



# Calibration Certificate

Certificate No. 06680

Page 1 of 4 Pages

Customer : Lam Geotechnics Limited

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

Order No. : Q02553

Date of receipt : 18-Nov-10

## Item Tested

Description : Precision Integrating Sound Level Meter

Manufacturer : ACO

Model : Type 6224

Serial No. : 050112

## Test Conditions

Date of Test : 19-Nov-10

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 & 804 Type I Specification.

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

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017A	Multi-Function Generator	00804	SCL-HKSAR
S024	Sound Level Calibrator	04062	NIM-PRC & SCL-HKSAR

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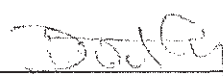
The test equipment used for calibration are traceable to International System of Units (SI).

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

Calibrated by :

  
P. F. Wong

Approved by :

  
Dorothy Cheuk

Date: 23-Nov-10

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. SPL Accuracy

UUT Setting			Applied Value (dB)	UUT Reading (dB)
Level Range (dB)	Weight	Time Const.		
20 - 100	L <sub>A</sub>	Fast	94.0	94.3
		Slow		94.3
	L <sub>C</sub>	Fast		94.3
30 - 120	L <sub>A</sub>	Fast	94.0	94.4
		Slow		94.4
	L <sub>C</sub>	Fast		94.4
30 - 120	L <sub>A</sub>	Fast	114.0	94.3
		Slow		94.3
	L <sub>C</sub>	Fast		94.3

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 :  $\pm 0.01$  dB

## 3. Linearity

### 3.1 Level Linearity

UUT Range (dB)	Applied Value (dB)	UUT Rdg (dB)	Variation (dB)	IEC 651 Type 1 Spec. (Primary Indicator Range)
140	114.0	114.5	+0.1	$\pm 0.7$ dB
130	104.0	104.4	0.0	
120	94.0	94.4 (Ref.)	--	
110	84.0	84.1	-0.3	
100	74.0	74.2	-0.2	
90	64.0	64.1	-0.3	
80	54.0	54.1	-0.3	

Uncertainty :  $\pm 0.1$  dB



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## 3.2 Differential level linearity

UUT Range (dB)	Applied Value (dB)	UUT Rdg (dB)	Variation (dB)	IEC 651 Type 1 Spec.
120	84.0	84.1	-0.3	± 0.4
	94.0	94.4 (Ref.)	--	
	95.0	95.4	0.0	± 0.2

Uncertainty : ± 0.1 dB

## 4. Frequency Weighting

A weighting

Frequency	Attenuation (dB)	IEC 651 Type 1 Spec.
31.5 Hz	-39.3	- 39.4 dB, ± 1.5 dB
63 Hz	-26.2	- 26.2 dB, ± 1.5 dB
125 Hz	-16.1	- 16.1 dB, ± 1 dB
250 Hz	-8.7	- 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	+1.3	+ 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	-5.8	- 6.6 dB, + 3 dB ~ - ∞

Uncertainty : ± 0.1 dB



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## 4. 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	39.9	
1/10 <sup>3</sup>	40.0	40.3	± 1.0 dB
1/10 <sup>4</sup>	40.0	40.3	

Uncertainty : ± 0.1 dB

- Remark : 1. UUT : Unit-Under-Test  
2. The uncertainty claimed is for a confidence probability of not less than 95%.  
3. Atmospheric Pressure : 1 009 hPa.

-----END-----



# Calibration Certificate

Certificate No. 06681

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Customer : Lam Geotechnics Limited

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

Order No. : Q02553

Date of receipt : 18-Nov-10

## Item Tested

Description : Sound Level Calibrator (EL469)

Manufacturer : ACO

Model : --

Serial No. : 050213

## Test Conditions

Date of Test : 19-Nov-10

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 IEC 942 Class 1 specification.

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

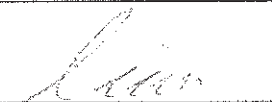
Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S014	Spectrum Analyzer	03926	NIM-PRC & SCL-HKSAR
S024	Sound Level Calibrator	04062	NIM-PRC & SCL-HKSAR
S041	Universal Counter	04461	SCL-HKSAR
S206	Sound Level Meter	04462	SCL-HKSAR

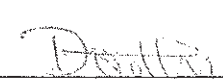
The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, 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 :

  
P. F. Wong

Approved by :

  
Dorothy Cheuk

Date: 23-Nov-10



# Calibration Certificate

Certificate No. 06681

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Results :

## 1. Level

UUT Nominal Value (dB)	Measured Value (dB)	IEC 942 Class 1 Spec.
94	94.22	$\pm 0.3$ dB

The above measured values are the mean of 3 measurements.

Uncertainty :  $\pm 0.1$  dB

## 2. Frequency

UUT Nominal Value	Measured Value	IEC 942 Class 1 Spec.
1 kHz	0.9834 kHz	$\pm 2$ %

Uncertainty ;  $\pm 3.6 \times 10^{-6}$

## 3. Level Stability : 0.0 dB

IEC 942 Class 1 Spec. :  $\pm 0.1$  dB

Uncertainty :  $\pm 0.01$  dB

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

IEC 942 Class 1 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. Atmospheric Pressure : 1 009 hPa.

-----END-----



# Calibration Certificate

Certificate No. 12888

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Customer : Lam Geotechnics Limited

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

Order No. : Q10982

Date of receipt : 25-May-11

## Item Tested

Description : Precision Integrating Sound Level Meter

Manufacturer : Rion

Model : NL-14

Serial No. : 10303242

## Test Conditions

Date of Test : 26-May-11

Supply Voltage : --

Ambient Temperature :  $(23 \pm 3)^{\circ}\text{C}$

Relative Humidity :  $(50 \pm 25)\%$

## Test Specifications

Calibration check.

Ref. Document/Procedure: Z01.

## Test Results

All results were within the IEC 651 Type 1 or IEC 804 Type 1 specification after adjustment.

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

Main Test equipment used:

Equipment No.	Description	Cert. No.	Traceable to
S017	Multi-Function Generator	C101623	SCL-HKSAR
S024	Sound Level Calibrator	04062	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 :   
P. F. Wong

Approved by :   
Alan Chu

Date: 26-May-11





# Calibration Certificate

Certificate No. 12888

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Results :

## 1. SPL Accuracy

Level Range (dB)	UUT Setting			Applied Value (dB)	UUT Reading (dB)	
	Filter	Weight	Time Const.		Before adjust.	After adjust.
40 – 100	OFF	L <sub>p</sub>	Fast	94.00	--	94.1
		L <sub>PA</sub>	Fast		*95.0	94.1
			Slow		--	94.1
		L <sub>PC</sub>	Fast		--	94.1
60 – 120	OFF	L <sub>p</sub>	Fast	94.00	--	94.1
		L <sub>PA</sub>	Fast		--	94.0
			Slow		--	94.0
		L <sub>PC</sub>	Fast		--	94.0
60 – 120	OFF	L <sub>p</sub>	Fast	114.00	--	114.0
		L <sub>PA</sub>	Fast		--	113.9
			Slow		--	113.9
		L <sub>PC</sub>	Fast		--	113.9

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

Uncertainty :  $\pm 0.2$  dB

## 2. Level Stability : 0.1 dB

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

Uncertainty :  $\pm 0.01$  dB





# Calibration Certificate

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## 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	-0.1	± 0.7 dB
130	104.0	103.8	-0.2	
120	94.0	94.0 (Ref.)	--	
110	84.0	83.9	-0.1	
100	74.0	74.1	+0.1	
90	64.0	64.1	+0.1	
80	54.0	54.3	+0.3	

Uncertainty : ± 0.1 dB

### 3.2 Differential level linearity

UUT Range (dB)	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec.
120	84.0	84.0	0.0	± 0.4 dB
	94.0	94.0 (Ref.)	--	
	95.0	95.0	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	-39.0	- 39.4 dB, ± 1.5 dB
63 Hz	-25.9	- 26.2 dB, ± 1.5 dB
125 Hz	-15.9	- 16.1 dB, ± 1 dB
250 Hz	-8.4	- 8.6 dB, ± 1 dB
500 Hz	-3.0	- 3.2 dB, ± 1 dB
1 kHz	0.0 (Ref)	0 dB, ± 1 dB
2 kHz	+1.3	+ 1.2 dB, ± 1 dB
4 kHz	+0.8	+ 1.0 dB, ± 1 dB
8 kHz	-1.3	- 1.1 dB, + 1.5 dB ~ -3 dB
16 kHz	-7.1	- 6.6 dB, + 3 dB ~ - ∞

Uncertainty : ± 0.1 dB



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## 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	39.6	
1/10 <sup>3</sup>	40.0	39.2	± 1.0 dB
1/10 <sup>4</sup>	40.0	39.4	

Uncertainty : ± 0.1 dB

Remark : 1. UUT : Unit-Under-Test

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

3. Atmospheric Pressure : 1 004 hPa.

4. \*Out of Specification

----- END -----



# Calibration Certificate

Certificate No. 12889

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**Customer :** Lam Geotechnics Limited

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

**Order No. :** Q10982

**Date of receipt :** 25-May-11

## Item Tested

**Description :** Sound Level Calibrator

**Manufacturer :** Rion

**Model :** NC-73

**Serial No. :** 10465798

## Test Conditions

**Date of Test :** 26-May-11

**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 after adjustment.


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	03926	NIM-PRC & SCL-HKSAR
S024	Sound Level Calibrator	04062	NIM-PRC & SCL-HKSAR
S041	Universal Counter	04461	SCL-HKSAR
S206	Sound Level Meter	04462	SCL-HKSAR

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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 :**   
P. F. Wong

**Approved by :**   
Alan Chu

**Date:** 26-May-11



# Calibration Certificate

Certificate No. 12889

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Results :

## 1. Level Accuracy (at 1 kHz)

UUT Nominal Value	Measured Value		Mfr's Spec.
	Before Adjust.	After Adjust.	
94 dB	*95.20 dB	93.94 dB	± 1 dB

Uncertainty : ± 0.2 dB

## 2. Frequency Accuracy

UUT Nominal Value	Measured Value	Mfr's Spec.
1 kHz	0.994 kHz	± 2 %

Uncertainty : ± 0.1 %

## 3. Level Stability : 0.0 dB

Uncertainty : ± 0.01 dB

## 4. Total Harmonic Distortion : < 0.5 %

Mfr's Spec. : < 3 %

Uncertainty : ± 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 are the mean of 3 measurement.

4. Atmospheric Pressure : 1 004 hPa

5. \*Out of Specification

----- END -----





# Calibration Certificate

Certificate No. 13813

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**Customer :** Lam Geotechnics Limited

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

**Order No. :** Q11569

**Date of receipt :** 7-Jul-11

## Item Tested

**Description :** Sound Level Meter

**Manufacturer :** B&K

**Model :** 2250

**Serial No. :** 2722310

## Test Conditions

**Date of Test :** 8-Jul-11

**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>
S017A	Multi-Function Generator	07279	SCL-HKSAR
S024	Sound Level Calibrator	04062	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.

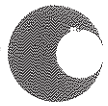
The test equipment used for calibration are traceable to International System of Units (SI).

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

**Calibrated by :**   
P. F. Wong

**Approved by :**   
Dorothy Cheuk

**Date:** 8-Jul-11



# Calibration Certificate

Certificate No. **13813**

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Results :

## 1. SPL

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Range	Freq. Wgt.	Time Const.	Center Freq.		
20 - 140	A (SPL)	Fast	--	94.0	93.8
		Slow	--		93.8
	C (SPL)	Fast	--	94.0	93.9
	A (SPL)	Fast	--	114.0	113.7
		Slow	--		113.7
	C (SPL)	Fast	--	114.0	113.7
	--	1/1 - Oct/Fast	1 kHz	94.0	93.8
				114.0	113.7
	--	1/3 - Oct/Fast	1 kHz	94.0	93.8
				114.0	113.7

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

Uncertainty :  $\pm 0.2$  dB

## 2. Level Stability : 0.0 dB

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

Uncertainty :  $\pm 0.01$  dB

## 3. Linearity

Differential level linearity

UUT Range (dB)	Applied Value (dB)	UUT Rdg (dB)	Variation (dB)	IEC 651 Type 1 Spec.
120	84.0	83.8	0.0	$\pm 0.4$ dB
	94.0	93.8 (Ref.)	--	
	95.0	94.8	0.0	$\pm 0.2$ dB

Uncertainty :  $\pm 0.1$  dB





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## 4. Frequency Weighting

A weighting

Frequency	Attenuation (dB)	IEC 651 Type 1 Spec.
31.5 Hz	-39.9	- 39.4 dB, $\pm 1.5$ dB
63 Hz	-26.6	- 26.2 dB, $\pm 1.5$ dB
125 Hz	-16.5	- 16.1 dB, $\pm 1$ dB
250 Hz	-9.0	- 8.6 dB, $\pm 1$ dB
500 Hz	-3.5	- 3.2 dB, $\pm 1$ dB
1 kHz	0.0 (Ref)	0 dB, $\pm 1$ dB
2 kHz	+1.4	+ 1.2 dB, $\pm 1$ dB
4 kHz	+1.2	+ 1.0 dB, $\pm 1$ dB
8 kHz	-1.2	- 1.1 dB, + 1.5 dB $\sim$ -3 dB
16 kHz	-5.8	- 6.6 dB, + 3 dB $\sim$ - $\infty$

Uncertainty :  $\pm 0.1$  dB

## 5. Time Averaging

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

Uncertainty :  $\pm 0.1$  dB



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## 6. Filter Characteristics

### 6.1 1/1 – Octave Filter

Frequency	Attenuation (dB)	IEC 1260 Class 1 Spec. (dB)
125 Hz	-64.2	< - 61
250 Hz	-44.9	< - 42
500 Hz	-21.0	< - 17.5
707 Hz	-3.8	- 2 ~ - 5
1 kHz (Ref)	--	--
1.414 kHz	-3.5	- 2 ~ - 5
2 kHz	-20.8	< - 17.5
4 kHz	-55.9	< - 42
8 kHz	-85.7	< - 61

Uncertainty :  $\pm 0.25$  dB

### 6.2 1/3 – Octave Filter

Frequency	Attenuation (dB)	IEC 1260 Class 1 Spec.(dB)
326 Hz	-63.6	< - 61
530 Hz	-47.9	< - 42
772 Hz	-23.5	< - 17.5
891 Hz	-3.7	+ 0.3 ~ - 5.0
1 kHz (Ref)	--	--
1.122 kHz	-3.6	+ 0.3 ~ - 5.0
1.296 kHz	-23.4	< - 17.5
1.887 kHz	-48.1	< - 42
3.070 kHz	-69.8	< - 61

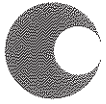
Uncertainty :  $\pm 0.25$  dB

Remarks : 1. UUT : Unit-Under-Test

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

3. Atmospheric pressure : 1 000 hPa.

----- END -----



# Calibration Certificate

Certificate No. **13784**

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**Customer :** Lam Geotechnics Limited

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

**Order No. :** Q11569

**Date of receipt :** 6-Jul-11

## Item Tested

**Description :** Sound Level Meter

**Manufacturer :** B&K

**Model :** 2250

**Serial No. :** 2722311

## Test Conditions

**Date of Test :** 6-Jul-11

**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	C101623	SCL-HKSAR
S024	Sound Level Calibrator	04062	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 :** 

P. F. Wong

**Approved by :** 

Dorothy Cheuk

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

**Date:** 6-Jul-11



# Calibration Certificate

Certificate No. **13784**

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Results :

## 1. SPL

UUT Setting				Applied Value (dB)	UUT Reading (dB)
Range	Freq. Wgt.	Time Const.	Center Freq.		
20 - 140	A (SPL)	Fast	--	94.0	93.9
		Slow	--		93.9
	C (SPL)	Fast	--	94.0	93.9
	A (SPL)	Fast	--	114.0	113.8
		Slow	--		113.8
	C (SPL)	Fast	--	114.0	113.8
	--	1/1 – Oct/Fast	1 kHz	94.0	93.8
				114.0	113.7
	--	1/3 – Oct/Fast	1 kHz	94.0	93.7
				114.0	113.6

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 :  $\pm 0.01$  dB

## 3. Linearity

Differential level linearity

UUT Range (dB)	Applied Value (dB)	UUT Rdg (dB)	Variation (dB)	IEC 651 Type 1 Spec.
20~140	84.0	83.9	0.0	$\pm 0.4$ dB
	94.0	93.9 (Ref.)	--	
	95.0	95.0	+0.1	$\pm 0.2$ dB

Uncertainty :  $\pm 0.1$  dB



# Calibration Certificate

Certificate No. 13784

Page 3 of 4 Pages

## 4. Frequency Weighting

A weighting

Frequency	Attenuation (dB)	IEC 651 Type 1 Spec.
31.5 Hz	-39.8	- 39.4 dB, $\pm 1.5$ dB
63 Hz	-26.5	- 26.2 dB, $\pm 1.5$ dB
125 Hz	-16.5	- 16.1 dB, $\pm 1$ dB
250 Hz	-9.0	- 8.6 dB, $\pm 1$ dB
500 Hz	-3.5	- 3.2 dB, $\pm 1$ dB
1 kHz	0.0 (Ref)	0 dB, $\pm 1$ dB
2 kHz	+1.1	+ 1.2 dB, $\pm 1$ dB
4 kHz	+1.1	+ 1.0 dB, $\pm 1$ dB
8 kHz	-1.3	- 1.1 dB, + 1.5 dB $\sim -3$ dB
16 kHz	-5.9	- 6.6 dB, + 3 dB $\sim -\infty$

Uncertainty :  $\pm 0.1$  dB

## 5. Time Averaging

Applied Burst duty Factor	Applied Leq Value (dB)	UUT Reading (dB)	IEC 804 Type 1 Spec.
continuous	40.0	--	--
1/10	40.0	40.1	$\pm 0.5$ dB
1/10 <sup>2</sup>	40.0	40.0	
1/10 <sup>3</sup>	40.0	40.0	
1/10 <sup>4</sup>	40.0	40.0	$\pm 1.0$ dB

Uncertainty :  $\pm 0.1$  dB



# Calibration Certificate

Certificate No. 13784

Page 4 of 4 Pages

## 6. Filter Characteristics

### 6.1 1/1 – Octave Filter

Frequency	Attenuation (dB)	IEC 1260 Class 1 Spec. (dB)
125 Hz	-64.2	< - 61
250 Hz	-44.9	< - 42
500 Hz	-21.1	< - 17.5
707 Hz	-3.8	- 2 ~ - 5
1 kHz (Ref)	--	--
1.414 kHz	-3.6	- 2 ~ - 5
2 kHz	-20.9	< - 17.5
4 kHz	-56.0	< - 42
8 kHz	-86.0	< - 61

Uncertainty :  $\pm 0.25$  dB

### 6.2 1/3 – Octave Filter

Frequency	Attenuation (dB)	IEC 1260 Class 1 Spec.(dB)
326 Hz	-64.9	< - 61
530 Hz	-48.1	< - 42
772 Hz	-23.6	< - 17.5
891 Hz	-3.9	+ 0.3 ~ - 5.0
1 kHz (Ref)	--	--
1.122 kHz	-3.9	+ 0.3 ~ - 5.0
1.296 kHz	-23.7	< - 17.5
1.887 kHz	-48.8	< - 42
3.070 kHz	-70.4	< - 61

Uncertainty :  $\pm 0.25$  dB

Remarks : 1. UUT : Unit-Under-Test

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

3. Atmospheric pressure : 996 hPa.

----- END -----





# ALS Technichem (HK) Pty Ltd

## REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

**CONTACT:** MS CHERRY MAK  
**CLIENT:** LAM GEOTECHNICS LIMITED  
**ADDRESS:** 11/F., CENTRE POINT,  
181-185 GLOUCESTER ROAD,  
WAN CHAI, HONG KONG

**WORK ORDER:** HK1122321  
**LABORATORY:** HONG KONG  
**DATE RECEIVED:** 22/09/2011  
**DATE OF ISSUE:** 27/09/2011

**PROJECT:** --

### COMMENTS

It is certified that the item under calibration/checking has been calibrated/checked by corresponding calibrated equipment in the laboratory.

Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of ALS will be followed.

**Scope of Test:** Dissolved Oxygen, pH, Salinity and Temperature  
**Description:** Multimeter  
**Brand Name:** WTW  
**Model No.:** Multi 3430  
**Serial No.:** 10410294  
**Equipment No.:** --  
**Date of Calibration:** 23 September, 2011

### NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

### ISSUING LABORATORY: HONG KONG

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Laboratory Manager - Hong Kong

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# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

**Work Order:** HK1122321  
**Date of Issue:** 27/09/2011  
**Client:** LAM GEOTECHNICS LIMITED



**Description:** Multimeter  
**Brand Name:** WTW  
**Model No.:** Multi 3430  
**Serial No.:** 10410294  
**Equipment No.:** --

**Date of Calibration:** 23 September, 2011                      **Date of next Calibration:** 23 December, 2011

**Parameters:**

**Dissolved Oxygen**      **Method Ref: APHA (21st edition), 4500O: G**

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
4.76	4.71	-0.05
5.89	5.83	-0.06
7.82	7.82	0
Tolerance Limit (±mg/L)		0.20

**pH Value**                      **Method Ref: APHA (21st edition), 4500H:B**

Expected Reading (pH Unit)	Displayed Reading (pH Unit)	Tolerance (pH unit)
4.0	4.125	0.125
7.0	7.050	0.050
10.0	9.991	-0.009
Tolerance Limit (±unit)		0.20

**Salinity**                      **Method Ref: APHA (21st edition), 2520B**

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)
0.0	0.0	--
10.0	10.3	3.0
20.0	20.4	2.0
30.0	30.5	1.7
Tolerance Limit (±%)		10.0

**Temperature**                      **Method Ref: Section 6 of International Accreditation New Zealand Technical**

**Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.**

Reading of Ref. thermometer (°C)	Displayed Reading (°C)	Tolerance (°C)
11.0	10.7	-0.3
24.5	23.5	-1.0
50.0	49.2	-0.8
Tolerance Limit (°C)		2.0

  
 \_\_\_\_\_  
 Mr Chan Kwok Fai, Godfrey  
 Laboratory Manager - Hong Kong



# ALS Technichem (HK) Pty Ltd

## REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

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**ADDRESS:** 11/F., CENTRE POINT,  
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**WORK ORDER:** HK1116231  
**LABORATORY:** HONG KONG  
**DATE RECEIVED:** 14/07/2011  
**DATE OF ISSUE:** 19/07/2011

**PROJECT:** --

### COMMENTS

It is certified that the item under calibration/checking has been calibrated/checked by corresponding calibrated equipment in the laboratory.  
Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of ALS will be followed.

Scope of Test: Conductivity, Dissolved Oxygen pH, Salinity and Temperature  
Description: YSI Sonde  
Brand Name: YSI  
Model No.: YSI Professional Plus  
Serial No.: 10G101955  
Equipment No.: N/A  
Date of Calibration: 18 July, 2011

### NOTES

This is the Final Report and supersedes any preliminary report with this batch number.  
Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

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# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1116231  
 Date of Issue: 19/07/2011  
 Client: LAM GEOTECHNICS LIMITED



Description: YSI Sonde  
 Brand Name: YSI  
 Model No.: YSI Professional Plus  
 Serial No.: 10G101955  
 Equipment No.: N/A  
 Date of Calibration: 18 July, 2011

Date of next Calibration: 18 October, 2011

## Parameters:

### Conductivity

Method Ref: APHA (20th edition), 2510B

Expected Reading (uS/cm)	Displayed Reading (uS/cm )	Tolerance (%)
146.9	147.9	0.7
6667	6568	-1.5
12890	12300	-4.6
58670	55033	-6.2
	Tolerance Limit (%)	10.0

### Dissolved Oxygen

Method Ref: APHA (21st edition), 4500O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
5.01	5.16	0.15
6.45	6.63	0.18
7.50	7.46	-0.04
	Tolerance Limit ( $\pm$ mg/L)	0.20

### pH Value

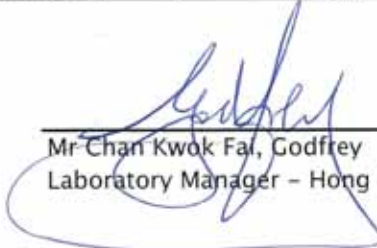
Method Ref: ALPHA (21st edition), 4500H:B

Expected Reading (pH Unit)	Displayed Reading (pH Unit)	Tolerance (pH unit)
4.00	4.14	0.14
7.00	7.19	0.19
10.0	9.98	-0.02
	Tolerance Limit ( $\pm$ unit)	0.20

### Salinity

Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
10.0	10.57	5.7
20.0	20.52	2.6
30.0	30.85	2.8
	Tolerance Limit ( $\pm$ %)	10.0

  
 Mr Chan Kwok Fai, Godfrey  
 Laboratory Manager - Hong Kong

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1116231  
Date of Issue: 19/07/2011  
Client: LAM GEOTECHNICS LIMITED



Description: YSI Sonde  
Brand Name: YSI  
Model No.: YSI Professional Plus  
Serial No.: 10G101955  
Equipment No.: N/A  
Date of Calibration: 18 July, 2011

Date of next Calibration: 11 October, 2011


## Parameters:

### Temperature

Method Ref: Section 6 of International Accreditation New Zealand Technical

Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (°C)	Displayed Reading (°C)	Tolerance (°C)
12.0	12.5	0.5
24.0	24.7	0.7
33.0	33.3	0.3
	Tolerance Limit (°C)	2.0

  
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Laboratory Manager - Hong Kong



# ALS Technichem (HK) Pty Ltd

## REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

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**WORK ORDER:** HK1124198  
**LABORATORY:** HONG KONG  
**DATE RECEIVED:** 13/10/2011  
**DATE OF ISSUE:** 17/10/2011

**PROJECT:** --

### COMMENTS

It is certified that the item under calibration/checking has been calibrated/checked by corresponding calibrated equipment in the laboratory.

Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of ALS will be followed.

**Scope of Test:** Dissolved Oxygen, pH, Salinity and Temperature  
**Description:** YSI Sonde  
**Brand Name:** YSI  
**Model No.:** YSI 600XL Sonde  
**Serial No.:** 05C1607  
**Equipment No.:** EL424  
**Date of Calibration:** 17 October, 2011

### NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

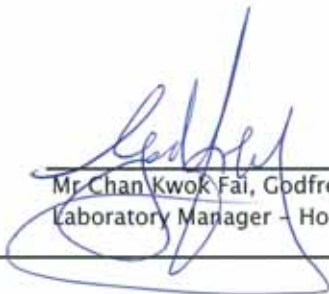
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# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1124198  
 Date of Issue: 17/10/2011  
 Client: LAM GEOTECHNICS LIMITED



Description: YSI Sonde  
 Brand Name: YSI  
 Model No.: YSI 600XL Sonde  
 Serial No.: 05C1607  
 Equipment No.: EL424  
 Date of Calibration: 17 October, 2011      Date of next Calibration: 17 January, 2012

**Parameters:**

**Dissolved Oxygen**

Method Ref: APHA (21st edition), 4500O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
5.30	5.20	-0.10
6.02	5.98	-0.04
7.78	7.69	-0.09
Tolerance Limit (±mg/L)		0.20

**pH Value**

Method Ref: ALPHA (21st edition), 4500H:B

Expected Reading (pH Unit)	Displayed Reading (pH Unit)	Tolerance (pH unit)
4.00	3.93	-0.07
7.00	6.91	-0.09
10.0	9.93	-0.07
Tolerance Limit (±unit)		0.20

**Salinity**

Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
10.0	10.12	1.2
20.0	20.46	2.3
30.0	30.28	0.9
Tolerance Limit (±%)		10.0

**Temperature**

Method Ref: Section 6 of International Accreditation New Zealand Technical

Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (°C)	Displayed Reading (°C)	Tolerance (°C)
12.0	11.00	-1.0
22.0	21.25	-0.8
38.0	37.73	-0.3
Tolerance Limit (°C)		2.0

  
 Mr Chan Kwok Fai, Godfrey  
 Laboratory Manager – Hong Kong



# ALS Technichem (HK) Pty Ltd

## REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

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**WORK ORDER:** HK1118564  
**LABORATORY:** HONG KONG  
**DATE RECEIVED:** 08/08/2011  
**DATE OF ISSUE:** 10/08/2011

**PROJECT:** --

### COMMENTS

It is certified that the item under calibration/checking has been calibrated/checked by corresponding calibrated equipment in the laboratory.  
Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of ALS will be followed.

**Scope of Test:** Turbidity  
**Description:** Turbidimeter  
**Brand Name:** HACH  
**Model No.:** 2100P  
**Serial No.:** 931000003861  
**Equipment No.:** EL148  
**Date of Calibration:** 09 August, 2011

### NOTES


This is the Final Report and supersedes any preliminary report with this batch number.  
Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

### ISSUING LABORATORY: HONG KONG

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Laboratory Manager - Hong Kong

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# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1118564  
Date of Issue: 10/08/2011  
Client: LAM GEOTECHNICS LIMITED



Description: Turbidimeter  
Brand Name: HACH  
Model No.: 2100P  
Serial No.: 931000003861  
Equipment No.: EL148  
Date of Calibration: 09 August, 2011

Date of next Calibration: 09 November, 2011

## Parameters:

### Turbidity

Method Ref: ALPHA 21st Ed. 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0.00	0.09	--
4.00	3.77	-5.8
40.0	38.2	-4.5
80.0	79.8	-0.3
400	401	0.3
800	827	3.4
Tolerance Limit ( $\pm\%$ )		10.0

  
Mr Chan Kwok Fai, Godfrey  
Laboratory Manager - Hong Kong





# ALS Technichem (HK) Pty Ltd

## REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

**CONTACT:** MS CHERRY MAK  
**CLIENT:** LAM GEOTECHNICS LIMITED  
**ADDRESS:** 11/F., CENTRE POINT,  
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WAN CHAI, HONG KONG  
**PROJECT:** --

**WORK ORDER:** HK1122327  
**LABORATORY:** HONG KONG  
**DATE RECEIVED:** 22/09/2011  
**DATE OF ISSUE:** 28/09/2011

### COMMENTS

It is certified that the item under calibration/checking has been calibrated/checked by corresponding calibrated equipment in the laboratory.  
Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of ALS will be followed.

**Scope of Test:** Turbidity  
**Description:** Turbidimeter  
**Brand Name:** HACH  
**Model No.:** 2100P  
**Serial No.:** 930300002705  
**Equipment No.:** --  
**Date of Calibration:** 28 September, 2011

### NOTES

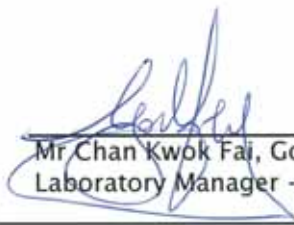
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# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1122327  
Date of Issue: 28/09/2011  
Client: LAM GEOTECHNICS LIMITED



Description: Turbidimeter  
Brand Name: HACH  
Model No.: 2100P  
Serial No.: 930300002705  
Equipment No.: --  
Date of Calibration: 28 September, 2011      Date of next Calibration: 28 December, 2011

## Parameters:

### Turbidity

Method Ref: ALPHA 21st Ed. 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0.00	0.35	--
4.00	4.25	6.3
40.0	38.5	-3.8
80.0	80.3	0.4
400	413	3.3
800	851	6.4
	Tolerance Limit ( $\pm$ %)	10.0

  
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AIR POLLUTION MONITORING EQUIPMENT

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Jul 11, 2011 Rootsometer 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	1.3710	3.2	2.00
2	NA	NA	1.00	0.9730	6.4	4.00
3	NA	NA	1.00	0.8690	7.9	5.00
4	NA	NA	1.00	0.8300	8.8	5.50
5	NA	NA	1.00	0.6860	12.8	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9817	0.7160	1.4042	0.9957	0.7263	0.8919
0.9775	1.0046	1.9859	0.9915	1.0190	1.2613
0.9754	1.1225	2.2203	0.9894	1.1385	1.4101
0.9743	1.1739	2.3286	0.9882	1.1907	1.4790
0.9690	1.4126	2.8084	0.9829	1.4328	1.7837
Qstd slope (m) = 2.01593			Qa slope (m) = 1.26234		
intercept (b) = -0.03978			intercept (b) = -0.02526		
coefficient (r) = 0.99999			coefficient (r) = 0.99999		
y axis = SQRT[H2O(Pa/760) (298/Ta)]			y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

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

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

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

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

For subsequent flow rate calculations:

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

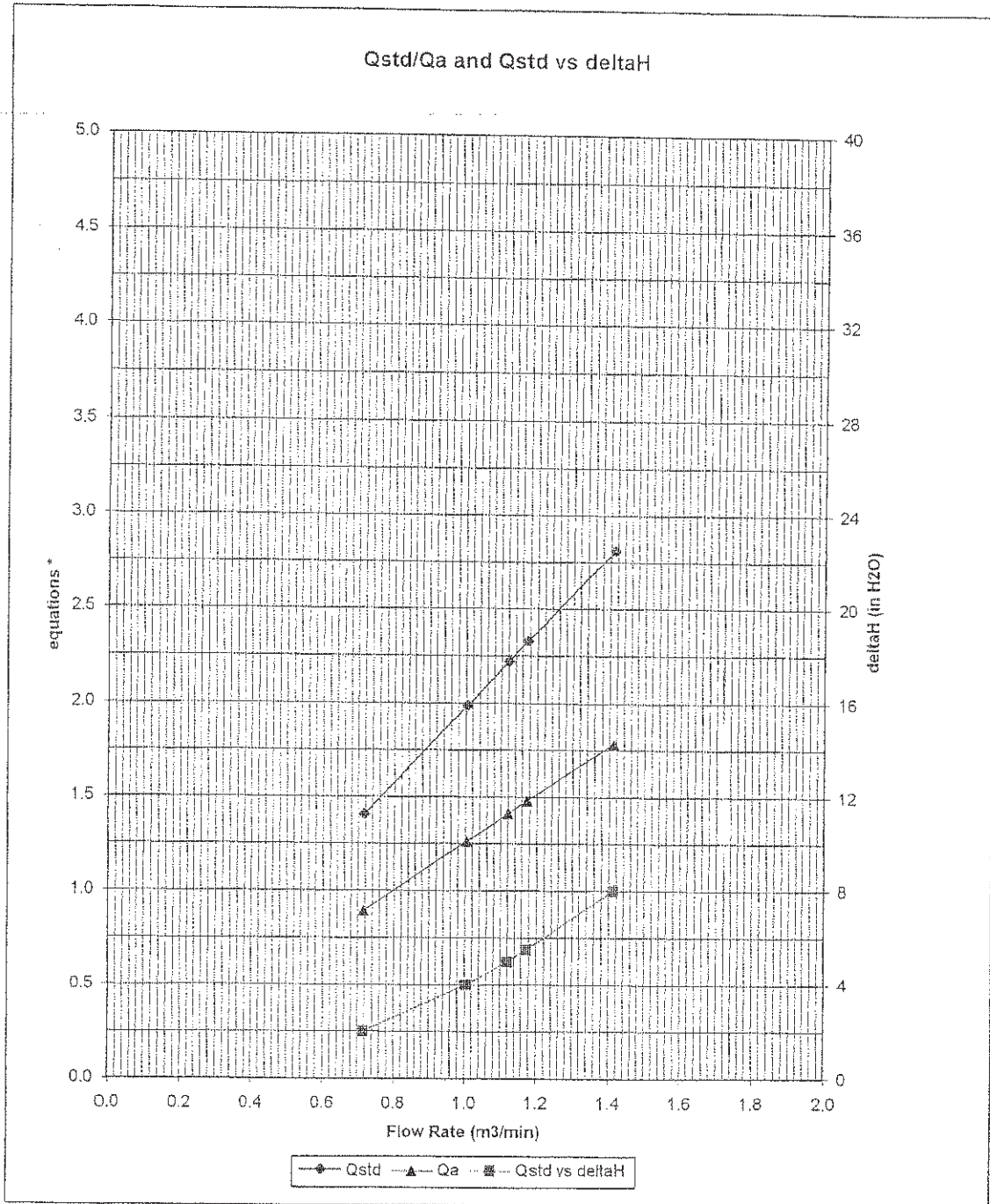
$$Qa = 1/m \{ [\text{SQRT} H2O(Ta/Pa)] - b \}$$





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AIR POLLUTION MONITORING EQUIPMENT



\* y-axis equations:

Qstd series: 
$$\sqrt{\Delta H \left( \frac{P_a}{P_{std}} \right) \left( \frac{T_{std}}{T_a} \right)}$$

Qa series: 
$$\sqrt{\Delta H (T_a / P_a)}$$

#0005

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

Location : CMA2a  
 Equipment no. : EL449

Calibration Date : 23-Aug-11  
 Calibration Due Date : 23-Oct-11

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, $T_a$	305	Kelvin	Pressure, $P_a$
			1010 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, $m_c$	2.01593	Intercept, $b_c$	-0.03978
Last Calibration Date	11-Jul-11	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	11-Jul-12				

Calibration of RSP						
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	6.3	6.3	12.6	1.7574	52	51.3161
2	5.0	5.0	10.0	1.5677	45	44.4081
3	3.8	3.8	7.6	1.3693	37	36.5133
4	2.4	2.4	4.8	1.0922	27	26.6449
5	1.5	1.5	3.0	0.8676	14	13.8159

By Linear Regression of Y on X

Slope, m = 41.1960      Intercept, b = -20.2858  
 Correlation Coefficient\* = 0.9959  
 Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

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

Calibrated by : Sam Lam  
 Date : 23-Aug-11

Checked by : Cherry Mak  
 Date : 23-Aug-11

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

Location : CMA2a  
 Equipment no. : EL449

Calibration Date : 25-Oct-11  
 Calibration Due Date : 25-Dec-11

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, $T_a$	298	Kelvin	Pressure, $P_a$
			1010 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, $m_c$	2.01593	Intercept, $b_c$	-0.03978
Last Calibration Date	11-Jul-11	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	11-Jul-12				

Calibration of RSP						
Calibration Point	Manometer Reading			$Q_{std}$ ( $m^3 / min.$ ) <b>X-axis</b>	Continuous Flow Recorder, $W$ (CFM)	IC $(W(P_a/1013.3 \times 298/T_a)^{1/2}/35.31)$ <b>Y-axis</b>
	(up)	(down)	(difference)			
1	5.9	5.9	11.8	1.7209	50	49.9185
2	4.8	4.8	9.6	1.5542	43	42.9299
3	3.5	3.5	7.0	1.3300	37	36.9397
4	2.5	2.5	5.0	1.1271	29	28.9527
5	1.4	1.4	2.8	0.8484	17	16.9723

By Linear Regression of Y on X

Slope,  $m$  = 36.8863                      Intercept,  $b$  = -13.4049  
 Correlation Coefficient\* = 0.9968  
 Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

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

Calibrated by : Sam Lam  
 Date : 25-Oct-11

Checked by : Cherry Mak  
 Date : 25-Oct-11

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

Location : CMA3a  
 Equipment no. : EL888

Calibration Date : 23-Aug-11  
 Calibration Due Date : 23-Oct-11

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, $T_a$	305	Kelvin	Pressure, $P_a$
			1010 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, $m_c$	2.01593	Intercept, $b_c$	-0.03978
Last Calibration Date	11-Jul-11	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	11-Jul-12				

Calibration of RSP						
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	5.4	5.4	10.8	1.6285	46	45.3950
2	4.3	4.3	8.6	1.4553	41	40.4607
3	3.5	3.5	7.0	1.3149	35	34.5396
4	2.3	2.3	4.6	1.0696	26	25.6580
5	1.5	1.5	3.0	0.8676	18	17.7632

By Linear Regression of Y on X

Slope, m = 36.7801      Intercept, b = -13.8439  
 Correlation Coefficient\* = 0.9988  
 Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

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

Calibrated by : Sam Lam  
 Date : 23-Aug-11

Checked by : Cherry Mak  
 Date : 23-Aug-11



Lam Geotechnics Limited

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

Location : CMA3a  
 Equipment no. : EL888

Calibration I : 25-Oct-11  
 Calibration I : 25-Dec-11

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition				
Temperature, $T_a$	298	Kelvin	Pressure, $P_a$	1010 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, $m_c$	2.01593	Intercept, $b_c$	-0.03978
Last Calibration Date	11-Jul-11	$\left( H \times P_a / 1013.3 \times 298 / T_a \right)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	11-Jul-12				

Calibration of RSP						
Calibration Point	Manometer Reading H (inches of water)			$Q_{std}$ ( $m^3 / min.$ ) <b>X-axis</b>	Continuous Flow Recorder, W (CFM)	IC $(W(P_a/1013.3 \times 298/T_a)^{1/2}/35.31)$ <b>Y-axis</b>
	(up)	(down)	(difference)			
1	5.6	5.6	11.2	1.6771	47	46.9234
2	4.5	4.5	9.0	1.5055	41	40.9332
3	3.5	3.5	7.0	1.3300	35	34.9430
4	2.2	2.2	4.4	1.0586	26	25.9576
5	1.4	1.4	2.8	0.8484	16	15.9739
By Linear Regression of Y on X						
Slope, m		=	<u>36.5792</u>	Intercept, b		= <u>-14.0184</u>
Correlation Coefficient*		=	<u>0.9976</u>			
Calibration Accepted		=	<u>Yes/No**</u>			

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

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

Calibrated by : Sam Lam  
 Date : 25-Oct-11

Checked by : Cherry Mak  
 Date : 25-Oct-11

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

Location : CMA4a  
 Equipment no. : EL390

Calibration Date : 23-Aug-11  
 Calibration Due Date : 23-Oct-11

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, $T_a$	305	Kelvin	Pressure, $P_a$
			1010 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, $m_c$	2.01593	Intercept, $b_c$	-0.03978
Last Calibration Date	11-Jul-11	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	11-Jul-12				

Calibration of RSP						
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	5.8	5.8	11.6	1.6870	54	53.2897
2	4.5	4.5	9.0	1.4883	48	47.3687
3	3.5	3.5	7.0	1.3149	41	40.4607
4	2.3	2.3	4.6	1.0696	31	30.5923
5	1.4	1.4	2.8	0.8389	21	20.7238

By Linear Regression of Y on X

Slope, m = 38.8337                      Intercept, b = -11.2100  
 Correlation Coefficient\* = 0.9982  
 Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

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

Calibrated by : Sam Lam  
 Date : 23-Aug-11

Checked by : Cherry Mak  
 Date : 23-Aug-11

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

Location : CMA4a  
 Equipment no. : EL390

Calibration Date : 25-Oct-11  
 Calibration Due Date : 25-Dec-11

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, $T_a$	298	Kelvin	Pressure, $P_a$
			1010 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, $m_c$	2.01593	Intercept, $b_c$	-0.03978
Last Calibration Date	11-Jul-11	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	11-Jul-12				

Calibration of RSP						
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	5.8	5.8	11.6	1.7065	58	57.9055
2	4.6	4.6	9.2	1.5219	50	49.9185
3	3.7	3.7	7.4	1.3669	44	43.9283
4	2.3	2.3	4.6	1.0819	31	30.9495
5	1.5	1.5	3.0	0.8775	24	23.9609

By Linear Regression of Y on X

Slope, m = 41.4483      Intercept, b = -13.0036  
 Correlation Coefficient\* = 0.9992  
 Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

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

Calibrated by : Sam Lam  
 Date : 25-Oct-11

Checked by : Cherry Mak  
 Date : 25-Oct-11

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

Location : CMA5a  
 Equipment no. : EL380

Calibration Date : 23-Aug-11  
 Calibration Due Date : 23-Oct-11

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, $T_a$	305	Kelvin	Pressure, $P_a$
			1010 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, $m_c$	2.01593	Intercept, $b_c$	-0.03978
Last Calibration Date	11-Jul-11	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	11-Jul-12				

Calibration of RSP						
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	5.8	5.8	11.6	1.6870	54	53.2897
2	4.6	4.6	9.2	1.5045	49	48.3555
3	3.6	3.6	7.2	1.3333	43	42.4344
4	2.3	2.3	4.6	1.0696	34	33.5528
5	1.5	1.5	3.0	0.8676	27	26.6449

By Linear Regression of Y on X

Slope, m = 32.8954      Intercept, b = -1.6589  
 Correlation Coefficient\* = 0.9993  
 Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

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

Calibrated by : Sam Lam  
 Date : 23-Aug-11

Checked by : Cherry Mak  
 Date : 23-Aug-11



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

Location : CMA5a  
 Equipment no. : EL380

Calibration Date : 25-Oct-11  
 Calibration Due Date : 25-Dec-11

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, $T_a$	298	Kelvin	Pressure, $P_a$
			1010 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, $m_c$	2.01593	Intercept, $b_c$	-0.03978
Last Calibration Date	11-Jul-11	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	11-Jul-12				

Calibration of RSP						
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	6.2	6.2	12.4	1.7637	56	55.9087
2	4.9	4.9	9.8	1.5701	51	50.9169
3	3.8	3.8	7.6	1.3850	44	43.9283
4	2.5	2.5	5.0	1.1271	35	34.9430
5	1.5	1.5	3.0	0.8775	26	25.9576

By Linear Regression of Y on X

Slope, m = 34.3328      Intercept, b = -3.8356  
 Correlation Coefficient\* = 0.9987  
 Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

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

Calibrated by : Sam Lam  
 Date : 25-Oct-11

Checked by : Cherry Mak  
 Date : 25-Oct-11

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

Location : CMA6a  
 Equipment no. : EL448

Calibration Date : 23-Aug-11  
 Calibration Due Date : 23-Oct-11

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, $T_a$	305	Kelvin	Pressure, $P_a$
			1010 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, $m_c$	2.01593	Intercept, $b_c$	-0.03978
Last Calibration Date	11-Jul-11	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	11-Jul-12				

Calibration of RSP						
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	6.0	6.0	12.0	1.7155	56	55.2634
2	4.8	4.8	9.6	1.5365	51	50.3292
3	3.7	3.7	7.4	1.3514	44	43.4213
4	2.4	2.4	4.8	1.0922	35	34.5396
5	1.4	1.4	2.8	0.8389	24	23.6843

By Linear Regression of Y on X

Slope, m = 36.0920      Intercept, b = -5.7206  
 Correlation Coefficient\* = 0.9978  
 Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

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

Calibrated by : Sam Lam  
 Date : 23-Aug-11

Checked by : Cherry Mak  
 Date : 23-Aug-11

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

Location : CMA6a  
 Equipment no. : EL448

Calibration Date : 25-Oct-11  
 Calibration Due Date : 25-Dec-11

**CALIBRATION OF CONTINUOUS FLOW RECORDER**

Ambient Condition			
Temperature, $T_a$	298	Kelvin	Pressure, $P_a$
			1010 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086	Slope, $m_c$	2.01593	Intercept, $b_c$	-0.03978
Last Calibration Date	11-Jul-11	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	11-Jul-12				

Calibration of RSP						
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	6.2	6.2	12.4	1.7637	60	59.9022
2	5.0	5.0	10.0	1.5858	52	51.9153
3	3.8	3.8	7.6	1.3850	46	45.9250
4	2.4	2.4	4.8	1.1048	37	36.9397
5	1.5	1.5	3.0	0.8775	29	28.9527

By Linear Regression of Y on X

Slope, m = 33.9988      Intercept, b = -0.9453  
 Correlation Coefficient\* = 0.9983  
 Calibration Accepted = Yes/No\*\*

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

\*\* Delete as appropriate.

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

Calibrated by : Sam Lam  
 Date : 25-Oct-11

Checked by : Cherry Mak  
 Date : 25-Oct-11