018	10:30 - 11:30	60
Carbon Monoxide	R1	mg/m^3	>4524		09/11/2018	10:30 - 11:30	60
Oxygen	R1	% v/v	0.16		09/11/2018	10:30 - 11:30	60

All results are expressed at the respective reference conditions.

PROCESS DETAILS

Inbev UK Ltd, Magor
A1- Boiler-1
9th November 2018

Standard Operating Conditions

Parameter	Value
Process Status	Operational
Capacity (of 100%) and Tonnes / Hour	Lead Boiler-Load as required by production
Continuous or Batch Process	Continuous
Feedstock (if applicable)	-
Abatement System	None
Abatement System Running Status	N/A
Fuel	Natural gas
Plume Appearance	Not visible

Executive Summary

MONITORING & ANALYTICAL METHODS

Inbev UK Ltd, Magor
A1- Boiler-1
9th November 2018

	Monitoring				Analysis					
Parameter	**Standard**	**Technical Procedure**	**ISO 17025 Testing**	**Testing Lab**	**Analytical Procedure**	**Analytical Technique**	**ISO 17025 Analysis**	**Analysis Lab**	**MCERTS Testing**	**LOD (Average)**
Oxides of Nitrogen (as NO_2)	EN 14792	CAT-TP-21	Yes	CAT	Chemiluminescence by Horiba PG-250 SRM				Yes	0.41 mg/m³
Carbon Monoxide	EN 15058	CAT-TP-21	Yes	CAT	NDIR by Horiba PG-250 SRM				No	0.3 mg/m³
Oxygen	EN 14789	CAT-TP-21	Yes	CAT	Dry Paramagnetic Cell by Horiba PG-250 SRM				Yes	0.1 %

ANALYSIS LABORATORIES

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

Exova Catalyst (CAT)	ISO 17025 Accreditation Number: 4279

SUMMARY OF SAMPLING DEVIATIONS

Parameter	Run	Deviation
Carbon Monoxide	1	The concentration of carbon monoxide exceeded the maximunm range of the instrument (5000 ppm) at certain points during the test, hence the result is reported as a ">" value.
		The operating range of the instrument was increased to its maximum (5000 ppm) during the test period because of the higher than expected concenmtrations present.

SUITABILITY OF SAMPLING LOCATION

Duct Characteristics

Parameter	Units	Value
Type	-	Circular
Depth	m	1.29
Width	m	-
Area	m²	1.31
Port Depth	cm	5
Orientation of Duct	-	Vertical
Number of Ports	-	1
Sample Port Size	-	1" BSP

Location of Sampling Platform

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

Platform Details

EA Technical Guidance Note M1 / 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

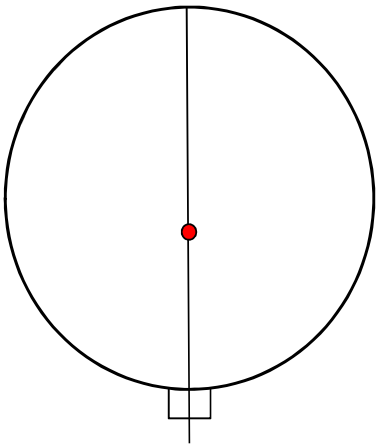
Sampling Location / Platform Improvement Recommendations

The sampling location meets all the requirements specified in EA Guidance Note M1 and EN 15259, and therefore there are no improvement recommendations.

EN 15259 Homogeneity Test Requirements

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

SAMPLE POINTS



where ○ = isokinetic point sampled at
● = isokinetic point not sampled at
● = combustion gases sample point
● = non-isokinetic sample point

APPENDIX CONTENTS

STACK EMISSIONS MONITORING PERSONNEL

Position	Name	MCERTS Accreditation	MCERTS Number	Technical Endorsements
Team Leader	Darren Price	MCERTS Level 2	MM 03 176	TE1 TE2 TE3 TE4
Team Leader	Craig Harley	MCERTS Level 2	MM 05 670	TE1 TE2 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)	-
S-Pitot (2)	-
L-Pitot	-
Site Balance	-
500g / 1Kg Check Weights	-
Last Impinger Arm	-
Callipers	-
Tubes Kit Thermocouple	-

Instrumental Analysers	
Equipment Type	**Equipment I.D.**
Horiba PG-250 SRM	CAT 9.14
Horiba PG-250	-
Servomex 4900	-
Eco Physics CLD 822Mh	-
ABB AO2020-URAS26	-
Testo 350 XL	-
JCT JCC P1 Cooler	CAT 4.0105
Gasmet DX4000	-
Gasmet Sampling System	-
Bernath 3006 FID	-
M&C PSS	CAT 12.123
Mass Flow Controller (1)	CAT 6.34
Mass Flow Controller (2)	CAT 6.35
Mass View (1)	-
Mass View (2)	-
Easylogger EN-EL-12 Bit	-
Hioki 5043 (V)	-
Bioaerosols Temperature Logger	-
Electronic Refrigerator	-

Miscellaneous Items	
Equipment Type	**Equipment I.D.**
Digital Manometer (1)	-
Digital Manometer (2)	-
Digital Temperature Meter	-
Stopwatch	-
Barometer	-
Stack Thermocouple (1)	-
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 20.63
20m Heated Line (2)	-
Dual Channel Heater Controller	-
Single Channel Heater Controller	CAT 20.63
Laboratory Balance	
Tape Measure	-

METHODS & TECHNICAL PROCEDURES USED

Parameter	Standard	Technical Procedure
Oxides of Nitrogen (as NO_2)	EN 14792	CAT-TP-21
Carbon Monoxide	EN 15058	CAT-TP-21
Oxygen	EN 14789	CAT-TP-21

OXIDES OF NITROGEN (as NO_2): RESULTS SUMMARY

Inbev UK Ltd, Magor
A1- Boiler-1

Sample Runs

Parameter	Units	Run 1		Mean
Concentration	mg/m³	152.4		152.4
Uncertainty	±mg/m³	459.3		459.3

General Sampling Information

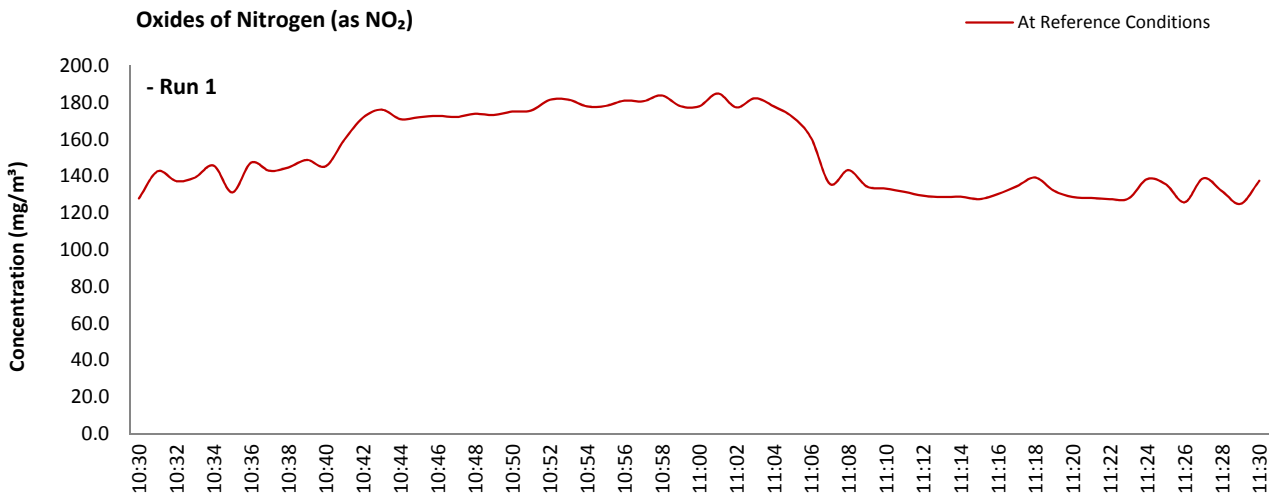
Parameter	Value	
Standard	EN 14792	
Technical Procedure	CAT-TP-21	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
Date & Result of Last Converter Check	27/04/2018 - 96.3%	
Span Gas Type	Nitrogen Monoxide	
Span Gas Reference Number	12.0140	
Span Gas Expiry Date	08/02/2020	
Span Gas Start Pressure (bar)	110	
Gas Cylinder Concentration (ppm)	412.6	NOTE: Dilution performed to achieve correct span value
Span Gas Uncertainty (%)	2	
Zero Gas Type	Nitrogen (5 Grade)	
Number of Sampling Lines Used	1/1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1/1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 3% oxygen.

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	-	10:30 - 11:30
Sampling Dates	-	09/11/2018
Instrument Range	ppm	250
Span Gas Value	ppm	107.2

Quality Assurance

Conditioning Unit Temperature	Units	Run 1
Average Temperature	°C	2.7
Allowable Temperature	< °C	4.0
Temperature Acceptable	-	Yes

	Zero Drift	Units	Run 1
CAL 1	Zero at Analyser (Pre)	ppm	0.00
	Zero at Analyser (Post)	ppm	0.60
	Zero Drift	ppm	0.60
CAL 2	Zero at Analyser (Pre)	ppm	
	Zero at Analyser (Post)	ppm	
	Zero Drift	ppm	
CAL 3	Zero at Analyser (Pre)	ppm	
	Zero at Analyser (Post)	ppm	
	Zero Drift	ppm	
	Allowable Zero Drift	± ppm	5.36
	Zero Drift Acceptable	-	Yes

	Span Drift	Units	Run 1
CAL 1	Span at Analyser (Pre)	ppm	107.00
	Span at Analyser (Post)	ppm	104.20
	Span Drift	ppm	-2.80
CAL 2	Span at Analyser (Pre)	ppm	
	Span at Analyser (Post)	ppm	
	Span Drift	ppm	
CAL 3	Span at Analyser (Pre)	ppm	
	Span at Analyser (Post)	ppm	
	Span Drift	ppm	
	Allowable Span Drift	± ppm	5.36
	Span Drift Acceptable	-	Yes

Test Conditions	Units	Run 1
Run Ambient Temperature Range	°C	20-21

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	

OXIDES OF NITROGEN (as NO_2): MEASUREMENT UNCERTAINTY CALCULATIONS

Performance characteristics	RUN 1		Units
Limit value	220.0		mg/m³ (REF)
TGN M2 Allowable MU	10.0		%
Measured concentration	176.43		mg/m³ (STP, dry)
Ratio NO / NO_2	5		%
Range Used	250.0		ppm
Range Used [A]	513.1		mg/m³
Cal gas conc.	107.2		ppm
Conversion	2.05		ppm to mg/m³
MCERTS Range [B]	200.0		mg/m³
Lower of [A] or [B]	200.0		mg/m³
Cal gas conc.	220.0		mg/m³

Performance characteristics	RUN 1		Units
Response time	117		seconds
Number of readings in measurement	60		-
Repeatability at zero	0.03		% full scale
Repeatability at span level	0.09		% full scale
Deviation from linearity	0.60		% of value
Zero drift	0.56		% full scale
Span drift	0.00		% full scale
Volume or pressure flow dependence	0.36		% of full scale
Atmospheric pressure dependence	-0.16		% of value/kPa
Ambient temperature dependence	0.11		% full scale/10K
Combined interference	0.50		% range
Dependence on voltage	-0.10		% full scale/10V
Converter efficiency	96.3		%
Losses in the line (leak)	0.93		% 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	0.69		mg/m³
Drift	0.71		mg/m³
Volume or pressure flow dependence	0.00		mg/m³
Atmospheric pressure dependence	-0.09		mg/m³
Ambient temperature dependence	0.02		mg/m³
Combined interference (from MCERTS Certificate)	0.58		mg/m³
Dependence on voltage	-0.01		mg/m³
Converter efficiency	0.19		mg/m³
Losses in the line (leak)	0.95		mg/m³
Uncertainty of calibration gas blending	1.43		mg/m³
Uncertainty of calibration gas	2.04		mg/m³

			RUN 1		Units
Measurement uncertainty		**Result**	176.43		mg/m³
Combined uncertainty			2.96		mg/m³
Expanded uncertainty	k =	1.96	5.81		mg/m³
Uncertainty corrected to std conds. (O_2)			5.02		mg/m³ (REF)

	RUN 1		Units
Expanded uncertainty (no O_2) - at 95% Confidence	3.29		% of Value
Expanded uncertainty (no O_2) - at 95% Confidence	2.64		% at ELV
Overall Allowable uncertainty (no O_2) - at 95% Confidence	10.0		% at ELV
Result of Compliance with Uncertainty Requirement in M2	**N/A**		-

	RUN 1		Units
Expanded uncertainty (with O_2) - at 95% Confidence	301.41		% of Value
Expanded uncertainty (with O_2) - at 95% Confidence	301.40		% at ELV
Overall Allowable uncertainty (with O_2) - at 95% Confidence	301.6		% at ELV
Result of Compliance with Uncertainty Requirement in M2	**COMPLIANT**		-

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). Ref EA TGN M2.

CARBON MONOXIDE: RESULTS SUMMARY

Inbev UK Ltd, Magor
A1- Boiler-1

Sample Runs

Parameter	Units	Run 1		Mean
Concentration	mg/m³	4524		4524
Uncertainty	±mg/m³	13636		13636

General Sampling Information

Parameter	Value	
Standard	EN 15058	
Technical Procedure	CAT-TP-21	
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	12.0140	
Span Gas Expiry Date	08/02/2020	
Span Gas Start Pressure (bar)	110	
Gas Cylinder Concentration (ppm)	398.3	NOTE: Dilution performed to achieve correct span value
Span Gas Uncertainty (%)	2	
Zero Gas Type	Nitrogen (5 Grade)	
Number of Sampling Lines Used	1/1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1/1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 3% oxygen.

CARBON MONOXIDE: DATA TREND

Graphical Trend of Data

CARBON MONOXIDE: SAMPLING DETAILS & QUALITY ASSURANCE

Sampling Details

Parameter	Units	Run 1
Sampling Times	-	10:30 - 11:30
Sampling Dates	-	09/11/2018
Instrument Range	ppm	200
Span Gas Value	ppm	160.0

Quality Assurance

Conditioning Unit Temperature	Units	Run 1
Average Temperature	°C	2.7
Allowable Temperature	< °C	4.0
Temperature Acceptable	-	Yes

	Zero Drift	Units	Run 1
CAL 1	Zero at Analyser (Pre)	ppm	0.00
	Zero at Analyser (Post)	ppm	-0.50
	Zero Drift	ppm	-0.50
CAL 2	Zero at Analyser (Pre)	ppm	
	Zero at Analyser (Post)	ppm	
	Zero Drift	ppm	
CAL 3	Zero at Analyser (Pre)	ppm	
	Zero at Analyser (Post)	ppm	
	Zero Drift	ppm	
	Allowable Zero Drift	± ppm	8.00
	Zero Drift Acceptable	-	Yes

	Span Drift	Units	Run 1
CAL 1	Span at Analyser (Pre)	ppm	160.50
	Span at Analyser (Post)	ppm	156.10
	Span Drift	ppm	-4.40
CAL 2	Span at Analyser (Pre)	ppm	
	Span at Analyser (Post)	ppm	
	Span Drift	ppm	
CAL 3	Span at Analyser (Pre)	ppm	
	Span at Analyser (Post)	ppm	
	Span Drift	ppm	
	Allowable Span Drift	± ppm	8.00
	Span Drift Acceptable	-	Yes

Test Conditions	Units	Run 1
Run Ambient Temperature Range	°C	20-21

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)
TGN M2 Allowable MU	6.0		%
Measured concentration	5237.42		mg/m³ (STP, dry)
Range Used	200.0		ppm
Range Used [A]	249.8		mg/m³
Cal gas conc.	160.0		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.	199.9		mg/m³

Performance characteristics	RUN 1		Units
Response time	111		seconds
Number of readings in measurement	60		-
Repeatability at zero	0.09		% full scale
Repeatability at span level	0.08		% full scale
Deviation from linearity	0.64		% of value
Zero drift	-0.31		% full scale
Span drift	0.00		% full scale
Volume or pressure flow dependence	-0.27		% of full scale
Atmospheric pressure dependence	0.30		% of value/kPa
Ambient temperature dependence	1.48		% full scale/10K
Combined interference	0.08		% range
Dependence on voltage	0.33		% full scale/10V
Losses in the line (leak)	1.56		% 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	0.28		mg/m³
Drift	-0.36		mg/m³
Volume or pressure flow dependence	0.00		mg/m³
Atmospheric pressure dependence	0.06		mg/m³
Ambient temperature dependence	0.21		mg/m³
Combined interference (from MCERTS Certificate)	0.03		mg/m³
Dependence on voltage	0.04		mg/m³
Losses in the line (leak)	47.25		mg/m³
Uncertainty of calibration gas blending	42.33		mg/m³
Uncertainty of calibration gas	60.48		mg/m³

			RUN 1		Units
Measurement uncertainty		**Result**	5237.42		mg/m³
Combined uncertainty			87.65		mg/m³
Expanded uncertainty	k =	1.96	171.79		mg/m³
Uncertainty corrected to std conds. (O_2)			148.39		mg/m³ (REF)

	RUN 1		Units
Expanded uncertainty (no O_2) - at 95% Confidence	3.28		% 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 in M2	**N/A**		-

	RUN 1		Units
Expanded uncertainty (with O_2) - at 95% Confidence	301.41		% 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 in M2	**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). Ref EA TGN M2.

OXYGEN: RESULTS SUMMARY

Inbev UK Ltd, Magor
A1- Boiler-1

Sample Runs

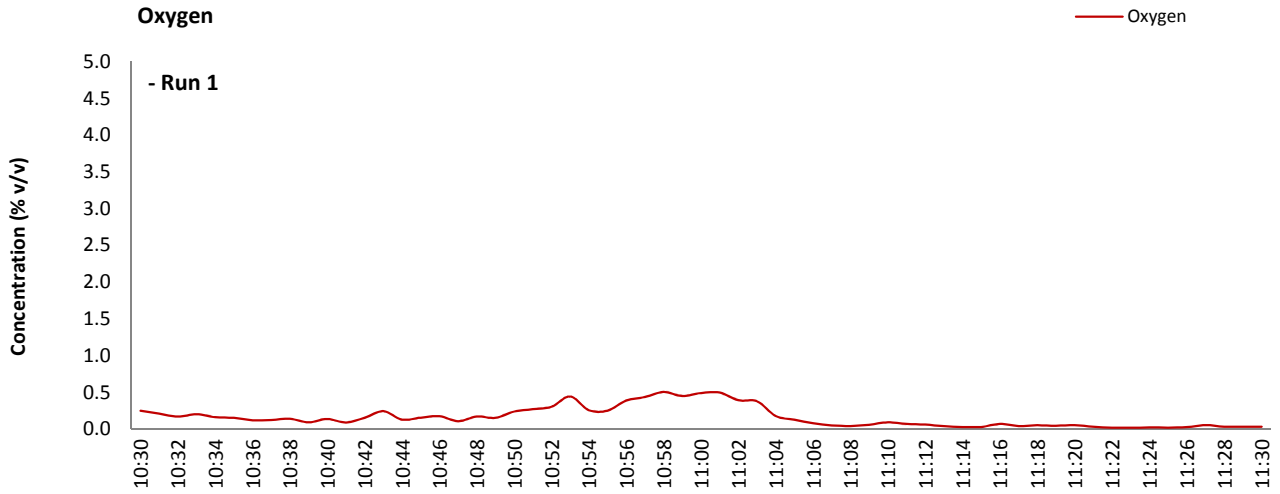
Parameter	Units	Run 1		Mean
Concentration	% v/v	0.16		0.16
Uncertainty	±% v/v	0.49		0.49

General Sampling Information

Parameter	Value	
Standard	EN 14789	
Technical Procedure	CAT-TP-21	
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	11.0333	
Span Gas Expiry Date	14/04/2023	
Span Gas Start Pressure (bar)	130	
Gas Cylinder Concentration (% v/v)	21.06	NOTE: Dilution performed to achieve correct span value
Span Gas Uncertainty (%)	2	
Zero Gas Type	Nitrogen (5 Grade)	
Number of Sampling Lines Used	1/1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1/1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

OXYGEN: DATA TREND

Graphical Trend of Data



OXYGEN: SAMPLING DETAILS & QUALITY ASSURANCE

Sampling Details

Parameter	Units	Run 1
Sampling Times	-	10:30 - 11:30
Sampling Dates	-	09/11/2018
Instrument Range	% v/v	25
Span Gas Value	% v/v	3.0

Quality Assurance

Conditioning Unit Temperature	Units	Run 1
Average Temperature	°C	2.7
Allowable Temperature	< °C	4.0
Temperature Acceptable	-	Yes

	Zero Drift	Units	Run 1
CAL 1	Zero at Analyser (Pre)	% v/v	0.00
	Zero at Analyser (Post)	% v/v	-0.06
	Zero Drift	% v/v	-0.06
CAL 2	Zero at Analyser (Pre)	% v/v	
	Zero at Analyser (Post)	% v/v	
	Zero Drift	% v/v	
CAL 3	Zero at Analyser (Pre)	% v/v	
	Zero at Analyser (Post)	% v/v	
	Zero Drift	% v/v	
	Allowable Zero Drift	± % v/v	0.15
	Zero Drift Acceptable	-	Yes

	Span Drift	Units	Run 1
CAL 1	Span at Analyser (Pre)	% v/v	3.10
	Span at Analyser (Post)	% v/v	2.95
	Span Drift	% v/v	-0.15
CAL 2	Span at Analyser (Pre)	% v/v	
	Span at Analyser (Post)	% v/v	
	Span Drift	% v/v	
CAL 3	Span at Analyser (Pre)	% v/v	
	Span at Analyser (Post)	% v/v	
	Span Drift	% v/v	
	Allowable Span Drift	± % v/v	0.15
	Span Drift Acceptable	-	Yes

Test Conditions	Units	Run 1
Run Ambient Temperature Range	°C	20-21

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	

OXYGEN: MEASUREMENT UNCERTAINTY CALCULATIONS

Performance characteristics	RUN 1		Units
Limit value	N/A		%vol
TGN M2 Allowable MU	6.0		%
Measured concentration	0.16		%vol
Range Used	25.0		%vol
Cal gas conc.	21.1		%vol

Performance characteristics	RUN 1		Units
Response time	110		seconds
Number of readings in measurement	60		-
Repeatability at zero	0.03		% full scale
Repeatability at span level	0.03		% full scale
Deviation from linearity	0.04		% of value
Zero drift	-1.94		% full scale
Span drift	0.00		% full scale
Volume or pressure flow dependence	0.08		% of full scale
Atmospheric pressure dependence	0.91		% of value/kPa
Ambient temperature dependence	0.15		% full scale/10K
Combined interference	0.19		% range
Dependence on voltage	0.05		% 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	0.01		%vol
Drift	-0.24		%vol
Volume or pressure flow dependence	0.00		%vol
Atmospheric pressure dependence	0.07		%vol
Ambient temperature dependence	0.02		%vol
Combined interference (from MCERTS Certificate)	0.03		%vol
Dependence on voltage	0.01		%vol
Losses in the line (leak)	0.00		%vol
Uncertainty of calibration gas	0.00		%vol

			RUN 1		Units
Measurement uncertainty		**Result**	0.16		%vol
Combined uncertainty			0.25		%vol
Expanded uncertainty	k =	1.96	0.49		%vol

	RUN 1		Units
Expanded uncertainty (no O_2) - at 95% Confidence	301.39		% of Value
Result of Compliance with Uncertainty Requirement in M2	**COMPLIANT**		-

Requirement for SRM is that Uncertainty should be 0.5%vol absolute or 6% relative whichever is the lower, on a dry gas basis. Ref EA TGN M2.