



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

- 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 $\pm 20\%$.
- 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 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.



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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	
	A	Pass	0.3	
	C	Pass	0.3	
Frequency weightings	Lin	Pass	0.3	
	Time weightings	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	Crest factor of 3	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	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.

- 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.: 15CA0528 04-03

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 Ltd.
Address of Customer: -
Request No.: -
Date of receipt: 28-May-2015

Date of test: 30-May-2015

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Lab standard microphone	B&K 4180	2341427	15-Apr-2016	SCL
Preamplifier	B&K 2673	2239857	22-Apr-2016	CEPREI
Measuring amplifier	B&K 2610	2346941	22-Apr-2016	CEPREI
Signal generator	DS 360	61227	16-Apr-2016	CEPREI
Digital multi-meter	34401A	US36087050	17-Apr-2016	CEPREI
Audio analyzer	8903B	GB41300350	17-Apr-2016	CEPREI
Universal counter	53132A	MY40003662	16-Apr-2016	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 60 ± 10 %
Air pressure: 1000 ± 5 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

This is to certify that the sound calibrator conforms to the requirements of annex B of IEC 60942: 1997 for the conditions under which the test was performed. This does not imply that the sound calibrator meets IEC 60942 under any other conditions.

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

Approved Signatory:


Huang Jian Min/Feng Jun Qi

Date: 01-Jun-2015

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.



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1, Measured Sound Pressure Level

The output Sound Pressure Level in the calibrator head was measured at the setting and frequency shown using a calibrated laboratory standard microphone and insert voltage technique. The results are given in below with the estimated uncertainties.

Frequency Shown Hz	Output Sound Pressure Level Setting dB	Measured Output Sound Pressure Level dB	(Output level in dB re 20 µPa)
			Estimated Expanded Uncertainty dB
1000	94.00	94.06	0.10

2, Sound Pressure Level Stability - Short Term Fluctuations

The Short Term Fluctuations was determined by measuring the maximum and minimum of the fast weighted DC output of the B&K 2610 measuring amplifier over a 20 second time interval as required in the standard. The Short Term Fluctuation was found to be:

At 1000 Hz STF = 0.002 dB
Estimated expanded uncertainty 0.005 dB

3, Actual Output Frequency

The determination of actual output frequency was made using a B&K 4180 microphone together with a B&K 2673 preamplifier connected to a B&K 2610 measuring amplifier. The AC output of the B&K 2610 was taken to an universal counter which was used to determine the frequency averaged over 20 second of operation as required by the standard. The actual output frequency at 1 KHz was:

At 1000 Hz Actual Frequency = 966.3 Hz
Estimated expanded uncertainty 0.1 Hz Coverage factor k = 2.2

4, Total Noise and Distortion

For the Total Noise and Distortion measurement, the unfiltered AC output of the B&K 2610 measuring amplifier was connected to an Agilent Type 8903 B distortion analyser. The TND result at 1 KHz was:

At 1000 Hz TND = 0.5 %
Estimated expanded uncertainty 0.7 %

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:

Date:

Fung Chi Yip

30-May-2015

Checked by:

Date:

Lam Tze Wai

01-Jun-2015

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.



TISCH ENVIRONMENTAL, INC.
 145 SOUTH MIAMI AVE
 VILLAGE OF CLEVELAND, OH
 45002
 513.467.9000
 877.263.7610 TOLL FREE
 513.467.9009 FAX

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Jun 30, 2015 Rootmeter S/N 0438320 Ta (K) - 296
 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	ORFICE
					DIFF Hg (mm)	DIFF H2O (in.)
1	NA	NA	1.00	1.3930	3.2	2.00
2	NA	NA	1.00	0.9800	6.4	4.00
3	NA	NA	1.00	0.8790	7.9	5.00
4	NA	NA	1.00	0.8350	8.7	5.50
5	NA	NA	1.00	0.6900	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9883	0.7095	1.4090	0.9957	0.7148	0.8889
0.9841	1.0042	1.9926	0.9915	1.0117	1.2570
0.9820	1.1172	2.2278	0.9894	1.1256	1.4054
0.9810	1.1749	2.3365	0.9884	1.1837	1.4740
0.9757	1.4141	2.8179	0.9830	1.4247	1.7777
Qstd slope (m) = 2.00072			Qa slope (m) = 1.25282		
intercept (b) = -0.01209			intercept (b) = -0.00763		
coefficient (r) = 0.99995			coefficient (r) = 0.99995		
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 Calibration Date : 10-Jun-15
 Equipment no. : EL452 Calibration Due Date : 10-Aug-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1007 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	1.7339	60	59.3176
2	4.7	4.7	9.4	1.5220	54	53.3859
3	3.8	3.8	7.6	1.3686	48	47.4541
4	2.3	2.3	4.6	1.0648	38	37.5678
5	1.4	1.4	2.8	0.8308	30	29.6588

By Linear Regression of Y on X

Slope, m = 33.1850 Intercept, b = 2.2031
 Correlation Coefficient* = 0.9994
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar Checked by : Derek Lo
 Date : 10-Jun-15 Date : 10-Jun-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA1b
 Equipment no. : EL452
 Calibration Date : 10-Aug-15
 Calibration Due Date : 10-Oct-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	301	Kelvin	Pressure, P _a
			1005 mmHg

Orifice Transfer Standard Information			
Equipment No.	EL086	Slope, m _c	2.00072
		Intercept, b _c	-0.01209
Last Calibration Date	30-Jun-15	$\left(\frac{H \times P_a}{1013.3 \times 298 / T_a} \right)^{1/2}$ $= m_c \times Q_{std} + b_c$	
Next Calibration Date	30-Jun-16		

Calibration of TSP						
Calibration Point	Manometer Reading			Q _{std} (m ³ / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC $(W(P_a/1013.3 \times 298/T_a)^{1/2}/35.31)$ Y-axis
	(up)	(down)	(difference)			
1	5.9	5.9	11.8	1.7074	60	59.4552
2	4.8	4.8	9.6	1.5406	52	51.5279
3	3.8	3.8	7.6	1.3714	45	44.5914
4	2.5	2.5	5.0	1.1135	36	35.6731
5	1.6	1.6	3.2	0.8920	28	27.7458

By Linear Regression of Y on X

Slope, m = 38.3067 Intercept, b = -6.9577

Correlation Coefficient* = 0.9980

Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar Checked by : Derek Lo
 Date : 10-Aug-15 Date : 10-Aug-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA2a **Calibration Date** : 10-Jun-15
Equipment no. : EL449 **Calibration Due Date** : 10-Aug-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1007 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	5.9	5.9	11.8	1.7053	60	59.3176
2	4.8	4.8	9.6	1.5381	52	51.4086
3	3.8	3.8	7.6	1.3686	46	45.4768
4	2.3	2.3	4.6	1.0648	36	35.5906
5	1.4	1.4	2.8	0.8308	20	19.7725

By Linear Regression of Y on X

Slope, m = 42.7672 Intercept, b = -13.3484
 Correlation Coefficient* = 0.9900
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar **Checked by** : Derek Lo
Date : 10-Jun-15 **Date** : 10-Jun-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA2a
 Equipment no. : EL449
 Calibration Date : 10-Aug-15
 Calibration Due Date : 10-Oct-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	301	Kelvin	Pressure, P _a
			1005 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	2.00072	Intercept, b _c	-0.01209
Last Calibration Date	30-Jun-15	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	30-Jun-16				

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	1.6929	59	58.4643
2	4.6	4.6	9.2	1.5083	50	49.5460
3	3.7	3.7	7.4	1.3534	43	42.6096
4	2.5	2.5	5.0	1.1135	34	33.6913
5	1.5	1.5	3.0	0.8639	22	21.8003

By Linear Regression of Y on X

Slope, m = 43.3899 Intercept, b = -15.4622

Correlation Coefficient* = 0.9990

Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar Checked by : Derek Lo
 Date : 10-Aug-15 Date : 10-Aug-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA3a
 Equipment no. : EL333

Calibration Date : 10-Jun-15
 Calibration Due Date : 10-Aug-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1007 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	5.6	5.6	11.2	1.6613	52	51.4086
2	4.5	4.5	9.0	1.4893	48	47.4541
3	3.4	3.4	6.8	1.2946	40	39.5451
4	2.2	2.2	4.4	1.0414	34	33.6133
5	1.4	1.4	2.8	0.8308	28	27.6816

By Linear Regression of Y on X

Slope, m = 28.9984 Intercept, b = 3.3019
 Correlation Coefficient* = 0.9964
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar
 Date : 10-Jun-15

Checked by : Derek Lo
 Date : 10-Jun-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA3a
 Equipment no. : EL333
 Calibration Date : 10-Aug-15
 Calibration Due Date : 10-Oct-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	301	Kelvin	Pressure, P _a
			1005 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	2.00072	Intercept, b _c	-0.01209
Last Calibration Date	30-Jun-15	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	30-Jun-16				

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	5.6	5.6	11.2	1.6636	54	53.5097
2	4.6	4.6	9.2	1.5083	48	47.5642
3	3.6	3.6	7.2	1.3350	42	41.6187
4	2.4	2.4	4.8	1.0912	34	33.6913
5	2.0	2.0	4.0	0.9966	29	28.7367

By Linear Regression of Y on X

Slope, m = 35.9922 Intercept, b = -6.4472

Correlation Coefficient* = 0.9984

Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar Checked by : Derek Lo
 Date : 10-Aug-15 Date : 10-Aug-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA4a Calibration Date : 10-Jun-15
 Equipment no. : EL390 Calibration Due Date : 10-Aug-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1007 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	5.9	5.9	11.8	1.7053	57	56.3517
2	4.7	4.7	9.4	1.5220	52	51.4086
3	3.6	3.6	7.2	1.3321	44	43.4996
4	2.3	2.3	4.6	1.0648	34	33.6133
5	1.4	1.4	2.8	0.8308	26	25.7043

By Linear Regression of Y on X

Slope, m = 35.8979 Intercept, b = -4.2281

Correlation Coefficient* = 0.9988

Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar Checked by : Derek Lo
 Date : 10-Jun-15 Date : 10-Jun-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA4a
 Equipment no. : EL390

Calibration Date : 10-Aug-15
 Calibration Due Date : 10-Oct-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	301	Kelvin	Pressure, P _a
			1005 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	2.00072	Intercept, b _c	-0.01209
Last Calibration Date	30-Jun-15	$\left(\frac{H \times P_a}{1013.3 \times 298 / T_a} \right)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	30-Jun-16				

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	5.7	5.7	11.4	1.6783	58	57.4734
2	4.6	4.6	9.2	1.5083	51	50.5370
3	3.6	3.6	7.2	1.3350	45	44.5914
4	2.4	2.4	4.8	1.0912	34	33.6913
5	1.5	1.5	3.0	0.8639	25	24.7730

By Linear Regression of Y on X

Slope, m = 40.2813 Intercept, b = -9.9646
 Correlation Coefficient* = 0.9994
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar
 Date : 10-Aug-15

Checked by : Derek Lo
 Date : 10-Aug-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA5b
 Equipment no. : EL222

Calibration Date : 02-Jun-15
 Calibration Due Date : 02-Aug-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1009 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	6.3	6.3	12.6	1.7639	65	64.3245
2	4.8	4.8	9.6	1.5397	58	57.3973
3	3.6	3.6	7.2	1.3334	52	51.4596
4	2.3	2.3	4.6	1.0658	42	41.5636
5	1.4	1.4	2.8	0.8316	30	29.6883

By Linear Regression of Y on X

Slope, m = 36.5046 Intercept, b = 1.1799
 Correlation Coefficient* = 0.9934
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar
 Date : 02-Jun-15

Checked by : Derek Lo
 Date : 02-Jun-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA5b Calibration Date : 01-Aug-15
 Equipment no. : EL222 Calibration Due Date : 01-Oct-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	302	Kelvin	Pressure, P _a
			1011 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m _c	2.00072	Intercept, b _c	-0.01209
Last Calibration Date	30-Jun-15	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	30-Jun-16				

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	1.6509	60	59.5336
2	4.3	4.3	8.6	1.4604	55	54.5725
3	3.4	3.4	6.8	1.2993	49	48.6191
4	2.3	2.3	4.6	1.0697	40	39.6891
5	1.5	1.5	3.0	0.8650	32	31.7513

By Linear Regression of Y on X						
Slope, m	=	35.9878	Intercept, b	=	1.1624	
Correlation Coefficient*	=	0.9974				
Calibration Accepted	=	Yes/No**				

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar Checked by : Derek Lo
 Date : 01-Aug-15 Date : 01-Aug-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1e Calibration Date : 10-Jun-15
 Equipment no. : EL455 Calibration Due Date : 10-Aug-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1007 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	6.3	6.3	12.6	1.7621	62	61.2949
2	5.0	5.0	10.0	1.5698	54	53.3859
3	3.7	3.7	7.4	1.3505	48	47.4541
4	2.3	2.3	4.6	1.0648	32	31.6361
5	1.3	1.3	2.6	0.8006	20	19.7725

By Linear Regression of Y on X

Slope, m = 43.4397 Intercept, b = -14.1778
 Correlation Coefficient* = 0.9950
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar Checked by : Derek Lo
 Date : 10-Jun-15 Date : 10-Jun-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1e Calibration Date : 10-Aug-15
 Equipment no. : EL455 Calibration Due Date : 10-Oct-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition						
Temperature, T _a	301	Kelvin	Pressure, P _a	1005	mmHg	
Orifice Transfer Standard Information						
Equipment No.	EL086	Slope, m _c	2.00072	Intercept, b _c	-0.01209	
Last Calibration Date	30-Jun-15	$\left(H \times P_a / 1013.3 \times 298 / T_a \right)^{1/2}$ $= m_c \times Q_{std} + b_c$				
Next Calibration Date	30-Jun-16					
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	6.3	6.3	12.6	1.7641	55	54.5006
2	5.1	5.1	10.2	1.5878	52	51.5279
3	3.9	3.9	7.8	1.3893	43	42.6096
4	2.5	2.5	5.0	1.1135	37	36.6641
5	1.6	1.6	3.2	0.8920	29	28.7367
By Linear Regression of Y on X						
Slope, m		=	29.8941	Intercept, b		= 2.4698
Correlation Coefficient*		=	0.9933			
Calibration Accepted		=	Yes/No**			

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar Checked by : Derek Lo
 Date : 10-Aug-15 Date : 10-Aug-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1w Calibration Date : 10-Jun-15
 Equipment no. : EL080 Calibration Due Date : 10-Aug-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	303	Kelvin	Pressure, P _a
			1007 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	6.2	6.2	12.4	1.7481	55	54.3745
2	4.9	4.9	9.8	1.5541	48	47.4541
3	3.7	3.7	7.4	1.3505	40	39.5451
4	2.3	2.3	4.6	1.0648	30	29.6588
5	1.4	1.4	2.8	0.8308	22	21.7498

By Linear Regression of Y on X

Slope, m = 35.6919 Intercept, b = -8.1867

Correlation Coefficient* = 0.9997

Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar Checked by : Derek Lo
 Date : 10-Jun-15 Date : 10-Jun-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1w Calibration Date : 10-Aug-15
 Equipment no. : EL080 Calibration Due Date : 10-Oct-15

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	301	Kelvin	Pressure, P _a
			1005 mmHg

Orifice Transfer Standard Information			
Equipment No.	EL086	Slope, m _c	2.00072
		Intercept, b _c	-0.01209
Last Calibration Date	30-Jun-15	$\left(H \times P_a / 1013.3 \times 298 / T_a \right)^{1/2}$ $= m_c \times Q_{std} + b_c$	
Next Calibration Date	30-Jun-16		

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	6.3	6.3	12.6	1.7641	55	54.5006
2	5.1	5.1	10.2	1.5878	50	49.5460
3	3.9	3.9	7.8	1.3893	42	41.6187
4	2.4	2.4	4.8	1.0912	32	31.7095
5	1.5	1.5	3.0	0.8639	25	24.7730

By Linear Regression of Y on X

Slope, m = 33.6445 Intercept, b = -4.6291
 Correlation Coefficient* = 0.9991
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar Checked by : Derek Lo
 Date : 10-Aug-15 Date : 10-Aug-15