Date and Time	CH_4 % v/v	CO_2 % v/v	O_2 % v/v	TVOC ppmv	H_2S ppmv	CO ppmv	Borehole Pressure millibars	Atmospheric Pressure millibars	Differential Pressure millibars	Temperature °C	Comments / Events
21/02/2014 12:38	0	0	17.9	0	0	0	980	980	0	3.6	2.45
21/02/2014 13:38	0	0	18.9	0	0	0	980	980	0	3.6	2.46
21/02/2014 14:38	0	0	18.7	0	0	0	979	979	0	3.5	2.45
21/02/2014 15:38	0	0	18.4	0	0	0	980	980	0	3.5	2.46
21/02/2014 16:38	0	0	18	0	0	0	980	980	0	3.5	2.47
21/02/2014 17:38	0	0	18.7	0	0	0	980	980	0	3.4	2.46
21/02/2014 18:38	0	0	18	0	0	0	980	980	0	3.4	2.46
21/02/2014 19:38	0	0	18.5	0	0	0	980	980	0	3.4	2.45
21/02/2014 20:38	0	0	17.8	0	0	0	980	980	0	3.4	2.46
21/02/2014 21:38	0	0	18.1	0	0	0	980	980	0	3.4	2.46
21/02/2014 22:38	0	0	18.3	0	0	0	980	980	0	3.4	2.45
21/02/2014 23:38	0	0	17.6	0	0	0	980	980	0	3.4	2.45
22/02/2014 00:38	0	0	18.4	0	0	0	981	980	1	3.4	2.45
22/02/2014 01:38	0	0	18.5	0	0	0	981	980	1	3.4	2.45
22/02/2014 02:38	0	0	17.7	0	0	0	981	981	0	3.4	2.45
22/02/2014 03:38	0	0	18.5	0	0	0	982	982	0	3.4	2.46
22/02/2014 04:38	0	0	17.6	0	0	0	982	982	0	3.4	2.46
22/02/2014 05:38	0	0	18.7	0	0	0	983	983	0	3.4	2.45
22/02/2014 06:38	0	0	17.9	0	0	0	984	984	0	3.3	2.45
22/02/2014 07:38	0	0	18.4	0	0	0	986	985	1	3.3	2.44
22/02/2014 08:38	0	0	17.7	0	0	0	986	986	0	3.3	2.45
22/02/2014 09:38	0	0	18.3	0	0	0	987	987	0	3.3	2.44
22/02/2014 10:38	0	0	17.9	0	0	0	987	987	0	3.3	2.45
22/02/2014 11:38	0	0	17.6	0	0	0	988	988	0	3.3	2.46
22/02/2014 12:38	0	0	17.1	0	0	0	988	988	0	3.3	2.45
22/02/2014 13:38	0	0	17.5	0	0	0	988	988	0	3.2	2.45
22/02/2014 14:38	0	0	16.9	0	0	0	988	987	1	3.2	2.44
22/02/2014 15:38	0	0	18	0	0	0	988	987	1	3.2	2.45
22/02/2014 16:38	0	0	16.9	0	0	0	988	987	1	3.2	2.46
22/02/2014 17:38	0	0	18	0	0	0	988	987	1	3.2	2.47
22/02/2014 18:38	0	0	17	0	0	0	988	987	1	3.2	2.44
22/02/2014 19:38	0	0	18.1	0	0	0	988	987	1	3.2	2.47
22/02/2014 20:38	0	0	17	0	0	0	987	987	0	3.2	2.45
22/02/2014 21:38	0	0	17.6	0	0	0	987	987	0	3.3	2.45
22/02/2014 22:38	0	0	17	0	0	0	987	987	0	3.3	2.44
22/02/2014 23:38	0	0	17.9	0	0	0	987	986	1	3.3	2.44
23/02/2014 00:38	0	0	17	0	0	0	986	986	0	3.3	2.45
23/02/2014 01:38	0	0	17.9	0	0	0	986	985	1	3.3	2.4
23/02/2014 02:38	0	0	17	0	0	0	985	985	0	3.3	2.46
23/02/2014 03:38	0	0	17.5	0	0	0	985	984	1	3.3	2.44
23/02/2014 04:38	0	0	18.2	0	0	0	985	984	1	3.4	2.45
23/02/2014 05:38	0	0	17.3	0	0	0	985	984	1	3.4	2.45
23/02/2014 06:38	0	0	16.9	0	0	0	984	983	1	3.4	2.44
23/02/2014 07:38	0	0	18.1	0	0	0	984	984	0	3.4	2.44
23/02/2014 08:38	0	0	17.3	0	0	0	984	983	1	3.4	2.45
23/02/2014 09:38	0	0	16.9	0	0	0	984	983	1	3.4	2.45
23/02/2014 10:38	0	0	18	0	0	0	984	983	1	3.4	2.43
23/02/2014 11:38	0	0	18	0	0	0	984	983	1	3.4	2.44
23/02/2014 12:38	0	0	17.4	0	0	0	984	983	1	3.4	2.44
23/02/2014 13:38	0	0	18.3	0	0	0	983	983	0	3.5	2.46
23/02/2014 14:38	0	0	17.3	0	0	0	983	983	0	3.5	2.45
23/02/2014 15:38	0	0	17.6	0	0	0	983	983	0	3.5	2.45
23/02/2014 16:38	0	0	18.2	0	0	0	983	983	0	3.6	2.43
23/02/2014 17:38	0	0	17.6	0	0	0	984	983	1	3.6	2.45
23/02/2014 18:38	0	0	18.5	0	0	0	984	984	0	3.6	2.44
23/02/2014 19:38	0	0	17.9	0	0	0	985	985	0	3.6	2.45
23/02/2014 20:38	0	0	18.5	0	0	0	985	984	1	3.6	2.45
23/02/2014 21:38	0	0	18	0	0	0	985	985	0	3.7	2.44
23/02/2014 22:38	0	0	18.1	0	0	0	985	984	1	3.7	2.44
23/02/2014 23:38	0	0	18.3	0	0	0	984	984	0	3.8	2.44
24/02/2014 00:38	0	0	17.9	0	0	0	984	984	0	3.8	2.43
24/02/2014 01:38	0	0	18.4	0	0	0	983	983	0	3.8	2.44
24/02/2014 02:38	0	0	18.6	0	0	0	983	982	1	3.8	2.45
24/02/2014 03:38	0	0	17.9	0	0	0	982	981	1	3.8	2.42
24/02/2014 04:38	0	0	18.6	0	0	0	981	981	0	3.9	2.44
24/02/2014 05:38	0	0	18.9	0	0	0	981	980	1	3.9	2.44
24/02/2014 06:38	0	0	18.3	0	0	0	980	980	0	3.9	2.43
24/02/2014 07:38	0	0	18.4	0	0	0	982	981	1	3.9	2.44
24/02/2014 08:38	0	0	18.6	0	0	0	983	982	1	3.9	2.43
24/02/2014 09:38	0	0	19	0	0	0	983	982	1	3.9	2.43
24/02/2014 10:38	0	0	18.6	0	0	0	983	983	0	3.9	2.44
24/02/2014 11:38	0	0	18.2	0	0	0	983	983	0	3.9	2.45
24/02/2014 12:38	0	0	17.9	0	0	0	983	983	0	3.9	2.44
24/02/2014 13:38	0	0	18.1	0	0	0	982	982	0	3.9	2.45
24/02/2014 14:38	0	0	18	0	0	0	983	982	1	3.9	2.45
24/02/2014 15:38	0	0	17.7	0	0	0	982	982	0	3.9	2.43
24/02/2014 16:38	0	0	18.8	0	0	0	982	981	1	3.9	2.47
24/02/2014 17:38	0	0	18.8	0	0	0	981	980	1	3.9	2.44
24/02/2014 18:38	0	0	18.9	0	0	0	980	980	0	4	2.43
24/02/2014 19:38	0	0	18.9	0	0	0	980	980	0	4	2.43
24/02/2014 20:38	0	0	19	0	0	0	979	979	0	4	2.43
24/02/2014 21:38	0	0	19.1	0	0	0	978	978	0	4.1	2.44
24/02/2014 22:38	0	0	19.1	0	0	0	977	977	0	4.1	2.44
24/02/2014 23:38	0	0	19.2	0	0	0	976	976	0	4.1	2.43
25/02/2014 00:38	0	0	19.1	0	0	0	976	976	0	4.1	2.43
25/02/2014 01:38	0	0	18.8	0	0	0	976	975	1	4.1	2.44
25/02/2014 02:38	0	0	18.9	0	0	0	975	975	0	4.1	2.46
25/02/2014 03:38	0	0	18.7	0	0	0	975	975	0	4.1	2.43
25/02/2014 04:38	0	0	18.7	0	0	0	975	975	0	4.1	2.44
25/02/2014 05:38	0	0	19.2	0	0	0	975	975	0	4.2	2.43
25/02/2014 06:38	0	0	18.9	0	0	0	976	975	1	4.2	2.44
25/02/2014 07:38	0	0	18.5	0	0	0	975	975	0	4.1	2.43
25/02/2014 08:38	0	0	18.3	0	0	0	975	975	0	4.1	2.43
25/02/2014 09:38	0	0	19	0	0	0	975	975	0	4.1	2.43
25/02/2014 10:38	0	0	19	0	0	0	976	976	0	4.1	2.43
25/02/2014 11:38	0	0	19	0	0	0	976	975	1	4.1	2.42
25/02/2014 12:38	0	0	19.1	0	0	0	976	975	1	4.1	2.43
25/02/2014 13:38	0	0	18.9	0	0	0	976	976	0	4.1	2.42
25/02/2014 14:38	0	0	18.4	0	0	0	976	976	0	4.1	2.42
25/02/2014 15:38	0	0	18.3	0	0	0	977	976	1	4.1	2.43
25/02/2014 16:38	0	0	18.3	0	0	0	977	977	0	4.1	2.43
25/02/2014 17:38	0	0	18.3	0	0	0	979	978	1	4.1	2.43
25/02/2014 18:38	0	0	19	0	0	0	979	979	0	4.1	2.42
25/02/2014 19:38	0	0	19.1	0	0	0	981	980	1	4.2	2.42
25/02/2014 20:38	0	0	19	0	0	0	981	981	0	4.2	2.42
25/02/2014 21:38	0	0	19.1	0	0	0	982	982	0	4.2	2.43
25/02/2014 22:38	0	0	19.1	0	0	0	983	983	0	4.2	2.43
25/02/2014 23:38	0	0	19.1	0	0	0	983	983	0	4.3	2.42
26/02/2014 00:38	0	0	19	0	0	0	984	984	0	4.3	2.43
26/02/2014 01:38	0	0	19.1	0	0	0	985	985	0	4.3	2.42
26/02/2014 02:38	0	0	19.1	0	0	0	985	985	0	4.3	2.42
26/02/2014 03:38	0	0	19.2	0	0	0	986	986	0	4.3	2.41
26/02/2014 04:38	0	0	19.1	0	0	0	987	986	1	4.2	2.41
26/02/2014 05:38	0	0	19	0	0	0	987	987	0	4.2	2.41
26/02/2014 06:38	0	0	19	0	0	0	988	987	1	4.2	2.41
26/02/2014 07:38	0	0	19.2	0	0	0	989	989	0	4.2	2.41
26/02/2014 08:38	0	0	19.2	0	0	0	990	989	1	4.1	2.41
26/02/2014 09:38	0	0	19.1	0	0	0	990	990	0	4.1	2.41
26/02/2014 10:38	0	0	19	0	0	0	991	991	0	4.1	2.41
26/02/2014 11:38	0	0	19.2	0	0	0	991	991	0	4.1	2.42
26/02/2014 12:38	0	0	19.3	0	0	0	991	991	0	4	2.41
26/02/2014 13:38	0	0	19.4	0	0	0	992	992	0	4	2.42
26/02/2014 14:38	0	0	19.2	0	0	0	992	992	0	3.9	2.41
26/02/2014 15:38	0	0	19.1	0	0	0	993	992	1	3.9	2.42
26/02/2014 16:38	0	0	18.9	0	0	0	992	992	0	3.9	2.42
26/02/2014 17:38	0	0	18.8	0	0	0	993	992	1	3.9	2.42
26/02/2014 18:38	0	0	18.7	0	0	0	993	992	1	3.9	2.4
26/02/2014 19:38	0	0	18.8	0	0	0	993	993	0	3.9	2.41
26/02/2014 20:38	0	0	18.5	0	0	0	992	991	1	3.9	2.4
26/02/2014 21:38	0	0	19	0	0	0	992	991	1	3.9	2.4
26/02/2014 22:38	0	0	18.5	0	0	0	991	990	1	3.9	2.41
26/02/2014 23:38	0	0	18.8	0	0	0	989	988	1	3.9	2.41
27/02/2014 00:38	0	0	18.5	0	0	0	987	987	0	3.9	2.41
27/02/2014 01:38	0	0	18.9	0	0	0	986	986	0	3.9	2.41
27/02/2014 02:38	0	0	18.5	0	0	0	984	984	0	3.9	2.41
27/02/2014 03:38	0	0	19.1	0	0	0	983	982	1	3.9	2.41
27/02/2014 04:38	0	0	19.1	0	0	0	981	981	0	3.9	2.4
27/02/2014 05:38	0	0	18.9	0	0	0	981	981	0	3.9	2.41
27/02/2014 06:38	0	0	18.7	0	0	0	982	981	1	3.9	2.4
27/02/2014 07:38	0	0	18.6	0	0	0	983	982	1	3.9	2.41
27/02/2014 08:38	0	0	18.4	0	0	0	983	983	0	3.9	2.41

Appendix D

Calibration Certificates

ground - gas solutions limited

CHECKLIST FOR GASCLAM

KIT CONTENTS

GasClam	✓	Filters x 3	✓
Communication Cable	✓	O-Ring (Bottom) x 5	✓
Start Cable	✓	O-Ring (Top) x 5	✓
Gasclam Snorkel Assembly	✓	Moisture Filter x 3	✓
Box Spanner	✓	Hose Barb (for vent)	✓
Allen Key x 2	✓	Sensor Blanks x 3	✓
User Manual	✓	Charger	✓
Software CD	✓	Battery Pack (x2)	✓

QUALITY CHECK

Software version:	5.4.33
Firmware version:	07.11.248

Final instrument inspection date:	C.May	15/10/13

PD-FM-073-05

CALIBRATION CERTIFICATE

Date of Calibration: - 14th October 2013
Certificate Number: - 224580
Calibrated by: - C May
Signed: - C.May
Customer: - Shawcity Limited
Description: - GasClam
Manufacturer: - Elok - Opava
Type Number: - Version 7
Serial Number: - 000317/06/12
Calibration due date: - October 2014

This instrument has been factory calibrated to fully documented procedures in accordance with our ISO 9001:2008 Quality Management System.
Measurement standards are derived from volumetric and time sources which have been calibrated at a UKAS accredited laboratory. The following list indicates the serial numbers of equipment used during the calibration procedure.

BAR02	PRESS04	C298326 / A7871[1]	C9122 / A8053[1]	C9489 / A7915[1]
C298926 / A7283[1]				

[1] Gas mixtures prepared using equipment traceable to N.P.L. standards against Suppliers Certificate No

The instrument has been calibrated at a temperature of 23.0°C ± 0.25°C and a barometric pressure of 1004.0 mbar ± 2 mbar.

ION Science hereby certify that on the day of calibration the instrument was working according to the manufacturer's original sales specification as checked by the calibration procedure, unless otherwise stated.

Copies of this certificate may only be reproduced in full.

RESULTS ON DESPATCH

Applied Concentration		Instrument Indication	
Isobutylene	100 ppm	100 ppm	VOC
Hydrogen Sulphide	20 ppm	20 ppm	Hydrogen Sulphide
Carbon Monoxide	39 ppm	40 ppm	Carbon Monoxide
Oxygen	20.9 % O_2	21.0 %	Oxygen
Methane	59.9 % CH_4	59.9 %	Methane
Carbon Dioxide	40.1 % CO_2	40.6 %	Carbon Dioxide
Barometric Pressure	1004.0 mbar	1004	mbar
Borehole Pressure	1004.0 mbar	1004	mbar

The estimated applied gas uncertainty is ± 2.0%

Comments: -

PD-FM-077-04

Unrivalled Detection. www.ionscience.com
Ion Science Ltd, The Way, Fowlmere, Cambs, SG8 7UJ, UK. T: +44 (0)1763 208 503 E: info@ionscience.com

shawcity LIMITED
Be sure. Be safe

CERTIFICATE OF CALIBRATION
GasClam

CALIBRATION CERTIFICATE NO: 49608

ISSUED BY: SHAWCITY LIMITED
DATE: 01.10.13

APPROVED SIGNATORY: 

NAME: Peter Gunter

CUSTOMER: Ground Gas Solutions Ltd
INSTRUMENT: GasClam
SERIAL NUMBER: 000033/12/09

CALIBRATION METHOD: CM14
AMBIENT CONDITIONS: 20°C ± 2°C and 50% (± 20%) RH

Prior to calibration the instrument was allowed to stabilise in the laboratory for at least 30 minutes.
The instrument was calibrated by exposing the sensor to known values of gas concentrations.
All gases were sampled through the complete probe and in line filter, where applicable.
The reference values are those generated by the certified source and the indicated values are those measured by the instrument.

CALIBRATION RESULTS

GAS/SOURCE	LOT No	REF. VALUE	INDICATED VALUE
Oxygen	Ambient Air	20.9% O2	20.9% O2
Nitrogen	1467959	>99.999%	0.0% O2
Methane	1467968	60.0%	60.0%
Carbon Dioxide	1467968	40.0%	40.0%
Hydrogen Sulphide	1480827	50 ppm	50 ppm
Carbon Monoxide	1500844	50 ppm	50 ppm
Isobutylene	1464995	100 ppm	100 ppm
Barometric Pressure	Digitron 2025P	993 mbar	993 mbar
Borehole Pressure	Digitron 2025P	993 mbar	993 mbar

COMMENTS:
The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k=2$.
This provides a level of confidence of uncertainty of approximately 95%.
The uncertainty of measurement is ±2 ppm.
The results indicate that the instrument conforms to the applicable parts of the published specification.

Tel: 01793 780622
www.shawcity.co.uk
Instrument House, 91-92 Shrivenham Hundred Business Park
Watchfield, Oxfordshire, SN6 8TY
Fax: 01793 784466
service@shawcity.co.uk

shawcity LIMITED
Be sure. Be safe

CERTIFICATE OF CALIBRATION
GasClam

CALIBRATION CERTIFICATE NO: 49720

ISSUED BY: SHAWCITY LIMITED
DATE: 04.11.13

APPROVED SIGNATORY: P A Gunter

NAME: Peter Gunter

CUSTOMER: Ground Gas Solutions Ltd
INSTRUMENT: GasClam
SERIAL NUMBER: 000030/12/09

CALIBRATION METHOD: CM14
AMBIENT CONDITIONS: 20°C ± 2°C and 50% (± 20%) RH

Prior to calibration the instrument was allowed to stabilise in the laboratory for at least 30 minutes.
The instrument was calibrated by exposing the sensor to known values of gas concentrations.
All gases were sampled through the complete probe and in line filter, where applicable.
The reference values are those generated by the certified source and the indicated values are those measured by the instrument.

CALIBRATION RESULTS

GAS/SOURCE	LOT No	REF. VALUE	INDICATED VALUE
Oxygen	Ambient Air	20.9% O2	20.9% O2
Nitrogen	1467959	>99.999%	0.0% O2
Methane	1467968	60.0%	60.0%
Carbon Dioxide	1467968	40.0%	40.0%
Hydrogen Sulphide	1480827	50 ppm	50 ppm
Carbon Monoxide	1467966	50 ppm	50 ppm
Isobutylene	1504738	100 ppm	100 ppm
Barometric Pressure	Digitron 2025P	989 mbar	989 mbar
Borehole Pressure	Digitron 2025P	989 mbar	989 mbar

COMMENTS:
The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k=2$.
This provides a level of confidence of uncertainty of approximately 95%.
The uncertainty of measurement is ±2 ppm.
The results indicate that the instrument conforms to the applicable parts of the published specification.

Tel: 01793 780622
www.shawcity.co.uk
Instrument House, 91-92 Shrivenham Hundred Business Park
Watchfield, Oxfordshire, SN6 8TY
Fax: 01793 784466
service@shawcity.co.uk

TEST DATE AND CONDITIONS	
Date	20/02/2013
Atmospheric Pressure	1011mB
Ambient Temp	19.7°C
Environics Serial No.	3268

GAS DATA LTD
Pegasus House
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LB
Tel 02476303311 Fax 02476307711

GFM435-1 FINAL INSPECTION & CALIBRATION CHECK CERTIFICATE

FLOW CHECKS					
Calibration Flow		Instrument Flow Channels Read			
Applied Flow	Applied Pressure	Flow [Flow] (l/hour)	tol. (l/hour)	Differential Pressure [Dp] (Pa)	tol. (Pa)
-30.0 l/hour	-253 Pa	-31.6	+/-3.0	-284	+/-50
-3.0 l/hour	-12 Pa	-3.0	+/-1.0	-11	+/-6
0.0 l/hour	0 Pa	0.0	0.0	0	0.0
+3.0 l/hour	12 Pa	3.0	+/-0.5	11	+/-3
+30.0 l/hour	269 Pa	30.0	+/-3.0	270	+/-50
+60.0 l/hour	823 Pa	60.7	+/-6.0	853	+/-130
+90.0 l/hour	1634 Pa	91.8	+/-9.0	1726	+/-250

OPTIONAL GAS CHECKS								
Calibration Gas		Instrument Gas Channels Read						
Gas Type	Applied Conc.	Label	H2S	CO			Hexane	tol.
		Range	5000ppm	2000ppm			2%	(% vol.)
N2	100%		0	0			0	+/- 5.0
H2S	1500ppm		1500	0				+/- 5.0
CO	1000ppm		80	1002				+/- 5.0
								+/- 5.0
								+/- 5.0
								+/- 5.0
Hexane	20000ppm						1.916	+/- 10.0

TEMPERATURE CHECK		
Calibration Temperature	Instrument Temperature Channel Read	
Applied Equivalent Temperature	Temperature [Temp] (°C)	tol. (°C)
-10.0 °C	-9.5	+/- 2.0
0.0 °C	0.0	+/- 1.0
30.0 °C	30.0	+/- 1.0
60.0 °C	60.0	+/- 1.0
100.0 °C	100.0	+/- 1.0

TEST DATE AND CONDITIONS	
Date	20/02/2013
Atmospheric Pressure	1011mB
Ambient Temp	19.7°C
Environics Serial No.	3268

GAS DATA LTD
Pegasus House
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LB
Tel 02476303311 Fax 02476307711

GFM435-1 FINAL INSPECTION & CALIBRATION CHECK CERTIFICATE

INSTRUMENT DETAILS	
Serial No	Customer
11028	Ground Gas Solutions Ltd

INSTRUMENT CHECKS			
Keyboard	✓	Pump Flow	500cc/min
Display Contrast	✓	Pump Flow @ -200mB	300cc/min
Clock Set / Running	✓	S/W Version	G435.0024/0001
Labels Fitted	✓	Recalibration Date	20/02/2014

GAS CHECKS							
Calibration Gas		Instrument Gas Channels Read					
Gas Type	Applied Conc.	CH4 (%)	tol. (% vol.)	CO2 (%)	tol. (% vol.)	O2 (%)	tol. (% vol.)
N2	100%	0.0	0.0	0.0	0.0	0.0	+/-0.1
CH4	5 %	5.0	+/-0.3	0.0	0.0	0.0	+/-0.1
	60%	59.4	+/-3.0	0.0	0.0	-0.1	+/-0.1
CO2	5%	0.0	0.0	4.9	+/-0.3	-0.2	+/-0.1
	40%	0.0	0.0	40.8	+/-3.0	-0.8	+/-0.1
AIR (20.9% O2, 400ppm CO2)	100%	0.0	0.0	0.0	+0.1	20.8	+/-0.5

PRESSURE CHECKS							
Calibration Pressure		Instrument Pressure Channels Read					
Pressure @	Applied Pressure	Atmospheric [Ap] (mB)	tol. (mB)				
All ports	current atmospheric	1011	+/-2.0				
Ap port (internal)	+800mB(a)	801	+/-5.0				
	+1200mB(a)	1203	+/-5.0				

TEST DATE AND CONDITIONS	
Date	25.2.13
Atmospheric Pressure	1016 mB
Ambient Temp	19.2 °C
Environics Serial No.	3268

GAS DATA LTD
Pegasus House
Seven Stars Estate
Wheler Rd.
Coventry
CV3 4LB
Tel: 024 76 303311 Fax: 024 76 307711

GFM435 (MCERTS) OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS					
SO Number	Instrument Banner	Instrument Serial Number + SW Version	Job Number(s)		
305921	GFM435	11028 - 24.01	12158	—	—

Calibration Technician ..... JSD ..... **DATE** 20-2-2013

Inspection Technician ..... **DATE** 25.2.13

INSTRUMENT CHECKS		Pass (P), Fail (F) or not applicable(NA)
Function Tests	Dust Caps Fitted	P
	Keyboard Test (All keys)	P
	Backlight Test	P
	Clock Set / Running	P
	Comms Test	P
	Pump Flow Test (In & Out)	P
	Overall Leak Test (30mb)	P
	Battery Charge Test	P
	Service Date set to?	20.2.14
Channel Tests	Data Logging Enabled?	NA
	Verify CH4/LEL/Hexane/PID	P
	Verify CO2	P
	Verify O2	P
	Verify H2S	P
	Verify CO	P
	Verify 1st Option gas	NA
	Verify 2nd Option gas	NA
	Verify atmospheric pressure	P
	Verify differential pressure	P
	Verify flow	P
	Verify temperature probe input	P
	Verify vane anemometer input	P
DataBase Checks	Jobcard(s) completed and signed	P
	Jobcard(s) booked off database	P
	Calibration certificate completed	P
	Complete & print QI record	NA
Label Checks	No. of Calibration label fitted	2495
	MCERTS label displayed	P
	Warranty label fitted	P
H2S Range	H2S Range from SO	5000
H2S Range	H2S Range from cal cert	5000
Over-range	Over-range value correct?	P

INSTRUMENT PACKING LIST		Tick if included
Instrument		✓
Leather Case		✓
Instrument Strap		✓
AC Battery Charger (UK)		✓
AC Battery Charger (EURO)		X
AC Battery Charger (US)		X
Gas Sample Pipe		X
Hard Carry Case		✓
Spares Pot		✓
Allen Key		X
Flow Sample Pipe		X
Pressure Sample Pipe		X
Temperature Probe		X
Vane Anemometer		X
USB Cable		✓
USB Memory Stick		✓
SiteMan Software	Ver	4.12
Internal Filter Pack	Qty	X
External Filter Pack	Qty	X
Field Guide		✓
Extra Items:		

Comments

TEST DATE AND CONDITIONS	
Date	20/01/14
Atmospheric Pressure	996mB
Ambient Temp	20.6°C
Environics Serial No.	2518

GAS DATA LTD
Pegasus House
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LB
Tel 02476303311 Fax 02476307711

GFM430-1 FINAL INSPECTION & CALIBRATION CHECK CERTIFICATE

FLOW CHECKS					
Calibration Flow		Instrument Flow Channels Read			
Applied Flow	Applied Pressure	Flow [Flow] (l/hour)	tol. (l/hour)	Differential Pressure [Dp] (Pa)	tol. (Pa)
-30.0 l/hour	-242 Pa	-27.8	+/-3.0	-219	+/-50
-3.0 l/hour	-11 Pa	-2.5	+/-1.0	-9	+/-6
0.0 l/hour	0 Pa	0.0	0.0	0	0.0
+3.0 l/hour	11 Pa	2.8	+/-0.5	9	+/-3
+30.0 l/hour	250 Pa	27.9	+/-3.0	226	+/-50
+60.0 l/hour	753 Pa	57.1	+/-6.0	655	+/-130
+90.0 l/hour	1483 Pa	86.3	+/-9.0	1357	+/-250

OPTIONAL GAS CHECKS								
Calibration Gas		Instrument Gas Channels Read						
Gas Type	Applied Conc.	Label Range	H2S 2000ppm	CO 2000ppm				tol. (% vol.)
N2	100%		0	0				0.0
H2S	100ppm		99	0				+/- 5.0
CO	1000ppm		74	994				+/- 5.0
								+/- 5.0
								+/- 5.0
								+/- 5.0

TEMPERATURE CHECK		
Calibration Temperature	Instrument Temperature Channel Read	
Applied Equivalent Temperature	Temperature [Temp] (°C)	tol. (°C)
-10.0 °C	-9.5	+/- 2.0
0.0 °C	0.0	+/- 1.0
30.0 °C	30.0	+/- 1.0
60.0 °C	60.0	+/- 1.0
100.0 °C	100.0	+/- 1.0

TEST DATE AND CONDITIONS	
Date	20/01/14
Atmospheric Pressure	996mB
Ambient Temp	20.6°C
Environics Serial No.	2518

GAS DATA LTD
Pegasus House
Seven Stars Estate
Wheler Rd
Coventry
CV3 4LB
Tel 02476303311 Fax 02476307711

GFM430-1 FINAL INSPECTION & CALIBRATION CHECK CERTIFICATE

INSTRUMENT DETAILS	
Serial No	Customer
10356	Ground Gas Solutions Ltd

INSTRUMENT CHECKS			
Keyboard	✓	Pump Flow	>500cc/min
Display Contrast	✓	Pump Flow @ -200mB	300cc/min
Clock Set / Running	✓	S/W Version	G430.0024/0013
Labels Fitted	✓	Recalibration Date	20/01/15

GAS CHECKS							
Calibration Gas		Instrument Gas Channels Read					
Gas Type	Applied Conc.	CH4 (%)	tol. (% vol.)	CO2 (%)	tol. (% vol.)	O2 (%)	tol. (% vol.)
N2	100%	0.0	0.0	0.0	0.0	0.0	+0.1
CH4	5 %	4.9	+/-0.3	0.0	0.0	0.0	+0.1
	60%	60.9	+/-3.0	0.0	0.0	0.0	+0.1
CO2	5%	0.0	0.0	4.9	+/-0.3	0.0	+0.1
	40%	0.0	0.0	39.8	+/-3.0	0.0	+0.1
AIR (20.9% O2, 400ppm CO2)	100%	0.0	0.0	0.1	+0.1	20.8	+/-0.5

PRESSURE CHECKS							
Calibration Pressure		Instrument Pressure Channels Read					
Pressure @	Applied Pressure	Atmospheric [Ap] (mB)	tol. (mB)				
All ports	current atmospheric	996	+/-2.0				
Ap port (internal)	+800mB(a)	799	+/-5.0				
	+1200mB(a)	1201	+/-5.0				

TEST DATE AND CONDITIONS	
Date	21.1.14
Atmospheric Pressure	998 mB
Ambient Temp	18.1 °C
Environics Serial No.	2633

GAS DATA LTD
Pegasus House
Seven Stars Estate
Wheler Rd.
Coventry
CV3 4LB
Tel: 024 76 303311 Fax: 024 76 307711

GFM400 SERIES OUTWARD INSPECTION & QUALITY CHECK SHEET

INSTRUMENT DETAILS					
SO Number	Instrument Type	Instrument Serial Number	Job Number(s)		
307167	GFM430	10356	15427	—	—

Calibration Technician ..... JSD ..... **DATE** 20-1-14

Inspection Technician ..... **DATE** 21.1.14

	INSTRUMENT CHECKS	Pass (P), Fail (F) or not applicable (NA)
Function Tests	Dust Caps Fitted	P
	Keyboard Test (All Keys)	P
	Backlight Test	P
	Clock Set / Running	P
	Comms Test	P
	Pump Flow Test (In & Out)	P
	Overall Leak Test (30mB)	P
	Battery Charge Test	P
	Service Date set to?	20.1.15
Channel Test	Data Logging Enabled?	NA
	Verify CH4/LEL	P
	Verify CO2	P
	Verify O2	P
	Verify first optional gas	P
	Verify second optional gas	P
	Verify third optional gas	NA
	Verify fourth optional gas	NA
	Verify atmospheric pressure	P
	Verify static pressure	NA
	Verify differential pressure	P
	Verify flow	P
	Verify temperature probe input	P
	Verify vane anemometer input	P
DataBase Checks	Jobcard(s) completed and signed	P
	Jobcard(s) booked off database	P
	Calibration certificate completed	P
	Complete & print QI record	NA
Label Checks	No. of Calibration label fitted	3686
	Warranty label fitted	P
H2S Range	H2S Range from Sales Order	2000
H2S Range	H2S Range from Calibration Certificate	2000
Over-range	Over-range value correct?	P

INSTRUMENT PACKING LIST		Tick if included
Instrument		✓
Leather Case		✓
Instrument Strap		✓
AC Battery Charger (UK)		✓
AC Battery Charger (EURO)		X
AC Battery Charger (US)		X
Gas Sample Pipe		✓
Operation Manual (hardcopy)		X
Carry Case		✓
Spares Pot		✓
Allen Key		✓
Flow Sample Pipe		✓
Pressure Sample Pipe		X
Temperature Probe		X
Vane Anemometer		X
USB Cable		✓
USB Memory stick		X
SiteMan Software	Ver	X
Internal Filter Pack	Qty	X
External Filter Pack	Qty	1
Field Guide		X
Extra Items:		

Comments

CHECKLIST FOR

PHOCHECK TIGER PRODUCT RANGE

KIT CONTENTS

PhoCheck Tiger Instrument	✓
PhoCheck Tiger Select Instrument	
Li-ion Battery Pack	✓
Alkaline Battery Pack	
Instrument Boot	✓
Charger	✓
Power Supply (12V)	✓
Quick Start Guide (Standard)	✓
Quick Start Guide (Tiger Select)	
Warranty Registration Card	✓
USB Stick	✓
USB Cable	✓
Accessory Kit	✓

Benzene Pre-Filter Tubes (pack of 10)	
Benzene Tube Holder	
Benzene Tube Opener	

UPGRADES

H&S (STEL & TWA)	861300	
PPB (Sensitivity)	861301	
Data Logging (Full)	861303	
Single Log (Push to log)	861309	
Multi Log	861310	
Tiger Select		

QUALITY CHECK

Software version:	0.4.22
Integrity seal present?	(Yes) / No

Final instrument inspection date:	[signature]	25/09/13

PD-FM-075-07

CALIBRATION CERTIFICATE

Date of Calibration: - 25th September 2013

Certificate Number: - 224459

Calibrated by: - M.Wadey-Leblond

Signed: - [signature]

Customer: - Shawcity Limited

Description: - PhoCheck Tiger

Manufacturer: - ION Science Ltd

Type Number: - N/A

Serial Number: - T-107622

Calibration Due date: - September 2014

This instrument has been factory calibrated to fully documented procedures in accordance with our ISO 9001:2008 Quality Management System.
Measurement standards are derived from volumetric and time sources which have been calibrated at a UKAS accredited laboratory. The following list indicates the serial numbers of equipment used during the calibration procedure.

BAR02	A-861251	C9081 / A8274[1]			

[1] Gas mixtures prepared using equipment traceable to N.P.L. standards against Suppliers Certificate No

The instrument has been calibrated at a temperature of 21.0°C ± 0.25°C and a barometric pressure of 1008.7 mbar ± 2 mbar.

ION Science hereby certify that on the day of calibration the instrument was working according to the manufacturer's original sales specification as checked by the calibration procedure, unless otherwise stated.

RESULTS ON DESPATCH

Applied Concentration	Instrument Indication
99.9 ppm Isobutylene	99.6 ppm Isobutylene

The estimated applied gas uncertainty is ± 2.0%

Comments: -

PD-FM-086-04

Unrivalled Detection. www.ionscience.com
Ion Science Ltd, The Way, Fowlmere, Cambs, SG8 7UJ, UK. T: +44 (0)1763 208 503 E: info@ionscience.com

shawcity LIMITED
Be sure. Be safe

CERTIFICATE OF CALIBRATION
PhoCheck Tiger

CALIBRATION CERTIFICATE NO: 50410

ISSUED BY: SHAWCITY LIMITED
DATE: 15-Jan-14

APPROVED SIGNATORY:

NAME: Steven Black

CUSTOMER: Ground Gas Solutions Ltd
INSTRUMENT: PhoCheck Tiger
SERIAL NUMBER: T-105553

CALIBRATION METHOD: CM03
AMBIENT CONDITIONS: 20°C ± 2°C and 50% (± 20%) RH

Prior to calibration the instrument was allowed to stabilise in the laboratory for at least 30 minutes.
The instrument was calibrated by exposing the sensor to known values of gas concentrations.
All gases were sampled through the complete probe and in line filter, where applicable.
The reference value is that generated by the certified source and the indicated value is that measured by the instrument.

CALIBRATION RESULTS

GAS	LOT No	REF. VALUE	INDICATED VALUE
Isobutylene	1504738	100 ppm	100 ppm
Isobutylene	SIPCYL-7761	1000ppm	1000ppm

COMMENTS:
The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k=2$.
This provides a level of confidence of uncertainty of approximately 95%.
The uncertainty of measurement is ±2 ppm.
The results indicate that the instrument conforms to the applicable parts of the published specification.

Tel: 01793 780622
www.shawcity.co.uk
Instrument House, 91-92 Shrivenham Hundred Business Park
Watchfield, Oxfordshire, SN6 8TY
Fax: 01793 784466
service@shawcity.co.uk

Appendix E

GasClam® Overview & Deployment Information Sheet

ground - gas solutions limited

GGS GasClam® Instrumentation Overview & Deployment Information

Introduction

GGS GasClam® instruments are in-situ borehole continuous ground-gas monitoring devices, suitable for detection of a wide range of ground gases commonly found in borehole monitoring. The equipment is ATEX approved, IP68 rated, operates safely in explosive atmospheres and can survive flooding environments. Instruments can also be secured to building walls or placed internally to monitor sub-floor spaces or indoor air.

GGS owns a large fleet of GasClam® instruments, with the following gas sensors as standard: Methane, Carbon Dioxide, Oxygen, Total Volatile Organic Compounds, Carbon Monoxide and Hydrogen Sulphide. To allow correlations to be drawn between ground-gases and environmental changes, the instruments are also fitted with sensors for atmospheric pressure, borehole pressure and temperature.

For sites where very low levels of Methane and Carbon Dioxide need to be measured, such as subfloor void or internal monitoring, GGS uses instruments fitted with low range, high resolution sensors (specification below).

Should sites be influenced by water level changes, GGS also installs equipment to provides continuous water level logging alongside continuous ground-gas monitoring.

GasClam® Sensor Specifications, Service and Maintenance

GGS GasClam® instruments are serviced and calibrated annually. Routine maintenance including the replacement of filters and operational checks are carried out at regular intervals and prior to deployment at a site. Copies of the calibration certificates for the instruments used on site are included as standard within reporting. Details of the sensor specifications are provided below:

Sensor	Method / Type	Range	Resolution
Methane (0-100%)	Infrared	0 - 100%v/v	1% of measuring range above 50%, 0.5% below 50%
#Methane (0-5%)	Infrared	0-5%v/v	0.05%
Carbon Dioxide (0-100%)	Infrared	0 - 100%v/v	1% of measuring range above 50%, 0.5% below 50%
#Carbon Dioxide (0-5%)	Infrared	0-5%v/v	0.05%
Oxygen	Electrochemical	0 - 25%v/v	0.1%
*Hydrogen Sulphide	Electrochemical	0 - 100ppmv	1ppmv
*Carbon Monoxide	Electrochemical	0 - 1000ppmv	1ppmv
*Total Volatile Organic Compounds	PID	0 - 4000ppmv	1ppmv
Atmospheric Pressure	Piezoelectric	800 - 1200mb	1mBar
Borehole Pressure	Piezoelectric	800 - 1200mb	1mBar
Temperature	Internal chip	-5°C to +50°C	1°C

Only installed on the 0-5% High Resolution GasClam® * Only installed in VOC GasClam®

GGS GasClam® equipment is battery powered and runs off two D cell batteries. Battery life is variable and depends on the site conditions (moisture levels and temperature), GGS will schedule interim site visits to change batteries when required.

Deployment Requirements

For GGS GasClam® instruments to be deployed, standard 50mm installation standpipes are required (larger diameter boreholes can be accommodated for). Headworks with enough clearance and a suitable secure cover are also required. GGS recommends that a minimum 8 inch diameter flush fit cover (for example MW8 covers available from Stuart Wells) be used. A minimum 100mm clearance is required from the top of the 50mm standpipe to the underside of the cover. Minimum 150mm internal headworks diameter is required (75mm clear radius from centre of standpipe). Standing water level should be greater than 0.9m below the standpipe top due to the instrument halting gas sampling automatically to avoid taking water internally.

GGS also deploys GasClam® instruments within buildings or fixed to external walls within protective and secure housing to monitor indoor air or subfloor void spaces of existing buildings or for verification purposes.

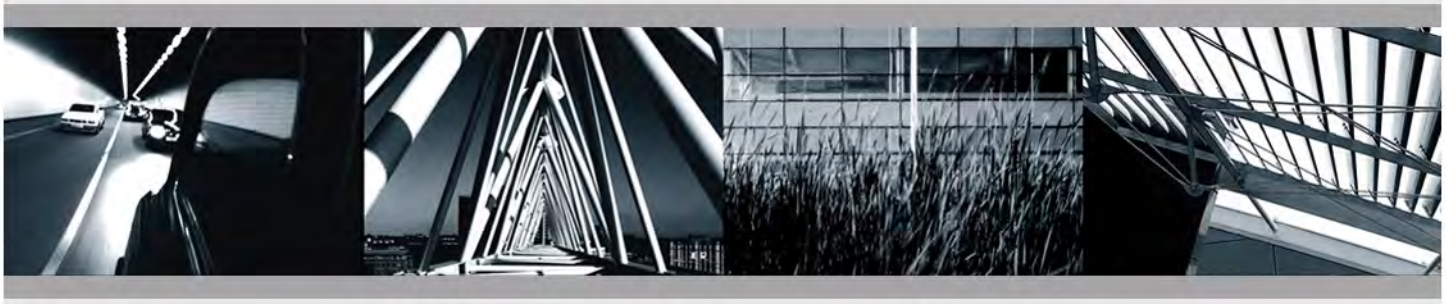
If the above requirements cannot be achieved, please contact GGS to discuss site specific deployment options – there probably is one!

GasClam Insurance

GGS carries specific insurance to cover the instruments against theft from site and is included as standard as part of our service.

Ground-Gas Solutions Ltd
Greenheys
Manchester Science Park
Pencroft Way
Manchester
M15 6JJ

Telephone: 0161 232 7465
E-mail: info@ground-gassolutions.co.uk
Web: www.ground-gassolutions.co.uk



www.campbellreith.com

Structural + Civil + Environmental + Geotechnical + Traffic and Transportation

Friars Bridge Court
41-45 Blackfriars Road
London
SE1 8NZ
Telephone: +44(0)20 7340 1700
Facsimile: +44(0)20 7340 1777
Email: london@campbellreith.com

Raven House
29 Linkfield Lane
Redhill
Surrey RH1 1SS
Telephone: +44(0)1737 784 500
Facsimile: +44(0)1737 784 501
Email: redhill@campbellreith.com

The Lexicon
10-12 Mount Street
Manchester
M2 5NT
Telephone: +44(0)161 819 3060
Facsimile: +44(0)161 819 3090
Email: manchester@campbellreith.com

Wessex House
Pixash Lane
Keynsham
Bristol
BS31 1TP
Telephone: +44(0)117 916 1066
Facsimile: +44(0)117 916 1069
Email: bristol@campbellreith.com

Chantry House
High Street
Coleshill
Birmingham
B46 3BP
Telephone: +44(0)1675 467 484
Facsimile: +44(0)1675 467 502
Email: birmingham@campbellreith.com