



# Calibration Certificate

Certificate No. 33624

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**Customer :** Lam Geotechnics Limited

**Address :** 11/F, Centre Point, 181-185 Gloucester Road, Wanchai, Hong Kong.

**Order No. :** Q31494

**Date of receipt :** 30-May-13

## Item Tested

**Description :** Digital Sound Level Meter

**Manufacturer :** B&K

**Model :** Type 2236

**Serial No. :** 2100736

## Test Conditions

**Date of Test :** 3-Jun-13

**Supply Voltage :** --

**Ambient Temperature :** (23 ± 3)°C

**Relative Humidity :** (50 ± 25) %

## Test Specifications

Calibration check.

Ref. Document/Procedure : Z01.

## Test Results

All results were within the IEC 651 Type 1, IEC 804 Type 1 & IEC 1260 Class 1 specification.

The results are shown in the attached page(s).

Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S017	Multi-Function Generator	C127181	SCL-HKSAR
S024	Sound Level Calibrator	30620	NIM-PRC & SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI).

The test results apply to the above Unit-Under-Test only

**Calibrated by :**   
Liam Wong

**Approved by :**   
Dorothy Cheuk

**Date:** 3-Jun-13



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Results :

## 1. SPL Accuracy

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Range	Parameter	Frequency Wt.	Freq. Response		
20 - 100	SPL	dBA	F	94.0	93.8
			S		93.8
		dBC	F		93.8
		dBL	F		93.9
		1 kHz	F		93.8
40 - 120	SPL	dBA	F	94.0	93.9
		1 kHz	F		93.9
	SPL	dBA	F	114.0	113.8
			S		113.8
		dBC	F		113.9
		dBL	F		113.9
1 kHz	F	113.8			

IEC 651 Type 1 Spec. :  $\pm 0.7$  dB

Uncertainty :  $\pm 0.1$  dB

## 2. Level Stability : 0.0 dB

IEC 651 Type 1 Spec. :  $\pm 0.3$  dB

Uncertainty :  $\pm 0.1$  dB

## 3. Linearity

### 3.1 Level Linearity

UUT Range (dB)	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec. (Primary Indicator Range)
140	114.0	113.9	0.0	$\pm 0.7$ dB
130	104.0	103.9	0.0	
120	94.0	93.9 (Ref.)	--	
110	84.0	83.9	0.0	
100	74.0	73.9	0.0	
100	64.0	63.9	0.0	
100	54.0	53.9	0.0	

Uncertainty :  $\pm 0.1$  dB



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## 3.2 Differential level linearity

UUT Range (dB)	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec.
120	84.0	83.9	0.0	± 0.4 dB
	94.0	93.9 (Ref.)	- -	
	95.0	94.9	0.0	± 0.2 dB

Uncertainty : ± 0.1 dB

## 4. Frequency Weighting

A weighting

Frequency	Attenuation (dB)	IEC 651 Type 1 Spec.
31.5 Hz	-39.6	- 39.4 dB, ± 1.5 dB
63 Hz	-26.4	- 26.2 dB, ± 1.5 dB
125 Hz	-16.3	- 16.1 dB, ± 1 dB
250 Hz	-8.8	- 8.6 dB, ± 1 dB
500 Hz	-3.3	- 3.2 dB, ± 1 dB
1 kHz	0.0 (Ref)	0 dB, ± 1 dB
2 kHz	+1.2	+ 1.2 dB, ± 1 dB
4 kHz	+0.9	+ 1.0 dB, ± 1 dB
8 kHz	-1.2	- 1.1 dB, + 1.5 dB ~ -3 dB
16 kHz	-6.8	- 6.6 dB, + 3 dB ~ -∞

Uncertainty : ± 0.1 dB

## 5. Time Averaging

Applied Burst duty Factor	Applied Leq Value (dB)	UUT Reading (dB)	IEC 804 Type 1 Spec.
continuous	40.0	40.0	--
1/10	40.0	39.9	± 0.5 dB
1/10 <sup>2</sup>	40.0	39.8	
1/10 <sup>3</sup>	40.0	39.7	± 1.0 dB
1/10 <sup>4</sup>	40.0	39.5	

Uncertainty : ± 0.1 dB



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## 6. Filter Response

Filter Setting	Attenuation (dB)	IEC 1260 Class 1 Spec.
125 Hz	-63.6	< - 61
250 Hz	-44.8	< - 42
500 Hz	-21.0	< - 17.5
707 Hz	-3.7	- 2 ~ - 5
1 kHz (Ref.)	0.0 (Ref.)	--
1.414 kHz	-4.1	- 2 ~ - 5
2 kHz	-21.4	< - 17.5
4 kHz	-45.0	< - 42
8 kHz	-63.9	< - 61

Uncertainty :  $\pm 0.2$  dB

Remark : 1. UUT : Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. Atmospheric Pressure : 996 hPa

4. The UUT was adjusted with the laboratory's sound calibrator at the reference sound pressure level before the calibration.

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**Customer :** Lam Geotechnics Limited

**Address :** 11/F, Centre Point, 181-185 Gloucester Road, Wanchai, Hong Kong.

**Order No. :** Q31610

**Date of receipt :** 21-Jun-13

## Item Tested

**Description :** Sound Level Calibrator

**Manufacturer :** Rion

**Model :** NC-73

**Serial No. :** 10707358

## Test Conditions

**Date of Test :** 25-Jun-13

**Supply Voltage :** --

**Ambient Temperature :** (23 ± 3)°C

**Relative Humidity :** (50 ± 25) %

## Test Specifications

Calibration check.

Ref. Document/Procedure : F21, Z02.

## Test Results

All results were within the manufacturer's specification.

The results are shown in the attached page(s).


Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S014	Spectrum Analyzer	30259	NIM-PRC & SCL-HKSAR
S024	Sound Level Calibrator	30620	NIM-PRC & SCL-HKSAR
S041	Universal Counter	28347	SCL-HKSAR
S206	Sound Level Meter	30655	SCL-HKSAR

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI).  
The test results apply to the above Unit-Under-Test only

**Calibrated by :**

  
Liam Wong

**Approved by :**

  
Dorothy Cheuk

**Date:** 25-Jun-13

This Certificate is issued by:

Hong Kong Calibration Ltd.

Unit 8B, 24/F., Well Fung Industrial Centre, No. 58-76, Ta Chuen Ping Street, Kwai Chung, NT, Hong Kong.

Tel: 2425 8801 Fax: 2425 8646

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Results :

## 1. Level Accuracy (at 1 kHz)

UUT Nominal Value	Measured Value	Mfr's Spec.
94 dB	93.88 dB	$\pm 1$ dB

Uncertainty :  $\pm 0.2$  dB

## 2. Frequency Accuracy

UUT Nominal Value	Measured Value	Mfr's Spec.
1 kHz	0.995 kHz	$\pm 2$ %

Uncertainty :  $\pm 0.1$  %

## 3. Level Stability : 0.0 dB

Uncertainty :  $\pm 0.01$  dB

## 4. Total Harmonic Distortion : $< 0.2$ %

Mfr's Spec. :  $< 3$  %

Uncertainty :  $\pm 2.3$  % of reading

Remark : 1. UUT : Unit-Under-Test

2. The uncertainty claimed is for a confidence probability of not less than 95%.

3. The above measured values were the mean of 3 measurements.

4. Atmospheric Pressure : 999 hPa

----- END -----



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

**AIR POLLUTION MONITORING EQUIPMENT**  
 ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Jul 15, 2013    Rootsmeter S/N    0438320    Ta (K) -    300  
 Operator Tisch    Orifice I.D. -    0005    Pa (mm) -    759.46

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	1.3910	3.2	2.00
2	NA	NA	1.00	0.9830	6.4	4.00
3	NA	NA	1.00	0.8800	7.9	5.00
4	NA	NA	1.00	0.8380	8.8	5.50
5	NA	NA	1.00	0.6930	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9884	0.7106	1.4090	0.9958	0.7159	0.8888
0.9843	1.0013	1.9926	0.9916	1.0087	1.2570
0.9822	1.1161	2.2278	0.9895	1.1244	1.4054
0.9811	1.1708	2.3365	0.9884	1.1795	1.4740
0.9760	1.4084	2.8180	0.9832	1.4188	1.7777
Qstd slope (m) = 2.01968			Qa slope (m) = 1.26469		
intercept (b) = -0.02746			intercept (b) = -0.01732		
coefficient (r) = 0.99999			coefficient (r) = 0.99999		
y axis = $\text{SQRT}[\text{H}_2\text{O}(\text{Pa}/760)(298/\text{Ta})]$			y axis = $\text{SQRT}[\text{H}_2\text{O}(\text{Ta}/\text{Pa})]$		

CALCULATIONS

$$\text{Vstd} = \text{Diff. Vol} [(\text{Pa} - \text{Diff. Hg}) / 760] (298 / \text{Ta})$$

$$\text{Qstd} = \text{Vstd} / \text{Time}$$

$$\text{Va} = \text{Diff Vol} [(\text{Pa} - \text{Diff Hg}) / \text{Pa}]$$

$$\text{Qa} = \text{Va} / \text{Time}$$

For subsequent flow rate calculations:

$$\text{Qstd} = 1/m \{ [\text{SQRT}(\text{H}_2\text{O}(\text{Pa}/760)(298/\text{Ta}))] - b \}$$

$$\text{Qa} = 1/m \{ [\text{SQRT}(\text{H}_2\text{O}(\text{Ta}/\text{Pa}))] - b \}$$



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**AIR POLLUTION MONITORING EQUIPMENT**  
 ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Jul 15, 2013 Rootsometer S/N 0438320 Ta (K) - 300  
 Operator Tisch Orifice I.D. - 0005 Pa (mm) - 759.46

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	1.3910	3.2	2.00
2	NA	NA	1.00	0.9830	6.4	4.00
3	NA	NA	1.00	0.8800	7.9	5.00
4	NA	NA	1.00	0.8380	8.8	5.50
5	NA	NA	1.00	0.6930	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9884	0.7106	1.4090	0.9958	0.7159	0.8888
0.9843	1.0013	1.9926	0.9916	1.0087	1.2570
0.9822	1.1161	2.2278	0.9895	1.1244	1.4054
0.9811	1.1708	2.3365	0.9884	1.1795	1.4740
0.9760	1.4084	2.8180	0.9832	1.4188	1.7777
Qstd slope (m) = 2.01968			Qa slope (m) = 1.26469		
intercept (b) = -0.02746			intercept (b) = -0.01732		
coefficient (r) = 0.99999			coefficient (r) = 0.99999		
y axis = SQRT[H2O(Pa/760) (298/Ta)]			y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

$$Vstd = \text{Diff. Vol} [(Pa - \text{Diff. Hg}) / 760] (298 / Ta)$$

$$Qstd = Vstd / \text{Time}$$

$$Va = \text{Diff Vol} [(Pa - \text{Diff Hg}) / Pa]$$

$$Qa = Va / \text{Time}$$

For subsequent flow rate calculations:

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

$$Qa = 1/m \{ [\text{SQRT}(\text{H2O}(\text{Ta}/\text{Pa}))] - b \}$$





Lam Geotechnics Limited

### Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA1b  
 Equipment no. : EL452

Calibration Date : 19-Nov-13  
 Calibration Due Date : 19-Jan-14

#### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T <sub>a</sub>	294	Kelvin	Pressure, P <sub>a</sub>
			1021 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968	Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	15-Jul-14				

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.1	6.1	12.2	1.7613	62	62.6571
2	5.1	5.1	10.2	1.6117	53	53.5617
3	4.0	4.0	8.0	1.4289	43	43.4557
4	2.5	2.5	5.0	1.1325	28	28.2967
5	1.4	1.4	2.8	0.8509	14	14.1484

By Linear Regression of Y on X

Slope, m = 52.9089      Intercept, b = -31.3758

Correlation Coefficient\* = 0.9994

Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry  
 Date : 19-Nov-13

Checked by : Derek Lo  
 Date : 19-Nov-13



Lam Geotechnics Limited

**Calibration Data for High Volume Sampler (TSP Sampler)**

Location : CMA1b Calibration Date : 18-Jan-14  
 Equipment no. : EL452 Calibration Due Date : 18-Mar-14

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	289	Kelvin	Pressure, P <sub>a</sub>
			1026 mmHg

Orifice Transfer Standard Information			
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968
		Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$\left( \frac{H \times P_a}{1013.3 \times 298 / T_a} \right)^{1/2}$ $= m_c \times Q_{std} + b_c$	
Next Calibration Date	15-Jul-14		

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.2	6.2	12.4	1.7951	60	61.3077
2	5.1	5.1	10.2	1.6294	51	52.1116
3	4.1	4.1	8.2	1.4623	41	41.8936
4	2.5	2.5	5.0	1.1449	25	25.5449
5	1.5	1.5	3.0	0.8899	13	13.2833

By Linear Regression of Y on X

Slope, m = 53.1762 Intercept, b = -34.7843  
 Correlation Coefficient\* = 0.9992  
 Calibration Accepted = Yes/No\*\*

\* if Correlation Coefficient &lt; 0.990, check and recalibration again.

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry Checked by : Derek Lo  
 Date : 18-Jan-14 Date : 18-Jan-14



Lam Geotechnics Limited

### Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA2a  
 Equipment no. : EL449

Calibration Date : 19-Nov-13  
 Calibration Due Date : 19-Jan-14

#### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T <sub>a</sub>	294	Kelvin	Pressure, P <sub>a</sub>
			1021 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968	Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$\left( \frac{H \times P_a}{1013.3 \times 298 / T_a} \right)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	15-Jul-14				

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.1	6.1	12.2	1.7613	60	60.6359
2	5.0	5.0	10.0	1.5959	51	51.5405
3	4.1	4.1	8.2	1.4465	43	43.4557
4	2.5	2.5	5.0	1.1325	27	27.2861
5	1.4	1.4	2.8	0.8509	14	14.1484

By Linear Regression of Y on X

Slope, m = 51.1083      Intercept, b = -29.9618

Correlation Coefficient\* = 0.9995

Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Sam  
 Date : 19-Nov-13

Checked by : Derek Lo  
 Date : 19-Nov-13



Lam Geotechnics Limited

### Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA2a  
 Equipment no. : EL449  
 Calibration Date : 18-Jan-14  
 Calibration Due Dat : 18-Mar-14

#### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T <sub>a</sub>	289	Kelvin	Pressure, P <sub>a</sub>
			1026 mmHg

Orifice Transfer Standard Information			
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968
		Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$	
Next Calibration Date	15-Jul-14		

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.1	6.1	12.2	1.7807	59	60.2859
2	5.1	5.1	10.2	1.6294	51	52.1116
3	4.0	4.0	8.0	1.4446	42	42.9154
4	2.5	2.5	5.0	1.1449	28	28.6103
5	1.4	1.4	2.8	0.8602	16	16.3487

By Linear Regression of Y on X

Slope, m = 47.6578      Intercept, b = -25.3287

Correlation Coefficient\* = 0.9993

Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry  
 Date : 18-Jan-14  
 Checked by : Derek Lo  
 Date : 18-Jan-14



Lam Geotechnics Limited

### Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA3a  
 Equipment no. : EL333

Calibration Date : 18-Dec-13  
 Calibration Due Date : 18-Feb-14

#### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T <sub>a</sub>	284	Kelvin	Pressure, P <sub>a</sub>
			1020 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968	Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	15-Jul-14				

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.1	6.1	12.2	1.7910	62	63.7194
2	5.0	5.0	10.0	1.6227	52	53.4421
3	4.0	4.0	8.0	1.4529	42	43.1648
4	2.6	2.6	5.2	1.1740	25	25.6933
5	1.6	1.6	3.2	0.9239	12	12.3328

By Linear Regression of Y on X

Slope, m = 59.7145      Intercept, b = -43.5049

Correlation Coefficient\* = 0.9996

Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry  
 Date : 18-Dec-13

Checked by : Derek Lo  
 Date : 18-Dec-13



Lam Geotechnics Limited

**Calibration Data for High Volume Sampler (TSP Sampler)**

Location : CMA4a  
 Equipment no. : EL390

Calibration Date : 19-Nov-13  
 Calibration Due Date : 19-Jan-14

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	294	Kelvin	Pressure, P <sub>a</sub>
			1021 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968	Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	15-Jul-14				

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.1	6.1	12.2	1.7613	62	62.6571
2	5.1	5.1	10.2	1.6117	52	52.5511
3	4.0	4.0	8.0	1.4289	42	42.4451
4	2.5	2.5	5.0	1.1325	26	26.2755
5	1.5	1.5	3.0	0.8803	13	13.1378

By Linear Regression of Y on X

Slope, m = 55.6501      Intercept, b = -36.4335  
 Correlation Coefficient\* = 0.9992  
 Calibration Accepted = Yes/No\*\*

\* if Correlation Coefficient &lt; 0.990, check and recalibration again.

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry  
 Date : 19-Nov-13

Checked by : Derek Lo  
 Date : 19-Nov-13



Lam Geotechnics Limited

### Calibration Data for High Volume Sampler (TSP Sampler)

Location : CMA4a  
 Equipment no. : EL390  
 Calibration Date : 18-Jan-14  
 Calibration Due Dat : 18-Mar-14

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	289	Kelvin	Pressure, P <sub>a</sub>
			1026 mmHg

Orifice Transfer Standard Information			
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968
		Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$	
Next Calibration Date	15-Jul-14		

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.0	6.0	12.0	1.7662	60	61.3077
2	5.1	5.1	10.2	1.6294	52	53.1334
3	3.9	3.9	7.8	1.4266	41	41.8936
4	2.5	2.5	5.0	1.1449	26	26.5667
5	1.5	1.5	3.0	0.8899	14	14.3051

By Linear Regression of Y on X

Slope, m = 53.7145      Intercept, b = -34.2208  
 Correlation Coefficient\* = 0.9994  
 Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry      Checked by : Derek Lo  
 Date : 18-Jan-14      Date : 18-Jan-14



Lam Geotechnics Limited

**Calibration Data for High Volume Sampler (TSP Sampler)**

Location : CMA5a  
 Equipment no. : EL380

Calibration Date : 19-Nov-13  
 Calibration Due Date : 19-Jan-14

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	294	Kelvin	Pressure, P <sub>a</sub>
			1021 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968	Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$\left( H \times P_a / 1013.3 \times 298 / T_a \right)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	15-Jul-14				

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.2	6.2	12.4	1.7756	61	61.6465
2	5.1	5.1	10.2	1.6117	52	52.5511
3	4.1	4.1	8.2	1.4465	44	44.4663
4	2.4	2.4	4.8	1.1099	28	28.2967
5	1.5	1.5	3.0	0.8803	18	18.1908

By Linear Regression of Y on X

Slope, m = 48.3214      Intercept, b = -24.9174  
 Correlation Coefficient\* = 0.9994  
 Calibration Accepted = Yes/No\*\*

\* if Correlation Coefficient &lt; 0.990, check and recalibration again.

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry  
 Date : 19-Nov-13

Checked by : Derek Lo  
 Date : 19-Nov-13





Lam Geotechnics Limited

**Calibration Data for High Volume Sampler (TSP Sampler)**

Location : CMA5a Calibration Date : 18-Jan-14  
 Equipment no. : EL380 Calibration Due Date : 18-Mar-14

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	289	Kelvin	Pressure, P <sub>a</sub>
			1026 mmHg

Orifice Transfer Standard Information			
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968
		Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$	
Next Calibration Date	15-Jul-14		

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.0	6.0	12.0	1.7662	60	61.3077
2	5.0	5.0	10.0	1.6135	51	52.1116
3	4.0	4.0	8.0	1.4446	42	42.9154
4	2.5	2.5	5.0	1.1449	26	26.5667
5	1.5	1.5	3.0	0.8899	13	13.2833

By Linear Regression of Y on X

Slope, m = 54.6083 Intercept, b = -35.6736  
 Correlation Coefficient\* = 0.9998  
 Calibration Accepted = Yes/No\*\*

\* if Correlation Coefficient &lt; 0.990, check and recalibration again.

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry Checked by : Derek Lo  
 Date : 18-Jan-14 Date : 18-Jan-14



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### Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1w  
 Equipment no. : EL080

Calibration Date : 19-Nov-13  
 Calibration Due Date : 19-Jan-13

#### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T <sub>a</sub>	294	Kelvin	Pressure, P <sub>a</sub>
			1021 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968	Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	15-Jul-14				

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.)	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31)
	(up)	(down)	(difference)			
1	6.1	6.1	12.2	1.7613	61	61.6465
2	5.0	5.0	10.0	1.5959	51	51.5405
3	4.2	4.2	8.4	1.4638	43	43.4557
4	2.5	2.5	5.0	1.1325	25	25.2649
5	1.5	1.5	3.0	0.8803	13	13.1378

By Linear Regression of Y on X

Slope, m = 55.0714      Intercept, b = -36.2605

Correlation Coefficient\* = 0.9990

Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry  
 Date : 19-Nov-13

Checked by : Derek Lo  
 Date : 19-Nov-13



Lam Geotechnics Limited

### Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1w Calibration Date : 18-Jan-14  
 Equipment no. : EL080 Calibration Due Date : 18-Mar-14

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	289	Kelvin	Pressure, P <sub>a</sub>
			1026 mmHg

Orifice Transfer Standard Information			
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968
		Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$\left( \frac{H \times P_a}{1013.3 \times 298 / T_a} \right)^{1/2}$ $= m_c \times Q_{std} + b_c$	
Next Calibration Date	15-Jul-14		

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.1	6.1	12.2	1.7807	59	60.2859
2	5.0	5.0	10.0	1.6135	51	52.1116
3	4.0	4.0	8.0	1.4446	42	42.9154
4	2.5	2.5	5.0	1.1449	27	27.5885
5	1.4	1.4	2.8	0.8602	14	14.3051

By Linear Regression of Y on X

Slope, m = 50.3357 Intercept, b = -29.4556

Correlation Coefficient\* = 0.9997

Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry Checked by : Derek Lo  
 Date : 18-Jan-14 Date : 18-Jan-14



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### Calibration Data for High Volume Sampler (TSP Sampler)

Location : MA1e  
 Equipment no. : EL455

Calibration Date : 19-Nov-13  
 Calibration Due Date : 19-Jan-14

#### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T <sub>a</sub>	294	Kelvin	Pressure, P <sub>a</sub>
			1021 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968	Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	15-Jul-14				

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.1	6.1	12.2	1.7613	60	60.6359
2	5.0	5.0	10.0	1.5959	51	51.5405
3	4.1	4.1	8.2	1.4465	43	43.4557
4	2.6	2.6	5.2	1.1546	28	28.2967
5	1.7	1.7	3.4	0.9362	18	18.1908

By Linear Regression of Y on X

Slope, m = 51.5772      Intercept, b = -30.6966

Correlation Coefficient\* = 0.9995

Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry  
 Date : 19-Nov-13

Checked by : Derek Lo  
 Date : 19-Nov-13



Lam Geotechnics Limited

**Calibration Data for High Volume Sampler (TSP Sampler)**

Location : MA1e Calibration Date : 18-Jan-14  
 Equipment no. : EL455 Calibration Due Date : 18-Mar-14

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, T <sub>a</sub>	289	Kelvin	Pressure, P <sub>a</sub>
			1026 mmHg

Orifice Transfer Standard Information			
Equipment No.	EL086	Slope, m <sub>c</sub>	2.01968
		Intercept, b <sub>c</sub>	-0.02746
Last Calibration Date	15-Jul-13	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$	
Next Calibration Date	15-Jul-14		

Calibration of RSP						
Calibration Point	Manometer Reading			Q <sub>std</sub> (m <sup>3</sup> / min.) X-axis	Continuous Flow Recorder, W (CFM)	IC (W(P <sub>a</sub> /1013.3x298/T <sub>a</sub> ) <sup>1/2</sup> /35.31) Y-axis
	(up)	(down)	(difference)			
1	6.1	6.1	12.2	1.7807	60	61.3077
2	5.0	5.0	10.0	1.6135	51	52.1116
3	4.1	4.1	8.2	1.4623	43	43.9372
4	2.5	2.5	5.0	1.1449	29	29.6321
5	1.5	1.5	3.0	0.8899	16	16.3487

By Linear Regression of Y on X

Slope, m = 49.7270 Intercept, b = -27.8685  
 Correlation Coefficient\* = 0.9994  
 Calibration Accepted = Yes/No\*\*

\* if Correlation Coefficient &lt; 0.990, check and recalibration again.

\*\* Delete as appropriate.

Remarks : \_\_\_\_\_

Calibrated by : Henry Checked by : Derek Lo  
 Date : 18-Jan-14 Date : 18-Jan-14