



CERTIFICATE OF CALIBRATION

Certificate No.: 14CA0529 01-01 Page 1 of 2

Item tested

Description:	Sound Level Meter (Type 1)	,	Microphone
Manufacturer:	B & K	,	B & K
Type/Model No.:	2236	,	4188
Serial/Equipment No.:	2100736	,	2157055
Adaptors used:	-	,	-

Item submitted by

Customer Name: Lam Geotechnics Limited
Address of Customer: -
Request No.: -
Date of receipt: 29-May-2014

Date of test: 29-May-2014

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	22-Jun-2014	CIGISMEC
Signal generator	DS 360	33873	09-Apr-2015	CEPREI
Signal generator	DS 360	61227	09-Apr-2015	CEPREI

Ambient conditions

Temperature: 22 ± 1 °C
Relative humidity: 60 ± 10 %
Air pressure: 1000 ± 10 hPa

Test specifications

- 1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- 2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
- 3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory:


Huang Jian Min / Feng Jun Qi

Date: 30-May-2014

Company Chop:



Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 14CA0529 01-01 Page 2 of 2

1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	1.0	2.1
	Lin	Pass	2.0	2.2
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Frequency weightings	A	Pass	0.3
Time weightings	C	Pass	0.3	
	Lin	Pass	0.3	
	Single Burst Fast	Pass	0.3	
Peak response	Single Burst Slow	Pass	0.3	
	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
	Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3
Time averaging	Repeated at frequency of 100 Hz	Pass	0.3	
	1 ms burst duty factor 1/10 ³ at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
	Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

Calibrated by:

Date:

Fung Chi Yip

29-May-2014

- End -

Checked by:

Date:

Lam Tze Wai

30-May-2014

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.



CERTIFICATE OF CALIBRATION

Certificate No.: 14CA1213 01 Page 1 of 2

Item tested

Description:	Sound Level Meter (Type 1)	Microphone
Manufacturer:	B & K	B & K
Type/Model No.:	2236	4188
Serial/Equipment No.:	2100736	2288941
Adaptors used:	-	-

Item submitted by

Customer Name: Lam Geotechnics Limited
Address of Customer: -
Request No.: -
Date of receipt: 13-Dec-2014

Date of test: 13-Dec-2014

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	20-Jun-2015	CIGISMEC
Signal generator	DS 360	33873	09-Apr-2015	CEPREI
Signal generator	DS 360	61227	09-Apr-2015	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 60 ± 5 %
Air pressure: 1010 ± 5 hPa

Test specifications

- The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of $\pm 20\%$.
- The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure response of the Sound Level Meter.


Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory:


Huang Jian Min/Feng Jun Qi

Date: 15-Dec-2014

Company Chop:



Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 14CA1213 01 Page 2 of 2

1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	2.1
	C	Pass	1.0	
	Lin	Pass	2.0	
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	2.2
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	A	Pass	0.3	
	C	Pass	0.3	
Frequency weightings	Lin	Pass	0.3	
	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
Peak response	Single 100µs rectangular pulse	Pass	0.3	
	R.M.S. accuracy	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/10 ³ at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
	Sound exposure level	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

- End -

Calibrated by:		Checked by:	
Date:	Fung Chi Yip 13-Dec-2014	Date:	Lam Tze Wai 15-Dec-2014

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.



CERTIFICATE OF CALIBRATION

Certificate No.: 14CA0529 01-02

Page: 1 of 2

Item tested

Description: Acoustical Calibrator (Class 1)
Manufacturer: Rion Co., Ltd.
Type/Model No.: NC-73
Serial/Equipment No.: 10465798
Adaptors used: -

Item submitted by

Customer: Lam Geotechnics Limited
Address of Customer: -
Request No.: -
Date of receipt: 29-May-2014

Date of test: 30-May-2014

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2412857	13-May-2015	SCL
Preamplifier	B&K 2673	2239857	10-Apr-2015	CEPREI
Measuring amplifier	B&K 2610	2346941	08-Apr-2015	CEPREI
Signal generator	DS 360	61227	09-Apr-2015	CEPREI
Digital multi-meter	34401A	US36087050	17-Dec-2014	CEPREI
Audio analyzer	8903B	GB41300350	07-Apr-2015	CEPREI
Universal counter	53132A	MY40003662	11-Apr-2015	CEPREI

Ambient conditions

Temperature: 22 ± 1 °C
Relative humidity: 60 ± 10 %
Air pressure: 1000 ± 10 hPa

Test specifications

- The Sound Calibrator has been calibrated in accordance with the requirements as specified in IEC 60942 1997 Annex B and the lab calibration procedure SMTP004-CA-156.
- The calibrator was tested with its axis vertical facing downwards at the specific frequency using insert voltage technique.
- The results are rounded to the nearest 0.01 dB and 0.1 Hz and have not been corrected for variations from a reference pressure of 1013.25 hectoPascals as the maker's information indicates that the instrument is insensitive to pressure changes.

Test results

Details of the performed measurements are presented on **page 2** of this certificate.

Approved Signatory:


Huang Jian Min/Feng Jun Qi

Date: 30-May-2014

Company Chop:



Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.



TISCH ENVIRONMENTAL, INC.
 145 SOUTH MIAMI AVE
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ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Jul 14, 2014 Rootsmeter S/N 0438320 Ta (K) - 298
 Operator Tisch Orifice I.D. - 0005 Pa (mm) - 749.3

PLATE OR Run #	VOLUME START (m3)	VOLUME STOP (m3)	DIFF VOLUME (m3)	DIFF TIME (min)	METER DIFF Hg (mm)	ORFICE DIFF H2O (in.)
1	NA	NA	1.00	1.3870	3.2	2.00
2	NA	NA	1.00	0.9830	6.4	4.00
3	NA	NA	1.00	0.8760	7.9	5.00
4	NA	NA	1.00	0.8340	8.8	5.50
5	NA	NA	1.00	0.6860	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9817	0.7078	1.4042	0.9957	0.7179	0.8919
0.9775	0.9944	1.9859	0.9915	1.0086	1.2613
0.9754	1.1135	2.2203	0.9894	1.1294	1.4101
0.9743	1.1683	2.3286	0.9882	1.1849	1.4790
0.9692	1.4128	2.8084	0.9830	1.4330	1.7837
Qstd slope (m) = 1.99175			Qa slope (m) = 1.24720		
intercept (b) = -0.00041			intercept (b) = -0.00026		
coefficient (r) = 0.99991			coefficient (r) = 0.99991		
y axis = SQRT[H2O(Pa/760) (298/Ta)]			y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

Vstd = Diff. Vol [(Pa-Diff. Hg)/760] (298/Ta)
 Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg)/Pa]
 Qa = Va/Time

For subsequent flow rate calculations:

Qstd = 1/m{ [SQRT(H2O(Pa/760) (298/Ta))] - b}
 Qa = 1/m{ [SQRT H2O(Ta/Pa)] - b}



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA1b
 Equipment no. : EL452

Calibration Date : 21-Oct-14
 Calibration Due Date : 21-Dec-14

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1015 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	1.99175	Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	14-Jul-15				

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.0	6.0	12.0	1.7265	64	63.5230
2	4.8	4.8	9.6	1.5442	58	57.5677
3	3.8	3.8	7.6	1.3740	52	51.6124
4	2.4	2.4	4.8	1.0920	40	39.7019
5	1.4	1.4	2.8	0.8341	32	31.7615

By Linear Regression of Y on X

Slope, m = 36.4512 Intercept, b = 0.9310
 Correlation Coefficient* = 0.9986
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau
 Date : 21-Oct-14

Checked by : Derek Lo
 Date : 21-Oct-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA1b
 Equipment no. : EL452
 Calibration Date : 18-Dec-14
 Calibration Due Date : 18-Feb-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	287	Kelvin	Pressure, P _a
			1026 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	1.99175	Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	14-Jul-15				

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.2	6.2	12.4	1.8130	65	66.6477
2	4.5	4.5	9.0	1.5446	55	56.3942
3	3.9	3.9	7.8	1.4380	50	51.2675
4	2.5	2.5	5.0	1.1513	42	43.0647
5	1.4	1.4	2.8	0.8616	31	31.7858

By Linear Regression of Y on X

Slope, m = 36.0094 Intercept, b = 0.7978
 Correlation Coefficient* = 0.9981
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau Checked by : Derek Lo
 Date : 18-Dec-14 Date : 18-Dec-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA2a
 Equipment no. : EL449

Calibration Date : 21-Oct-14
 Calibration Due Date : 21-Dec-14

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1015 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	1.99175	Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	14-Jul-15				

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.5	6.5	13.0	1.7970	63	62.5304
2	5.0	5.0	10.0	1.5761	57	56.5751
3	4.0	4.0	8.0	1.4097	50	49.6273
4	2.4	2.4	4.8	1.0920	41	40.6944
5	1.5	1.5	3.0	0.8633	34	33.7466

By Linear Regression of Y on X

Slope, m = 31.1199 Intercept, b = 6.6974
 Correlation Coefficient* = 0.9985
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau
 Date : 21-Oct-14

Checked by : Derek Lo
 Date : 21-Oct-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA2a
 Equipment no. : EL449

Calibration Date : 18-Dec-14
 Calibration Due Date : 18-Feb-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	287	Kelvin	Pressure, P _a
			1026 mmHg

Orifice Transfer Standard Information			
Equipment No.	EL086	Slope, m _c	1.99175
		Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$	
Next Calibration Date	14-Jul-15		

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.1	6.1	12.2	1.7983	62	63.5717
2	4.9	4.9	9.8	1.6118	55	56.3942
3	3.7	3.7	7.4	1.4006	49	50.2421
4	2.3	2.3	4.6	1.1043	40	41.0140
5	1.2	1.2	2.4	0.7977	32	32.8112

By Linear Regression of Y on X

Slope, m = 30.4893 Intercept, b = 7.8731
 Correlation Coefficient* = 0.9984
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau
 Date : 18-Dec-14

Checked by : Derek Lo
 Date : 18-Dec-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA3a
 Equipment no. : EL333

Calibration Date : 21-Oct-14
 Calibration Due Date : 21-Dec-14

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1015 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	1.99175	Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	14-Jul-15				

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	5.4	5.4	10.8	1.6379	54	53.5975
2	4.1	4.1	8.2	1.4272	49	48.6348
3	3.1	3.1	6.2	1.2410	42	41.6869
4	2.0	2.0	4.0	0.9969	37	36.7242
5	1.2	1.2	2.4	0.7722	31	30.7689

By Linear Regression of Y on X

Slope, m = 26.5451 Intercept, b = 10.0291
 Correlation Coefficient* = 0.9965
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau
 Date : 21-Oct-14

Checked by : Derek Lo
 Date : 21-Oct-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA3a
 Equipment no. : EL333

Calibration Date : 18-Dec-14
 Calibration Due Date : 18-Feb-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	287	Kelvin	Pressure, P _a
			1026 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	1.99175	Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	14-Jul-15				

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	5.5	5.5	11.0	1.7076	56	57.4196
2	4.3	4.3	8.6	1.5099	47	48.1914
3	3.2	3.2	6.4	1.3026	44	45.1154
4	2.5	2.5	5.0	1.1513	38	38.9633
5	1.2	1.2	2.4	0.7977	25	25.6337

By Linear Regression of Y on X

Slope, m = 33.6450 Intercept, b = -0.4658
 Correlation Coefficient* = 0.9920
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau
 Date : 18-Dec-14

Checked by : Derek Lo
 Date : 18-Dec-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA4a Calibration Date : 21-Oct-14
 Equipment no. : EL390 Calibration Due Date : 21-Dec-14

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1015 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	1.99175	Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	14-Jul-15				

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	5.9	5.9	11.8	1.7120	58	57.5677
2	4.8	4.8	9.6	1.5442	51	50.6199
3	3.7	3.7	7.4	1.3558	43	42.6795
4	2.4	2.4	4.8	1.0920	34	33.7466
5	1.5	1.5	3.0	0.8633	25	24.8137

By Linear Regression of Y on X

Slope, m = 38.2048 Intercept, b = -8.2956
 Correlation Coefficient* = 0.9993
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau Checked by : Derek Lo
 Date : 21-Oct-14 Date : 21-Oct-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA4a Calibration Date : 18-Dec-14
 Equipment no. : EL390 Calibration Due Date : 18-Feb-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	287	Kelvin	Pressure, P _a
			1026 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	1.99175	Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$\left(H \times P_a / 1013.3 \times 298 / T_a \right)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	14-Jul-15				

Calibration of TSP						
Calibration Point	Manometer Reading H (inches of water)			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.0	6.0	12.0	1.7835	65	66.6477
2	4.7	4.7	9.4	1.5785	52	53.3182
3	3.5	3.5	7.0	1.3622	45	46.1407
4	2.2	2.2	4.4	1.0801	32	32.8112
5	1.4	1.4	2.8	0.8616	27	27.6844

By Linear Regression of Y on X

Slope, m = 41.9297 Intercept, b = -10.5801
 Correlation Coefficient* = 0.9901
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau Checked by : Derek Lo
 Date : 18-Dec-14 Date : 18-Dec-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA5a
 Equipment no. : EL380

Calibration Date : 21-Oct-14
 Calibration Due Date : 21-Dec-14

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1015 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	1.99175	Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	14-Jul-15				

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.6	6.6	13.2	1.8107	58	57.5677
2	5.3	5.3	10.6	1.6226	54	53.5975
3	4.1	4.1	8.2	1.4272	48	47.6422
4	2.6	2.6	5.2	1.1366	39	38.7093
5	1.6	1.6	3.2	0.8916	32	31.7615

By Linear Regression of Y on X

Slope, m = 28.7132 Intercept, b = 6.2958
 Correlation Coefficient* = 0.9986
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau
 Date : 21-Oct-14

Checked by : Derek Lo
 Date : 21-Oct-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA5b
 Equipment no. : EL222

Calibration Date : 4-Dec-14
 Calibration Due Date : 4-Mar-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	288	Kelvin	Pressure, P _a
			1021 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	1.99175	Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	14-Jul-15				

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	5.8	5.8	11.6	1.7462	60	61.2642
2	4.6	4.6	9.2	1.5552	54	55.1378
3	3.5	3.5	7.0	1.3566	48	49.0114
4	2.3	2.3	4.6	1.0997	41	41.8639
5	1.4	1.4	2.8	0.8580	34	34.7164

By Linear Regression of Y on X						
Slope, m	=	29.6907	Intercept, b	=	9.1139	
Correlation Coefficient*	=	0.9997				
Calibration Accepted	=	Yes/No**				

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau
 Date : 4-Dec-14

Checked by : Derek Lo
 Date : 4-Dec-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1e Calibration Date : 21-Oct-14
 Equipment no. : EL455 Calibration Due Date : 21-Dec-14

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1015 mmHg

Orifice Transfer Standard Information			
Equipment No.	EL086	Slope, m _c	1.99175
		Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$	
Next Calibration Date	14-Jul-15		

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.4	6.4	12.8	1.7831	62	61.5379
2	5.2	5.2	10.4	1.6073	53	52.6050
3	4.0	4.0	8.0	1.4097	45	44.6646
4	2.6	2.6	5.2	1.1366	33	32.7540
5	1.6	1.6	3.2	0.8916	22	21.8360

By Linear Regression of Y on X

Slope, m = 43.9909 Intercept, b = -17.3967
 Correlation Coefficient* = 0.9996
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau Checked by : Derek Lo
 Date : 21-Oct-14 Date : 21-Oct-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1e Calibration Date : 18-Dec-14
 Equipment no. : EL455 Calibration Due Date : 18-Feb-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	287	Kelvin	Pressure, P _a
			1026 mmHg

Orifice Transfer Standard Information			
Equipment No.	EL086	Slope, m _c	1.99175
		Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$	
Next Calibration Date	14-Jul-15		

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.5	6.5	13.0	1.8563	64	65.6224
2	5.0	5.0	10.0	1.6281	53	54.3435
3	4.3	4.3	8.6	1.5099	47	48.1914
4	2.7	2.7	5.4	1.1965	32	32.8112
5	1.2	1.2	2.4	0.7977	20	20.5070

By Linear Regression of Y on X

Slope, m = 43.0414 Intercept, b = -15.8646
 Correlation Coefficient* = 0.9939
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau Checked by : Derek Lo
 Date : 18-Dec-14 Date : 18-Dec-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1w Calibration Date : 21-Oct-14
 Equipment no. : EL080 Calibration Due Date : 21-Dec-14

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition						
Temperature, T _a	303	Kelvin	Pressure, P _a	1015	mmHg	
Orifice Transfer Standard Information						
Equipment No.	EL086	Slope, m _c	1.99175	Intercept, b _c	-0.00041	
Last Calibration Date	14-Jul-14	$\left(\frac{H \times P_a}{1013.3 \times 298 / T_a} \right)^{1/2}$ $= m_c \times Q_{std} + b_c$				
Next Calibration Date	14-Jul-15					
Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.1	6.1	12.2	1.7408	54	53.5975
2	4.9	4.9	9.8	1.5602	48	47.6422
3	3.9	3.9	7.8	1.3920	41	40.6944
4	2.5	2.5	5.0	1.1145	30	29.7764
5	1.5	1.5	3.0	0.8633	22	21.8360
By Linear Regression of Y on X						
Slope, m		=	36.9491	Intercept, b		= -10.5868
Correlation Coefficient*		=	0.9990			
Calibration Accepted		=	Yes/No**			

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau Checked by : Derek Lo
 Date : 21-Oct-14 Date : 21-Oct-14



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1w Calibration Date : 18-Dec-14
 Equipment no. : EL080 Calibration Due Date : 18-Feb-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	287	Kelvin	Pressure, P _a
			1026 mmHg

Orifice Transfer Standard Information			
Equipment No.	EL086	Slope, m _c	1.99175
		Intercept, b _c	-0.00041
Last Calibration Date	14-Jul-14	$\left(H \times P_a / 1013.3 \times 298 / T_a \right)^{1/2}$ $= m_c \times Q_{std} + b_c$	
Next Calibration Date	14-Jul-15		

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	5.9	5.9	11.8	1.7686	56	57.4196
2	4.6	4.6	9.2	1.5617	45	46.1407
3	3.8	3.8	7.6	1.4194	38	38.9633
4	2.6	2.6	5.2	1.1741	27	27.6844
5	1.7	1.7	3.4	0.9494	19	19.4816

By Linear Regression of Y on X

Slope, m = 46.3683 Intercept, b = -25.8022
 Correlation Coefficient* = 0.9970
 Calibration Accepted = Yes/No**

* if Correlation Coefficient < 0.990, check and recalibration again.

** Delete as appropriate.

Remarks : _____

Calibrated by : Henry Lau Checked by : Derek Lo
 Date : 18-Dec-14 Date : 18-Dec-14