



CERTIFICATE OF CALIBRATION

Certificate No.: 15CA1203 04-01 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: 03-Dec-2015

Date of test: 04-Dec-2015

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	19-Jun-2016	CIGISMEC
Signal generator	DS 360	33873	16-Apr-2016	CEPREI
Signal generator	DS 360	61227	16-Apr-2016	CEPREI

Ambient conditions

Temperature: 22 ± 1 °C
Relative humidity: 50 ± 10 %
Air pressure: 1010 ± 10 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 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: 05-Dec-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.



CERTIFICATE OF CALIBRATION

(Continuation Page)

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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	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	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:  - End -
Date: 04-Dec-2015

Checked by: 
Date: 05-Dec-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.



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.



TISCH ENVIRONMENTAL, INC.
 145 SOUTH MIAMI AVE
 VILLAGE OF CLEVES, OH
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 513.467.9000
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ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Jun 30, 2015 Rootsmeter 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
 Equipment no. : EL452
 Calibration Date : 30-Nov-15
 Calibration Due Date : 30-Jan-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	295	Kelvin	Pressure, P _a
			1019 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	6.1	6.1	12.2	1.7656	58	58.4579
2	4.8	4.8	9.6	1.5669	52	52.4105
3	3.7	3.7	7.4	1.3764	44	44.3474
4	2.4	2.4	4.8	1.1097	36	36.2842
5	1.5	1.5	3.0	0.8786	24	24.1895

By Linear Regression of Y on X

Slope, m = 37.9882 Intercept, b = -7.7457

Correlation Coefficient* = 0.9953

Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Kit Au Checked by : Derek Lo
 Date : 30-Nov-15 Date : 30-Nov-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA1b
 Equipment no. : EL452
 Calibration Date : 30-Jan-16
 Calibration Due Date : 30-Mar-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	290	Kelvin	Pressure, P _a
			1018 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	6.2	6.2	12.4	1.7943	60	60.9628
2	4.6	4.6	9.2	1.5464	52	52.8345
3	3.8	3.8	7.6	1.4061	44	44.7061
4	2.2	2.2	4.4	1.0713	33	33.5296
5	1.5	1.5	3.0	0.8856	23	23.3691

By Linear Regression of Y on X

Slope, m = 40.9148 Intercept, b = -11.7761

Correlation Coefficient* = 0.9963

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 : 30-Jan-16 Date : 30-Jan-16



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA2a Calibration Date : 30-Nov-15
 Equipment no. : EL449 Calibration Due Date : 30-Jan-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	295	Kelvin	Pressure, P _a
			1019 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	6.7	6.7	13.4	1.8501	62	62.4895
2	5.3	5.3	10.6	1.6462	55	55.4342
3	4.1	4.1	8.2	1.4486	48	48.3789
4	2.7	2.7	5.4	1.1767	38	38.3000
5	1.6	1.6	3.2	0.9072	30	30.2368

By Linear Regression of Y on X

Slope, m = 34.6157 Intercept, b = -1.6936

Correlation Coefficient* = 0.9994

Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Kit Au Checked by : Derek Lo
 Date : 30-Nov-15 Date : 30-Nov-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA2a Calibration Date : 30-Jan-16
 Equipment no. : EL449 Calibration Due Date : 30-Mar-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	290	Kelvin	Pressure, P _a
			1018 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	7.4	7.4	14.8	1.9597	62	62.9949
2	5.7	5.7	11.4	1.7207	52	52.8345
3	4.4	4.4	8.8	1.5125	48	48.7703
4	2.6	2.6	5.2	1.1641	38	38.6098
5	1.6	1.6	3.2	0.9145	30	30.4814

By Linear Regression of Y on X

Slope, m = 29.9012 Intercept, b = 3.2523

Correlation Coefficient* = 0.9959

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 : 30-Jan-16 Date : 30-Jan-16



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA3a
 Equipment no. : EL333

Calibration Date : 30-Nov-15
 Calibration Due Date : 30-Jan-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	295	Kelvin	Pressure, P _a
			1019 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	1.7218	56	56.4421
2	4.5	4.5	9.0	1.5173	50	50.3947
3	3.5	3.5	7.0	1.3389	44	44.3474
4	2.3	2.3	4.6	1.0865	36	36.2842
5	1.5	1.5	3.0	0.8786	28	28.2211

By Linear Regression of Y on X

Slope, m = 33.3404 Intercept, b = -0.4922
 Correlation Coefficient* = 0.9990
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Kit Au
 Date : 30-Nov-15

Checked by : Derek Lo
 Date : 30-Nov-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA3a
 Equipment no. : EL333
 Calibration Date : 30-Jan-16
 Calibration Due Date : 30-Mar-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	290	Kelvin	Pressure, P _a
			1018 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	6.2	6.2	12.4	1.7943	58	58.9308
2	4.8	4.8	9.6	1.5795	52	52.8345
3	3.8	3.8	7.6	1.4061	44	44.7061
4	2.4	2.4	4.8	1.1187	38	38.6098
5	1.5	1.5	3.0	0.8856	30	30.4814

By Linear Regression of Y on X

Slope, m = 31.0014 Intercept, b = 3.0482

Correlation Coefficient* = 0.9948

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 : 30-Jan-16 Date : 30-Jan-16



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA4a
 Equipment no. : EL390

Calibration Date : 30-Nov-15
 Calibration Due Date : 30-Jan-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	295	Kelvin	Pressure, P _a
			1019 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 /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.4	6.4	12.8	1.8084	58	58.4579
2	5.1	5.1	10.2	1.6149	52	52.4105
3	3.9	3.9	7.8	1.4130	46	46.3632
4	2.6	2.6	5.2	1.1548	34	34.2684
5	1.6	1.6	3.2	0.9072	24	24.1895

By Linear Regression of Y on X

Slope, m = 38.5259 Intercept, b = -10.0149
 Correlation Coefficient* = 0.9962
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Kit Au
 Date : 30-Nov-15

Checked by : Derek Lo
 Date : 30-Nov-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA4a
 Equipment no. : EL390

Calibration Date : 30-Jan-16
 Calibration Due Date : 30-Mar-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	290	Kelvin	Pressure, P _a
			1018 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.)	Continuous Flow Recorder, W (CFM)	IC (W(P _a /1013.3x298/T _a) ^{1/2} /35.31)
	(up)	(down)	(difference)	X-axis		Y-axis
1	6.3	6.3	12.6	1.8087	58	58.9308
2	5.1	5.1	10.2	1.6280	50	50.8024
3	4.0	4.0	8.0	1.4424	44	44.7061
4	2.6	2.6	5.2	1.1641	34	34.5456
5	1.7	1.7	3.4	0.9425	24	24.3851

By Linear Regression of Y on X

Slope, m = 38.8441 Intercept, b = -11.5962
 Correlation Coefficient* = 0.9986
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar
 Date : 30-Jan-16

Checked by : Derek Lo
 Date : 30-Jan-16



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA5b Calibration Date : 30-Nov-15
 Equipment no. : EL222 Calibration Due Date : 30-Jan-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	295	Kelvin	Pressure, P _a
			1019 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	5.2	5.2	10.4	1.6306	62	62.4895
2	4.3	4.3	8.6	1.4834	58	58.4579
3	3.3	3.3	6.6	1.3002	53	53.4184
4	2.0	2.0	4.0	1.0136	46	46.3632
5	1.3	1.3	2.6	0.8183	38	38.3000

By Linear Regression of Y on X						
Slope, m	=	28.8602	Intercept, b	=	15.7526	
Correlation Coefficient*	=	0.9958				
Calibration Accepted	=	Yes/No**				

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Kit Au Checked by : Derek Lo
 Date : 30-Nov-15 Date : 30-Nov-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA5b Calibration Date : 30-Jan-16
 Equipment no. : EL222 Calibration Due Date : 30-Mar-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	290	Kelvin	Pressure, P _a
			1018 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	1.6904	62	62.9949
2	4.4	4.4	8.8	1.5125	58	58.9308
3	3.4	3.4	6.8	1.3303	52	52.8345
4	2.2	2.2	4.4	1.0713	46	46.7382
5	1.4	1.4	2.8	0.8558	38	38.6098

By Linear Regression of Y on X						
Slope, m	=	28.9045	Intercept, b	=	14.6750	
Correlation Coefficient*	=	0.9967				
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 : 30-Jan-16 Date : 30-Jan-16



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA6a
 Equipment no. : EL448
 Calibration Date : 30-Nov-15
 Calibration Due Date : 30-Jan-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition						
Temperature, T _a	295	Kelvin	Pressure, P _a	1019	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 /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.6	6.6	13.2	1.8363	60	60.4737
2	5.3	5.3	10.6	1.6462	54	54.4263
3	4.5	4.5	9.0	1.5173	50	50.3947
4	2.6	2.6	5.2	1.1548	40	40.3158
5	1.5	1.5	3.0	0.8786	30	30.2368
By Linear Regression of Y on X						
Slope, m	=	30.9785	Intercept, b	=	3.5936	
Correlation Coefficient*	=	0.9989				
Calibration Accepted	=	Yes/No**				

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Kit Au
 Date : 30-Nov-15
 Checked by : Derek Lo
 Date : 30-Nov-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA6a
 Equipment no. : EL448
 Calibration Date : 30-Jan-16
 Calibration Due Date : 30-Mar-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition						
Temperature, T _a	290	Kelvin	Pressure, P _a	1018	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	6.6	6.6	13.2	1.8511	55	55.8826
2	5.2	5.2	10.4	1.6438	50	50.8024
3	4.0	4.0	8.0	1.4424	42	42.6740
4	2.5	2.5	5.0	1.1416	34	34.5456
5	1.6	1.6	3.2	0.9145	26	26.4172
By Linear Regression of Y on X						
Slope, m		=	31.6095	Intercept, b		= -2.1475
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
 Date : 30-Jan-16
 Checked by : Derek Lo
 Date : 30-Jan-16



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1e Calibration Date : 30-Nov-15
 Equipment no. : EL455 Calibration Due Date : 30-Jan-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition						
Temperature, T _a	295	Kelvin	Pressure, P _a	1019	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	6.2	6.2	12.4	1.7800	59	59.4658
2	5.4	5.4	10.8	1.6616	50	50.3947
3	4.0	4.0	8.0	1.4309	44	44.3474
4	2.5	2.5	5.0	1.1325	30	30.2368
5	1.5	1.5	3.0	0.8786	20	20.1579
By Linear Regression of Y on X						
Slope, m		=	42.0478	Intercept, b		= -16.9673
Correlation Coefficient*		=	0.9948			
Calibration Accepted		=	Yes/No**			

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Kit Au Checked by : Derek Lo
 Date : 30-Nov-15 Date : 30-Nov-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1e Calibration Date : 30-Jan-16
 Equipment no. : EL455 Calibration Due Date : 30-Mar-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	290	Kelvin	Pressure, P _a
			1018 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 /1013.3x298/T _a) ^{1/2} /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.8	6.8	13.6	1.8789	62	62.9949
2	5.4	5.4	10.8	1.6750	54	54.8666
3	4.2	4.2	8.4	1.4779	45	45.7221
4	2.6	2.6	5.2	1.1641	31	31.4975
5	1.6	1.6	3.2	0.9145	20	20.3209

By Linear Regression of Y on X

Slope, m = 44.6146 Intercept, b = -20.3646

Correlation Coefficient* = 0.9998

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 : 30-Jan-16 Date : 30-Jan-16



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1w Calibration Date : 30-Nov-15
 Equipment no. : EL080 Calibration Due Date : 30-Jan-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	295	Kelvin	Pressure, P _a
			1019 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	6.5	6.5	13.0	1.8224	58	58.4579
2	5.2	5.2	10.4	1.6306	50	50.3947
3	4.0	4.0	8.0	1.4309	42	42.3316
4	2.5	2.5	5.0	1.1325	31	31.2447
5	1.5	1.5	3.0	0.8786	24	24.1895

By Linear Regression of Y on X

Slope, m = 36.5827 Intercept, b = -9.1241
 Correlation Coefficient* = 0.9973
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Kit Au Checked by : Derek Lo
 Date : 30-Nov-15 Date : 30-Nov-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1w Calibration Date : 30-Jan-16
 Equipment no. : EL080 Calibration Due Date : 30-Mar-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	290	Kelvin	Pressure, P _a
			1018 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 <small>(W(P_a/1013.3x298/T_a)^{1/2}/35.31)</small> Y-axis
	(up)	(down)	(difference)			
1	6.6	6.6	13.2	1.8511	58	58.9308
2	5.3	5.3	10.6	1.6595	51	51.8184
3	4.1	4.1	8.2	1.4603	43	43.6900
4	2.6	2.6	5.2	1.1641	32	32.5135
5	1.7	1.7	3.4	0.9425	22	22.3530

By Linear Regression of Y on X

Slope, m = 39.9903 Intercept, b = -14.7444

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 : 30-Jan-16 Date : 30-Jan-16



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : ACL1 Calibration Date : 30-Nov-15
 Equipment no. : EL380 Calibration Due Date : 30-Jan-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	295	Kelvin	Pressure, P _a
			1019 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	6.9	6.9	13.8	1.8775	56	56.4421
2	5.5	5.5	11.0	1.6768	50	50.3947
3	4.4	4.4	8.8	1.5005	46	46.3632
4	2.8	2.8	5.6	1.1982	38	38.3000
5	1.7	1.7	3.4	0.9349	30	30.2368

By Linear Regression of Y on X

Slope, m = 27.3339 Intercept, b = 5.0529

Correlation Coefficient* = 0.9991

Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Kit Au Checked by : Derek Lo
 Date : 30-Nov-15 Date : 30-Nov-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : ACL1 Calibration Date : 30-Jan-16
 Equipment no. : EL380 Calibration Due Date : 30-Mar-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	290	Kelvin	Pressure, P _a
			1018 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	6.9	6.9	13.8	1.8926	55	55.8826
2	5.5	5.5	11.0	1.6904	48	48.7703
3	4.2	4.2	8.4	1.4779	42	42.6740
4	2.8	2.8	5.6	1.2078	33	33.5296
5	1.6	1.6	3.2	0.9145	22	22.3530

By Linear Regression of Y on X

Slope, m = 33.8454 Intercept, b = -7.9815

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 : 30-Jan-16 Date : 30-Jan-16



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : ACL2a **Calibration Date** : 30-Nov-15
Equipment no. : EL111 **Calibration Due Date** : 30-Jan-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	295	Kelvin	Pressure, P _a
			1019 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	6.2	6.2	12.4	1.7800	63	63.4974
2	4.9	4.9	9.8	1.5831	56	56.4421
3	3.8	3.8	7.6	1.3948	50	50.3947
4	2.4	2.4	4.8	1.1097	42	42.3316
5	1.4	1.4	2.8	0.8490	30	30.2368

By Linear Regression of Y on X

Slope, m = 34.5978 Intercept, b = 2.1043
 Correlation Coefficient* = 0.9961
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Kit Au **Checked by** : Derek Lo
Date : 30-Nov-15 **Date** : 30-Nov-15



Lam Geotechnics Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location : ACL2a Calibration Date : 30-Jan-16
 Equipment no. : EL111 Calibration Due Date : 30-Mar-16

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T _a	290	Kelvin	Pressure, P _a
			1018 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	6.5	6.5	13.0	1.8371	62	62.9949
2	5.3	5.3	10.6	1.6595	56	56.8987
3	3.9	3.9	7.8	1.4244	50	50.8024
4	2.1	2.1	4.2	1.0468	40	40.6419
5	1.6	1.6	3.2	0.9145	32	32.5135

By Linear Regression of Y on X						
Slope, m	=	<u>31.0383</u>	Intercept, b	=	<u>6.0478</u>	
Correlation Coefficient*	=	<u>0.9926</u>				
Calibration Accepted	=	<u>Yes/No**</u>				

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

** Delete as appropriate.

Remarks : _____

Calibrated by : LuLu Mar Checked by : Derek Lo
 Date : 30-Jan-16 Date : 30-Jan-16