



Element, Cutbush Commercial, Cutbush Lane East, Reading, RG2 9AF  
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**Stack Emissions Testing Report Commissioned by**  
Blackmore Vale Farm Cream Ltd

**Installation Name & Address**  
Blackmore Vale Farm Cream Ltd  
Wincombe Lane  
Shaftesbury  
SP7 8QD

EPR Permit: HP3492EZ

**Stack Reference**  
A1 (Engine)

**Dates of the Monitoring Campaign**  
21st September 2021


**Job Reference Number**  
ERE-21395

Report Written by
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Report Approved by
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Report Date
13th October 2021

Version
Version 1

Signature of Report Approver


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## Executive Summary

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### MONITORING OBJECTIVES

Blackmore Vale Farm Cream Ltd, BV Dairy

A1 (Engine)

21st September 2021

#### Overall Aim of the Monitoring Campaign

Element were commissioned by Blackmore Vale Farm Cream Ltd to carry out stack emissions testing on the A1 (Engine) at BV Dairy.

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

Sulphur Dioxide, Total VOCs (as Carbon), Oxides of Nitrogen (as NO<sub>2</sub>), Carbon Monoxide

**MONITORING RESULTS**

Blackmore Vale Farm Cream Ltd, BV Dairy  
A1 (Engine)  
21st September 2021

where MU = Measurement Uncertainty associated with the Result

Parameter	Concentration				Mass Emission			
	Units	Result	MU +/-	Limit	Units	Result	MU +/-	Limit
Sulphur Dioxide	<sup>1</sup> mg/m <sup>3</sup>	181.34	29.39	350	g/hr			-
Total VOCs (as Carbon)	<sup>1</sup> mg/m <sup>3</sup>	658.96	23.81	1000	g/hr			-
Oxides of Nitrogen (as NO <sub>2</sub> )	<sup>1</sup> mg/m <sup>3</sup>	479.09	18.42	500	g/hr			-
Carbon Monoxide	<sup>1</sup> mg/m <sup>3</sup>	442.68	16.83	1400	g/hr			-
Oxygen	% v/v	Dry 5.51	0.14					
Water Vapour	% v/v	19.7	1.0					
Stack Gas Temperature	°C	498.0						

<sup>1</sup> Reference Conditions (REF) are: 273K, 101.3kPa, dry gas, 5% oxygen.

## Executive Summary

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### MONITORING DATE(S) & TIMES

Blackmore Vale Farm Cream Ltd, BV Dairy

A1 (Engine)

21st September 2021

Parameter	Units	Concentration			Sampling Date(s)	Sampling Times	Duration mins
Sulphur Dioxide	R1 mg/m <sup>3</sup>	181.3			21/09/2021	10:21 - 11:21	60
Total VOCs (as Carbon)	R1 mg/m <sup>3</sup>	659.0			21/09/2021	10:21 - 11:21	60
Oxides of Nitrogen (as NO <sub>2</sub> )	R1 mg/m <sup>3</sup>	479.1			21/09/2021	10:21 - 11:21	60
Carbon Monoxide	R1 mg/m <sup>3</sup>	442.7			21/09/2021	10:21 - 11:21	60
Oxygen	R1 % v/v	5.42			21/09/2021	10:21 - 11:21	60

All results are expressed at the respective reference conditions.

**PROCESS DETAILS**

Blackmore Vale Farm Cream Ltd, BV Dairy  
A1 (Engine)  
21st September 2021

**Standard Operating Conditions**

Parameter	Value
Process Status	Combustion
Capacity (of 100%) and Tonnes / Hour	190KWe (100%)
Continuous or Batch Process	Continuous
Feedstock (if applicable)	N/A
Abatement System	N/A
Abatement System Running Status	N/A
Fuel	Biogas
Plume Appearance	N/A

## Executive Summary

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### MONITORING & ANALYTICAL METHODS

Blackmore Vale Farm Cream Ltd, BV Dairy

A1 (Engine)

21st September 2021

Parameter	Monitoring				Analysis				Overall Status	LOD (Average)
	Standard	Technical Procedure	Sampling Status	Testing Lab	Analytical Procedure	Analytical Technique	Analysis Status	Analysis Lab		
Sulphur Dioxide	EN 14791	SP14791	MCERTS	EET	IC	IC	17025	EET	17025	0.052 mg/m <sup>3</sup>
Water Vapour	EN 14790	SP14790	MCERTS	EET	SP14790	Gravimetric	MCERTS	EET	MCERTS	0.10 % v/v
Total VOCs (as Carbon)	EN 12619:2013	SP12619	MCERTS	EET	Flame Ionisation Detection by Signal 3010HM FID				MCERTS	1.61 mg/m <sup>3</sup>
Oxides of Nitrogen (as NO <sub>2</sub> )	EN 14792	SP14792	MCERTS	EET	Chemiluminescence by Horiba PG-350E				MCERTS	0.41 mg/m <sup>3</sup>
Carbon Monoxide	EN 15058	SP15058	MCERTS	EET	NDIR by Horiba PG-350E				MCERTS	0.25 mg/m <sup>3</sup>
Oxygen	EN 14789	SP14789	MCERTS	EET	Dry Paramagnetic Cell by Horiba PG-350E				MCERTS	0.1 %
Velocity & Vol. Flow Rate	EN 16911-1 (MID)	SP16911	MCERTS	EET	Pitot Tube and Thermocouple				MCERTS	0.1°C

### ANALYSIS LABORATORIES

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

Element Materials Technology (EET)	ISO 17025 Accreditation Number: 4279
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### 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	0.22
Width	m	-
Area	m <sup>2</sup>	0.04
Port Depth	cm	2
Orientation of Duct	-	Horizontal
Number of Ports	-	1
Sample Port Size	-	1" BSP

### Location of Sampling Platform

General Platform Information	Value
Permanent / Temporary Platform	On Ground
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)	N/A
Platform has vertical base boards (approx. 0.25m high)	N/A
Platform has chains / self closing gates at top of ladders	N/A
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

Due to the nature of the access into the duct, it is not possible to conduct a full velocity profile, however no particulate phase sampling was required and all gaseous species were considered to be mixed sufficiently for the purposes of these tests. There is also no requirement to undertake a homogeneity test as per EN 15259 and as such the location cannot be compared against that or the criteria within TGN M1. The sampling location used in this instance has been approved for use by the Environment Agency.

### EN 15259 Homogeneity Test Requirements

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



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Photo 1



Photo 2



Job Number: ERE-21395, Version 1  
Sample Date/s: 21st September 2021  
EPR Permit: HP3492EZ

## APPENDIX CONTENTS

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

APPENDIX 2 - Summaries, Calculations, Raw Data and Charts

### STACK EMISSIONS MONITORING PERSONNEL

Position	Name	MCERTS Accreditation	MCERTS Number	Technical Endorsements
Team Leader	Bruce Kester	MCERTS Level 2	MM03 190	TE1 TE2 TE3 TE4
Technician	Danny Gibbons	MCERTS Trainee	MM16 1326	None

### LIST OF EQUIPMENT

Extractive Sampling		Instrumental Analysers		Miscellaneous Items	
Equipment Type	Equipment I.D.	Equipment Type	Equipment I.D.	Equipment Type	Equipment I.D.
Control Box DGM (1)	APEX#01	Horiba PG-350E	39.30	Digital Manometer (1)	DM#08
Control Box DGM (2)	-	Servomex 4900	-	Digital Manometer (2)	-
Box Thermocouples (1)	-	Eco Physics CLD 822Mh	-	Digital Temperature Meter	TCR#09
Box Thermocouples (2)	-	ABB AO2020-URAS26	-	Stopwatch	TP#13
Umbilical (1)	-	Testo 350 XL	-	Barometer	DB#30
Umbilical (2)	-	Signal 200SM	COND#05	Stack Thermocouple (1)	TC#64
Oven Box (1)	-	Ankersmid AOX210	CONV#04	Stack Thermocouple (2)	-
Oven Box (2)	-	Gasmet Sampling System	-	Stack Thermocouple (3)	-
Heated Probe (1)	-	Signal 3010HM	8.43	1m Heated Line (1)	HL#02
Heated Probe (2)	-	-	-	1m Heated Line (2)	HL#03
Heated Probe (3)	-	Mass Flow Controller (1)	-	1m Heated Line (3)	-
S-Pitot (1)	-	Mass Flow Controller (2)	-	5m Heated Line (1)	-
S-Pitot (2)	-	Mass View (1)	-	15m Heated Line (1)	-
L-Pitot	-	Mass View (2)	-	20m Heated Line (1)	HL#01
Site Balance	BAL#05	Squirrel 2020	DL#01	20m Heated Line (2)	-
500g / 1Kg Check Weights	CW#05	Easylogger EN-EL-12 Bit	-	Dual Channel Heater Controller	HLC#2abc
Last Impinger Arm	-	Bioaerosols Temperature Logger	-	Single Channel Heater Controller	-
Callipers	-	Electronic Refrigerator	-	Laboratory Balance	-
Tubes Kit Thermocouple	-			Tape Measure	TM#03

### METHODS & TECHNICAL PROCEDURES USED

Parameter	Standard	Technical Procedure
Sulphur Dioxide	EN 14791	SP14791
Water Vapour	EN 14790	SP14790
Total VOCs (as Carbon)	EN 12619:2013	SP12619
Oxides of Nitrogen (as NO <sub>2</sub> )	EN 14792	SP14792
Carbon Monoxide	EN 15058	SP15058
Oxygen	EN 14789	SP14789
Velocity & Vol. Flow Rate	EN 16911-1 (MID)	SP16911

## PRELIMINARY STACK SURVEY: CALCULATIONS

### General Stack Details

Stack Details (from Traverse)	Units	Value
Stack Diameter / Depth, D	m	0.22
Stack Width, W	m	-
Stack Area, A	m <sup>2</sup>	0.04
Average Stack Gas Temperature, T <sub>a</sub>	°C	498.0
Average Barometric Pressure, P <sub>b</sub>	kPa	100.3





## SULPHUR DIOXIDE: RESULTS SUMMARY

Blackmore Vale Farm Cream Ltd, BV Dairy

A1 (Engine)

### Sample Runs

Parameter	Units	Run 1	Mean
Concentration	mg/m <sup>3</sup>	181.34	181.34
Uncertainty	±mg/m <sup>3</sup>	29.39	29.39

Parameter	Units	Run 1	Mean
Water Vapour	% v/v	19.66	19.66
Uncertainty	±% v/v	0.99	0.99

### Blank Runs

Parameter	Units	Blank 1	Maximum
Concentration	mg/m <sup>3</sup>	< 0.01	< 0.01

### General Sampling Information

Parameter	Value
Standard	EN 14791
Technical Procedure	SP14791
Name of Analytical Laboratory	EET
Analytical Laboratory's Procedure	IC
ISO 17025 Accredited Analysis?	17025
Date of Sample Analysis	30/09/2021
Probe Material	Titanium
Filter Housing Material	Titanium
Impinger Material	Quartz Glass
Absorption Solution	0.3% Hydrogen Peroxide
Positioning of Filter	In Stack
Filter Size and Material	0.1µm Glass Fibre
Number of Sampling Lines Used	1 / 1
Number of Sampling Points Used	1 / 1
Sample Point I.D.'s	A1

FORMAT: Number Used / Number Required

FORMAT: Number Used / Number Required

### Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 5% oxygen.

## SULPHUR DIOXIDE: SAMPLING DETAILS

### Sample Runs

Parameter	Units	Run 1
Sampling Times	-	10:21 - 11:21
Sampling Dates	-	21/09/2021
Sampling Device	-	DGM
Duration	mins	60
DGM Start Volume	m <sup>3</sup>	410.6880
DGM End Volume	m <sup>3</sup>	411.3040
DGM Start Temperature	°C	12.0
DGM End Temperature	°C	18.0
Start ΔH	mmH <sub>2</sub> O	10.00
End ΔH	mmH <sub>2</sub> O	10.00
DGM Y <sub>d</sub>	-	0.9927
Barometric Pressure	kPa	100.3
Volume Sampled (STP, Dry)	m <sup>3</sup>	0.5743
Volume Sampled (STP, Wet)	m <sup>3</sup>	0.7148
Volume Sampled (REF)	m <sup>3</sup>	0.5527
Sample Flow Rate	l/min	10.19
Laboratory Result for Front Impingers	µg/ml	< 249.98
Laboratory Result for Back Impinger	µg/ml	< 1.37
Volume in Front Impingers	ml	400.0
Volume in Back Impinger	ml	175.0
Mass in Front Impingers	µg	< 99992.0
Mass in Back Impinger	µg	239.8
Total Mass Collected	µg	100231.8
Calculated Concentration	mg/m <sup>3</sup>	181.34
Liquid Trap Start Mass	g	2018.3
Liquid Trap End Mass	g	2123.4
Silica Trap Start Mass	g	735.2
Silica Trap End Mass	g	742.9
Total Mass Of Water Vapour	g	112.8
Calculated Water Vapour	% v/v	19.66

**Where:** DGM stands for Dry Gas Meter

### Blank Runs

Parameter	Units	Blank 1
Blank Dates	-	21/09/2021
Average Volume Sampled (REF)	m <sup>3</sup>	0.5527
Laboratory Result for Impingers	µg/ml	< 0.05
Volume in Impingers	ml	165.0
Total Mass Collected	µg	< 8.3
Calculated Concentration	mg/m <sup>3</sup>	< 0.01



## SULPHUR DIOXIDE: QUALITY ASSURANCE

### Sample Runs

Leak Test Results	Units	Run 1	
Mean Sampling Rate	l/min	10.2	
Pre-Sampling Leak Rate	l/min	0.10	
Post-Sampling Leak Rate	l/min	0.00	
Allowable Leak Rate	l/min	0.20	
Leak Test Acceptable	-	Yes	
Absorption Efficiency	Units	Run 1	
Absorption Efficiency	%	99.8	
Allowable Absorption Efficiency	%	95	
Absorption Efficiency Acceptable	-	Yes	
Water Droplets	Units	Run 1	
Are Water Droplets Present	-	No	
MU (Concurrent Water Vapour)	Units	Run 1	
Measurement Uncertainty (MU)	%	5.0	
Allowable MU	%	20.0	
MU Acceptable	%	Yes	
Silica Gel (Concurrent Water Vapour)	Units	Run 1	
Less than 50% Faded	%	Yes	
Test Conditions	Units	Run 1	
Ambient Temperature Recorded?	-	Yes	

### Blank Runs

Leak Test Results	Units	Blank 1	
Expected Sampling Rate	l/min	10.0	
Pre-Sampling Leak Rate	l/min	0.01	
Post-Sampling Leak Rate	l/min	0.10	
Allowable Leak Rate	l/min	0.20	
Leak Test Acceptable	-	Yes	
Validity of Blank vs ELV	Units	Blank 1	
Allowable Blank	mg/m <sup>3</sup>	35.0	
Blank Acceptable	-	Yes	

### Method Deviations

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

# SULPHUR DIOXIDE: MEASUREMENT UNCERTAINTY CALCULATIONS

Measured Quantities	Value		Standard uncertainty		
	Symbol	Run 1	Symbol	Units	Run 1
Sampled Volume (Actual)	$V_m$	0.6160	$uV_m$	$m^3$	0.0123
Sampled Gas Temperature	$T_m$	288.0	$uT_m$	K	2.00
Sampled Gas Pressure	$p_m$	100.3	$up_m$	kPa	0.50
Sampled Gas Humidity	$H_m$	0.00	$uH_m$	% v/v	1.00
Leak	L	0.00	$uL$	%	-
Laboratory Result	$L_r$	7.70	$uL_r$	%	-

Measured Quantities	Uncertainty as a Percentage		Requirement of Standard
	Units	Run 1	
Sampled Volume (Actual)	%	2.00	$\leq 2\%$
Sampled Gas Temperature	%	0.69	$\leq 1\%$
Sampled Gas Pressure	%	0.50	$\leq 1\%$
Sampled Gas Humidity	%	1.00	$\leq 1\%$
Leak	%	0.00	$\leq 2\%$
Laboratory Result	%	7.70	No Requirement

Measured Quantities	Uncertainty in Measurement Units			Sensitivity Coefficient
	Symbol	Units	Run 1	
Sampled Volume (STP)	$V_m$	$m^3$	0.5743	315.76
Leak	L	$mg/m^3$	0.000	1.00
Laboratory Result	$L_r$	$mg/m^3$	13.963	1.00

Measured Quantities	Uncertainty in Result	
	Units	Run 1
Sampled Volume (STP)	$mg/m^3$	4.563
Leak	$mg/m^3$	0.0000
Laboratory Result	$mg/m^3$	13.9630

Measured Quantities	Oxygen Correction Part of MU Budget	
	Units	Run 1
O <sub>2</sub> Correction Factor	-	1.04
Stack Gas O <sub>2</sub> Content	% v/v	5.60
MU for O <sub>2</sub> Correction	-	0.03
Overall MU For O <sub>2</sub> Measurement	%	3.25

Parameter	Units	Run 1
Combined uncertainty	$mg/m^3$	14.69
Expanded uncertainty (95% confidence), without Oxygen Correction	$mg/m^3$	28.79
Expanded uncertainty (95% confidence), with Oxygen Correction	$mg/m^3$	29.39
Expanded uncertainty (95% confidence), estimated with Method Deviations	$mg/m^3$	29.39
Reported Uncertainty	$mg/m^3$	29.39
Expanded uncertainty (95% confidence), without Oxygen Correction	%	15.9
Expanded uncertainty (95% confidence), with Oxygen Correction	%	16.2
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	16.2
Reported Uncertainty	%	16.2

## TOTAL VOCs (as CARBON): RESULTS SUMMARY

Blackmore Vale Farm Cream Ltd, BV Dairy  
A1 (Engine)

### Sample Runs

Parameter	Units	Run 1	Mean
Concentration	mg/m <sup>3</sup>	658.96	658.96
Uncertainty	±mg/m <sup>3</sup>	23.81	23.81

### General Sampling Information

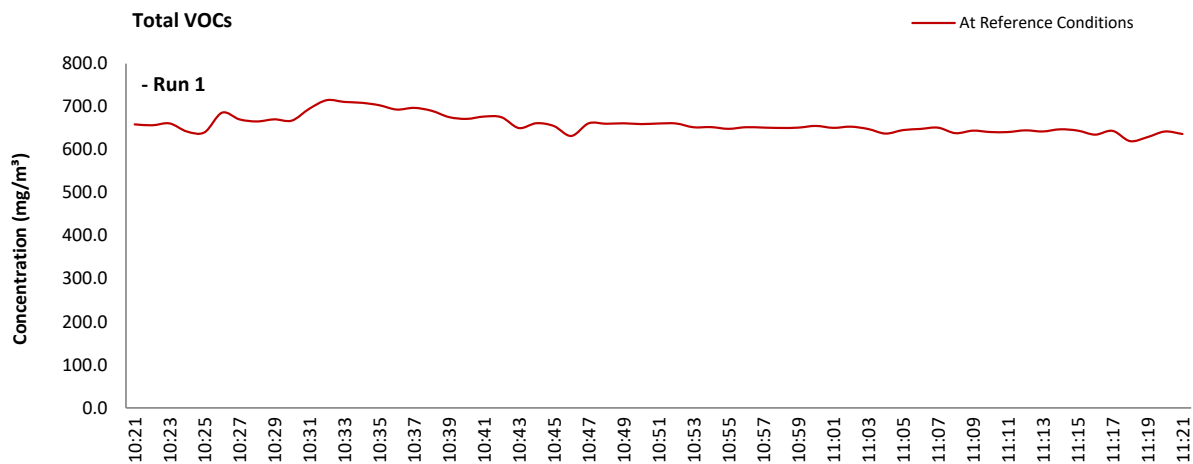
Parameter	Value
Standard	EN 12619:2013
Technical Procedure	SP12619
Probe Material	Titanium
Filtration Type / Size	2µm Stainless Steel and 0.1µm Glass Fibre
Heated Head Filter Used	No
Heated Line Temperature	180°C
Span Gas Type	Propane In Synthetic Air (5 Grade)
Span Gas Reference Number	VC8172860
Span Gas Expiry Date	01/03/2022
Span Gas Start Pressure (bar)	150
Gas Cylinder Concentration (ppm)	596
Span Gas Set Point (ppm)	596.00
Span Gas Uncertainty (%)	N/A
Zero Gas Type	Synthetic Air (5 Grade)
Number of Sampling Lines Used	1 / 1
Number of Sampling Points Used	1 / 1
Sample Point I.D.'s	A1

### Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 5% oxygen.

# TOTAL VOCs (as CARBON): DATA TREND

## Graphical Trend of Data



## TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE

### Sampling Details

Parameter	Units	Run 1	
Sampling Times	-	10:21 - 11:21	
Sampling Dates	-	21/09/2021	
Instrument Range	ppm	1000	
Span Gas Value	ppm	596.0	

### Quality Assurance

Zero Drift	Units	Run 1	
CAL 1 Zero Down Sampling Line (Pre)	ppm	1.00	
CAL 1 Zero Down Sampling Line (Post)	ppm	2.00	
CAL 1 Zero Drift	ppm	1.00	
Allowable Zero Drift	± ppm	29.80	
Zero Drift Acceptable	-	Yes	

Span Drift	Units	Run 1	
CAL 1 Span Down Sampling Line (Pre)	ppm	590.00	
CAL 1 Span Down Sampling Line (Post)	ppm	588.00	
CAL 1 Span Drift	ppm	-2.00	
Allowable Span Drift	± ppm	29.80	
Span Drift Acceptable	-	Yes	

Test Conditions	Units	Run 1	
Run Ambient Temperature Range	°C	19	

### Method Deviations

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

**TOTAL VOCs (as CARBON): MEASUREMENT UNCERTAINTY CALCULATIONS**

Performance characteristics	RUN 1		Units
Limit value	1000.0		mg/m <sup>3</sup> (REF)
Allowable MU	15.0		%
Measured concentration	641.78		mg/m <sup>3</sup> (STP, dry)
Range Used	1000.0		ppm
Range Used [A]	1606.1		mg/m <sup>3</sup>
Cal gas conc.	596.0		ppm
Conversion	1.61		ppm to mg/m <sup>3</sup>
MCERTS Range [B]	15.0		mg/m <sup>3</sup>
Lower of [A] or [B]	15.0		mg/m <sup>3</sup>
Cal gas conc.	957.3		mg/m <sup>3</sup>

Performance characteristics	RUN 1		Units
Response time	15		seconds
Number of readings in measurement	60		-
Repeatability at zero	0.15		% full scale
Repeatability at span level	0.80		% full scale
Deviation from linearity	1.05		% of value
Zero drift	0.17		% full scale
Span drift	-0.34		% full scale
Volume or pressure flow dependence	2.00		% of full scale
Atmospheric pressure dependence	0.80		% of value/kPa
Ambient temperature dependence	1.00		% full scale/10K
Combined interference	1.20		% range
Dependence on voltage	0.10		% full scale/10V
Losses in the line (leak)	1.01		% 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/m <sup>3</sup>
Standard deviation of repeatability at span level	0.10		mg/m <sup>3</sup>
Lack of fit	0.09		mg/m <sup>3</sup>
Drift	0.00		mg/m <sup>3</sup>
Volume or pressure flow dependence	0.00		mg/m <sup>3</sup>
Atmospheric pressure dependence	0.03		mg/m <sup>3</sup>
Ambient temperature dependence	0.14		mg/m <sup>3</sup>
Combined interference (from MCERTS Certificate)	0.10		mg/m <sup>3</sup>
Dependence on voltage	0.01		mg/m <sup>3</sup>
Losses in the line (leak)	3.73		mg/m <sup>3</sup>
Uncertainty of calibration gas	7.41		mg/m <sup>3</sup>

Measurement uncertainty	Result	RUN 1	Units
Combined uncertainty		641.78	mg/m <sup>3</sup>
Expanded uncertainty	k = 1.96	8.30	mg/m <sup>3</sup>
Expanded uncertainty		16.27	mg/m <sup>3</sup>
Uncertainty corrected to std conds. (O <sub>2</sub> )		16.70	mg/m <sup>3</sup> (REF)

	RUN 1	Units
Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence	2.53	% of Value
Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence	1.63	% at ELV
Overall Allowable uncertainty (no O <sub>2</sub> ) - at 95% Confidence	15.0	% at ELV
<b>Result of Compliance with Uncertainty Requirement</b>	<b>N/A</b>	-

	RUN 1	Units
Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence	3.61	% of Value
Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence	3.07	% at ELV
Overall Allowable uncertainty (with O <sub>2</sub> ) - at 95% Confidence	15.2	% at ELV
<b>Result of Compliance with Uncertainty Requirement</b>	<b>COMPLIANT</b>	-

Requirement for SRM is that Uncertainty should be <15% of the value at the ELV, on a dry gas basis, or if O<sub>2</sub> correction is applied less than 15% + the uncertainty associated with the O<sub>2</sub> correction (using sqrt of sum squares to add uncertainty components).

## OXIDES OF NITROGEN (as NO<sub>2</sub>): RESULTS SUMMARY

Blackmore Vale Farm Cream Ltd, BV Dairy  
A1 (Engine)

### Sample Runs

Parameter	Units	Run 1	Mean
Concentration	mg/m <sup>3</sup>	479.09	479.09
Uncertainty	±mg/m <sup>3</sup>	18.42	18.42

### General Sampling Information

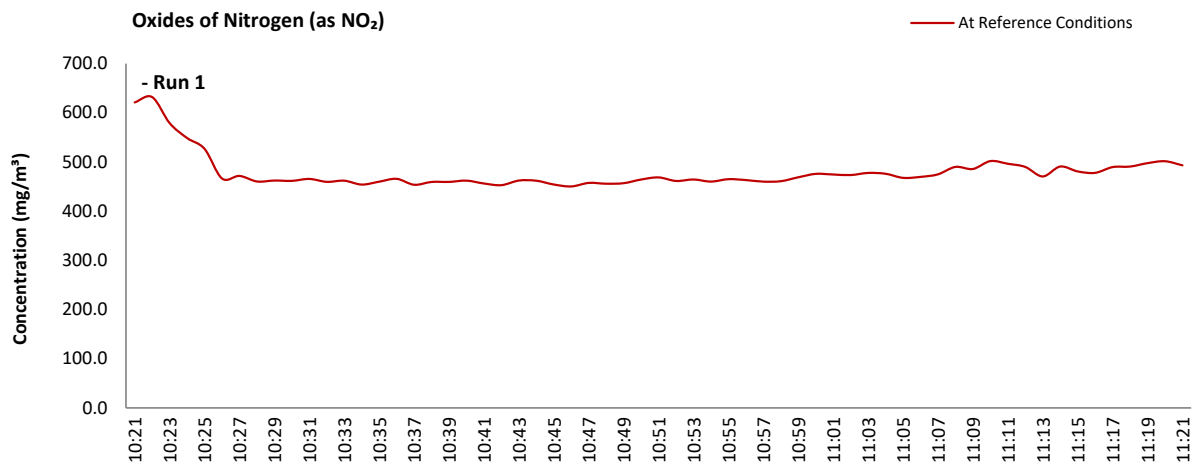
Parameter	Value
Standard	EN 14792
Technical Procedure	SP14792
Probe Material	Titanium
Filtration Type / Size	2µm Stainless Steel and 0.1µm Glass Fibre
Heated Head Filter Used	No
Heated Line Temperature	180°C
Date & Result of Last Converter Check	01/09/2021 - 95.4%
Span Gas Type	Nitrogen Monoxide
Span Gas Reference Number	VC109017
Span Gas Expiry Date	15/04/2022
Span Gas Start Pressure (bar)	120
Gas Cylinder Concentration (ppm)	257
Span Gas Uncertainty (%)	2
Zero Gas Type	Nitrogen (5 Grade)
Number of Sampling Lines Used	1 / 1
Number of Sampling Points Used	1 / 1
Sample Point I.D.'s	A1

### Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 5% oxygen.

# OXIDES OF NITROGEN (as NO<sub>2</sub>): DATA TREND

## Graphical Trend of Data





## OXIDES OF NITROGEN (as NO<sub>2</sub>): SAMPLING DETAILS & QUALITY ASSURANCE

### Sampling Details

Parameter	Units	Run 1	
Sampling Times	-	10:21 - 11:21	
Sampling Dates	-	21/09/2021	
Instrument Range	ppm	500	
Span Gas Value	ppm	257.0	

### Quality Assurance

Conditioning Unit Temperature	Units	Run 1	
Average Temperature	°C	3.0	
Allowable Temperature	< °C	4.0	
Temperature Acceptable	-	Yes	
Zero Drift	Units	Run 1	
Zero at Analyser (Pre)	ppm	0.00	
Zero at Analyser (Post)	ppm	1.20	
Zero Drift	ppm	1.20	
Zero Drift	%	0.47	
Drift Correction Applied	2-5%	No	
Allowable Zero Drift	± %	5.00	
Zero Drift Acceptable	-	Yes	
Span Drift	Units	Run 1	
Span at Analyser (Pre)	ppm	257.00	
Span at Analyser (Post)	ppm	255.00	
Span Drift	ppm	-2.00	
Zero Adj. Span Drift	%	1.25	
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	19	

### Method Deviations

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

# OXIDES OF NITROGEN (as NO<sub>2</sub>): MEASUREMENT UNCERTAINTY CALCULATIONS

Performance characteristics	RUN 1	Units
Limit value	500.0	mg/m <sup>3</sup> (REF)
Allowable MU	10.0	%
Measured concentration	466.59	mg/m <sup>3</sup> (STP, dry)
Ratio NO / NO <sub>2</sub>	5	%
Range Used	500.0	ppm
Range Used [A]	1026.1	mg/m <sup>3</sup>
Cal gas conc.	257.0	ppm
Conversion	2.05	ppm to mg/m <sup>3</sup>
MCERTS Range [B]	205.0	mg/m <sup>3</sup>
Lower of [A] or [B]	205.0	mg/m <sup>3</sup>
Cal gas conc.	527.4	mg/m <sup>3</sup>

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	0.50	% of value
Zero drift	0.47	% full scale
Span drift	-1.25	% 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	95.4	%
Losses in the line (leak)	0.39	% 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/m <sup>3</sup>
Standard deviation of repeatability at span level	0.01	mg/m <sup>3</sup>
Lack of fit	0.59	mg/m <sup>3</sup>
Drift	0.00	mg/m <sup>3</sup>
Volume or pressure flow dependence	0.00	mg/m <sup>3</sup>
Atmospheric pressure dependence	0.06	mg/m <sup>3</sup>
Ambient temperature dependence	0.01	mg/m <sup>3</sup>
Combined interference (from MCERTS Certificate)	0.75	mg/m <sup>3</sup>
Dependence on voltage	-0.03	mg/m <sup>3</sup>
Converter efficiency	0.62	mg/m <sup>3</sup>
Losses in the line (leak)	1.05	mg/m <sup>3</sup>
Uncertainty of calibration gas blending	3.77	mg/m <sup>3</sup>
Uncertainty of calibration gas	5.39	mg/m <sup>3</sup>

Measurement uncertainty	Result	RUN 1	Units
Combined uncertainty		466.59	mg/m <sup>3</sup>
Expanded uncertainty		6.80	mg/m <sup>3</sup>
Expanded uncertainty	k = 1.96	13.32	mg/m <sup>3</sup>
Uncertainty corrected to std conds. (O <sub>2</sub> )		13.68	mg/m <sup>3</sup> (REF)

	RUN 1	Units
Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence	2.86	% of Value
Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence	2.66	% at ELV
Overall Allowable uncertainty (no O <sub>2</sub> ) - at 95% Confidence	10.0	% at ELV
Result of Compliance with Uncertainty Requirement	N/A	-

	RUN 1	Units
Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence	3.84	% of Value
Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence	3.76	% at ELV
Overall Allowable uncertainty (with O <sub>2</sub> ) - at 95% Confidence	10.3	% at ELV
Result of Compliance with Uncertainty Requirement	COMPLIANT	-

Requirement for SRM is that Uncertainty should be <10% of the value at the ELV, on a dry gas basis, or if O<sub>2</sub> correction is applied less than 10% + the uncertainty associated with the O<sub>2</sub> correction (using sqrt of sum squares to add uncertainty components).

## CARBON MONOXIDE: RESULTS SUMMARY

Blackmore Vale Farm Cream Ltd, BV Dairy  
A1 (Engine)

### Sample Runs

Parameter	Units	Run 1	Mean
Concentration	mg/m <sup>3</sup>	442.68	442.68
Uncertainty	±mg/m <sup>3</sup>	16.83	16.83

### General Sampling Information

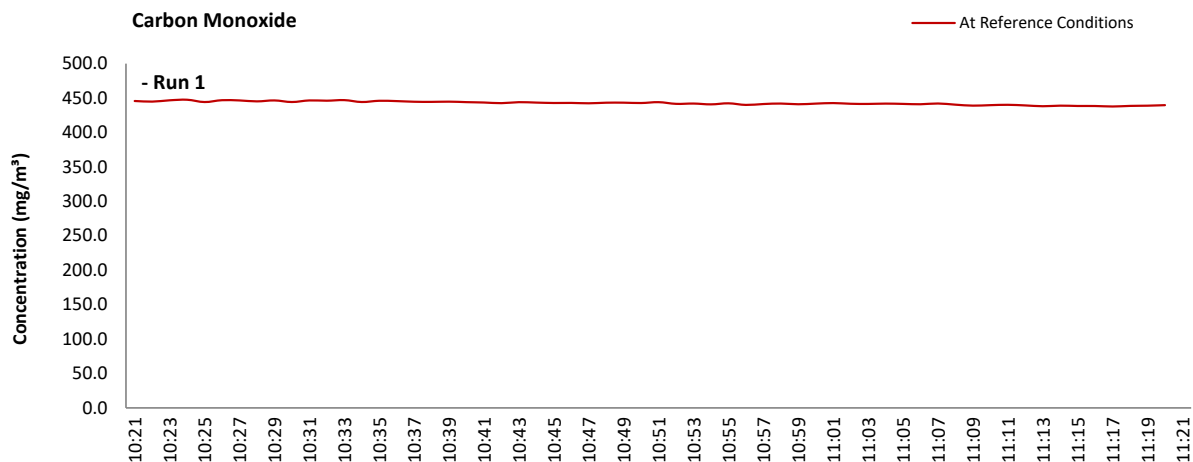
Parameter	Value
Standard	EN 15058
Technical Procedure	SP15058
Probe Material	Titanium
Filtration Type / Size	2µm Stainless Steel and 0.1µm Glass Fibre
Heated Head Filter Used	No
Heated Line Temperature	180°C
Span Gas Type	Carbon Monoxide
Span Gas Reference Number	VC109017
Span Gas Expiry Date	15/04/2022
Span Gas Start Pressure (bar)	120
Gas Cylinder Concentration (ppm)	1204
Span Gas Uncertainty (%)	2
Zero Gas Type	Nitrogen (5 Grade)
Number of Sampling Lines Used	1 / 1
Number of Sampling Points Used	1 / 1
Sample Point I.D.'s	A1

### Reference Conditions

Reference Conditions are: 273K, 101.3kPa, dry gas, 5% oxygen.

# CARBON MONOXIDE: DATA TREND

## Graphical Trend of Data



# CARBON MONOXIDE: SAMPLING DETAILS & QUALITY ASSURANCE

## Sampling Details

Parameter	Units	Run 1	
Sampling Times	-	10:21 - 11:21	
Sampling Dates	-	21/09/2021	
Instrument Range	ppm	2000	
Span Gas Value	ppm	1204.0	

## Quality Assurance

Conditioning Unit Temperature	Units	Run 1	
Average Temperature	°C	3.0	
Allowable Temperature	< °C	4.0	
Temperature Acceptable	-	Yes	

Zero Drift	Units	Run 1	
Zero at Analyser (Pre)	ppm	0.00	
Zero at Analyser (Post)	ppm	2.00	
Zero Drift	ppm	2.00	
Zero Drift	%	0.17	
Drift Correction Applied	2-5%	No	
Allowable Zero Drift	± %	5.00	
Zero Drift Acceptable	-	Yes	

Span Drift	Units	Run 1	
Span at Analyser (Pre)	ppm	1204.00	
Span at Analyser (Post)	ppm	1198.00	
Span Drift	ppm	-6.00	
Zero Adj. Span Drift	%	0.66	
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	19	

## Method Deviations

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

# CARBON MONOXIDE: MEASUREMENT UNCERTAINTY CALCULATIONS

Performance characteristics	RUN 1	Units
Limit value	1400.0	mg/m <sup>3</sup> (REF)
Allowable MU	6.0	%
Measured concentration	431.13	mg/m <sup>3</sup> (STP, dry)
Range Used	2000.0	ppm
Range Used [A]	2498.4	mg/m <sup>3</sup>
Cal gas conc.	1204.0	ppm
Conversion	1.25	ppm to mg/m <sup>3</sup>
MCERTS Range [B]	75.0	mg/m <sup>3</sup>
Lower of [A] or [B]	75.0	mg/m <sup>3</sup>
Cal gas conc.	1504.1	mg/m <sup>3</sup>

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	0.80	% of value
Zero drift	0.17	% full scale
Span drift	-0.66	% 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)	0.33	% 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/m <sup>3</sup>
Standard deviation of repeatability at span level	0.03	mg/m <sup>3</sup>
Lack of fit	0.35	mg/m <sup>3</sup>
Drift	0.00	mg/m <sup>3</sup>
Volume or pressure flow dependence	0.00	mg/m <sup>3</sup>
Atmospheric pressure dependence	0.05	mg/m <sup>3</sup>
Ambient temperature dependence	-0.03	mg/m <sup>3</sup>
Combined interference (from MCERTS Certificate)	-0.21	mg/m <sup>3</sup>
Dependence on voltage	-0.04	mg/m <sup>3</sup>
Losses in the line (leak)	0.83	mg/m <sup>3</sup>
Uncertainty of calibration gas blending	3.48	mg/m <sup>3</sup>
Uncertainty of calibration gas	4.98	mg/m <sup>3</sup>

Measurement uncertainty	Result	RUN 1	Units
Combined uncertainty		431.13	mg/m <sup>3</sup>
Expanded uncertainty		6.15	mg/m <sup>3</sup>
Expanded uncertainty	k = 1.96	12.05	mg/m <sup>3</sup>
Uncertainty corrected to std conds. (O <sub>2</sub> )		12.38	mg/m <sup>3</sup> (REF)

	RUN 1	Units
Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence	2.80	% of Value
Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence	0.86	% at ELV
Overall Allowable uncertainty (no O <sub>2</sub> ) - at 95% Confidence	6.0	% at ELV
Result of Compliance with Uncertainty Requirement	N/A	-

	RUN 1	Units
Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence	3.80	% of Value
Expanded uncertainty (with O <sub>2</sub> ) - at 95% Confidence	2.72	% at ELV
Overall Allowable uncertainty (with O <sub>2</sub> ) - at 95% Confidence	6.5	% at ELV
Result of Compliance with Uncertainty Requirement	COMPLIANT	-

Requirement for SRM is that Uncertainty should be <6% of the value at the ELV, on a dry gas basis, or if O<sub>2</sub> correction is applied less than 6% + the uncertainty associated with the O<sub>2</sub> correction (using sqrt of sum squares to add uncertainty components).

## OXYGEN: RESULTS SUMMARY

Blackmore Vale Farm Cream Ltd, BV Dairy  
A1 (Engine)

### Sample Runs

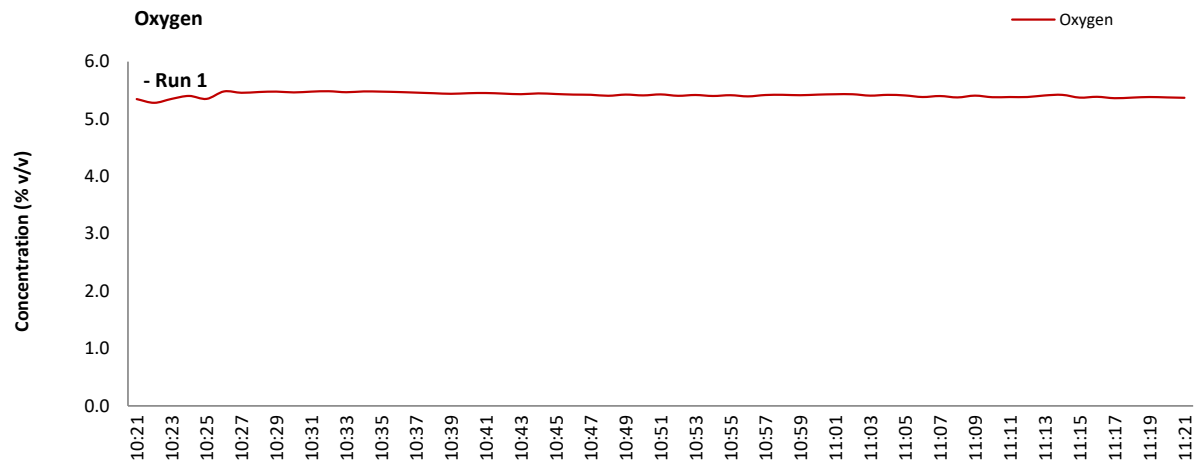
Parameter	Units	Run 1	Mean
Concentration	% v/v	5.42	5.42
Uncertainty	±% v/v	0.14	0.14

### General Sampling Information

Parameter	Value
Standard	EN 14789
Technical Procedure	SP14789
Probe Material	Titanium
Filtration Type / Size	2µm Stainless Steel and 0.1µm Glass Fibre
Heated Head Filter Used	No
Heated Line Temperature	180°C
Span Gas Type	Synthetic Air (5 Grade)
Span Gas Reference Number	VC8172860
Span Gas Expiry Date	01/03/2022
Span Gas Start Pressure (bar)	150
Gas Cylinder Concentration (% v/v)	8.02
Span Gas Uncertainty (%)	2
Zero Gas Type	Nitrogen (5 Grade)
Number of Sampling Lines Used	1 / 1
Number of Sampling Points Used	1 / 1
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	-	10:21 - 11:21
Sampling Dates	-	21/09/2021
Instrument Range	% v/v	25.0
Span Gas Value	% v/v	8.0

### Quality Assurance

Conditioning Unit Temperature	Units	Run 1
Average Temperature	°C	3.0
Allowable Temperature	< °C	4.0
Temperature Acceptable	-	Yes

Zero Drift	Units	Run 1
Zero at Analyser (Pre)	% v/v	0.00
Zero at Analyser (Post)	% v/v	-0.02
Zero Drift	% v/v	-0.02
Zero Drift	%	0.25
Drift Correction Applied	2-5%	No
Allowable Zero Drift	± %	5.00
Zero Drift Acceptable	-	Yes

Span Drift	Units	Run 1
Span at Analyser (Pre)	% v/v	8.02
Span at Analyser (Post)	% v/v	8.03
Span Drift	% v/v	0.01
Zero Adj. Span Drift	%	0.37
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	19

### Method Deviations

Nature of Deviation	Run Number
(x = deviation applies to the associated run)	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
Allowable MU	6.0	%
Measured concentration	5.42	%vol
Range Used	25.0	%vol
Cal gas conc.	8.0	%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	0.04	% of value
Zero drift	-0.25	% full scale
Span drift	0.37	% 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	0.01	%vol
Drift	0.00	%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	0.06	%vol

Measurement uncertainty	Result	RUN 1	Units
Combined uncertainty		5.42	%vol
Expanded uncertainty		0.07	%vol
Expanded uncertainty	k = 1.96	0.14	%vol

	RUN 1	Units
Expanded uncertainty (no O <sub>2</sub> ) - at 95% Confidence	2.57	% 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 Number	Record of changes made within this version of the document
V1	The original document issued to the client