Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. 12888 Page 1 of 4 Pages

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 ± 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 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

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 8601 Fax: 2425 8646

Calibration Certificate

Results :

1. SPL Accuracy

UUT Setting				Applied Value (dB)	UUT Reading (dB)	
Level Range (dB)	Filter	Weight	Time Const.		Before adjust.	After adjust.
40 – 100	OFF	L_P	Fast	94.00	--	94.1
		L_{PA}	Fast		*95.0	94.1
			Slow		--	94.1
		L_{PC}	Fast		--	94.1
60 – 120	OFF	L_P	Fast	94.00	--	94.1
		L_{PA}	Fast		--	94.0
			Slow		--	94.0
		L_{PC}	Fast		--	94.0
60 – 120	OFF	L_P	Fast	114.00	--	114.0
		L_{PA}	Fast		--	113.9
			Slow		--	113.9
		L_{PC}	Fast		--	113.9

IEC 651 Type 1 Spec. : ± 0.7 dB
Uncertainty : ± 0.2 dB

2. **Level Stability** : 0.1 dB
IEC 651 Type 1 Spec. : ± 0.3 dB
Uncertainty : ± 0.01 dB

Calibration Certificate

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

Calibration Certificate

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
$1/10^2$	40.0	39.6	
$1/10^3$	40.0	39.2	± 1.0 dB
$1/10^4$	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 ----------

Hong Kong Calibration Ltd.
香港校正有限公司

Calibration Certificate

Certificate No. 12889 Page 1 of 2 Pages

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:

Equipment No.	Description	Cert. No.	Traceable to
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 : _____
Alan Chu

Date: 26-May-11

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

Calibration Certificate

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 ----------

ALS Technichem (HK) Pty Ltd

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MS CHERRY MAK	**WORK ORDER:**	HK1127570
CLIENT:	LAM GEOTECHNICS LIMITED	**LABORATORY:**	HONG KONG
ADDRESS:	11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG	**DATE RECEIVED:**	23/11/2011
		DATE OF ISSUE:	01/12/2011
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 aceptance criteria of ALS will be followed.

Scope of Test:	Dissolved Oxygen, pH, Salinity and Temperature
Description:	YSI Sonde
Brand Name:	YSI
Model No.:	YSI Professional Plus
Serial No.:	11H100476
Equipment No.:	--
Date of Calibration:	30 November, 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

Address

ALS Technichem (HK) Pty Ltd

11/F Chung Shun Knitting Centre
1-3 Wing Yip Street
Kwai Chung
HONG KONG

Phone: 852-2610 1044
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Email: hongkong@alsglobal.com

Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1127570
Date of Issue: 01/12/2011
Client: LAM GEOTECHNICS LIMITED

Description: YSI Sonde
Brand Name: YSI
Model No.: YSI Professional Plus
Serial No.: 11H100476
Equipment No.: --
Date of Calibration: 30 November, 2011 Date of next Calibration: 01 March, 2012

Parameters:

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
5.87	5.78	-0.09
6.41	6.35	-0.06
7.89	7.79	-0.10
	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)
4.0	3.95	-0.05
7.0	7.03	0.03
10.0	9.90	-0.10
	Tolerance Limit (±unit)	0.20

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

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
10.0	9.95	-0.5
20.0	19.91	-0.4
30.0	29.13	-2.9
	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	13.1	1.1
22.0	21.8	-0.2
32.5	33.3	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

CONTACT:	MS CHERRY MAK	**WORK ORDER:**	HK1126440
CLIENT:	LAM GEOTECHNICS LIMITED	**LABORATORY:**	HONG KONG
ADDRESS:	11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG	**DATE RECEIVED:**	09/11/2011
		DATE OF ISSUE:	17/11/2011
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 aceptance criteria of ALS will be followed.

Scope of Test:	Turbidity
Description:	Turbidimeter
Brand Name:	HACH
Model No.:	2100P
Serial No.:	000032935
Equipment No.:	--
Date of Calibration:	16 November, 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

Address

ALS Technichem (HK) Pty Ltd

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1-3 Wing Yip Street
Kwai Chung
HONG KONG

Phone: 852-2610 1044
Fax: 852-2610 2021
Email: hongkong@alsglobal.com

Mr Chan Kwok Fai Godfrey
Laboratory Manager - Hong Kong

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1126440
Date of Issue: 17/11/2011
Client: LAM GEOTECHNICS LIMITED

Description: Turbidimeter
Brand Name: HACH
Model No.: 2100P
Serial No.: 000032935
Equipment No.: --
Date of Calibration: 16 November, 2011 Date of next Calibration: 16 February, 2012

Parameters:

Turbidity **Method Ref: ALPHA 21st Ed. 2130B**

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0.00	0.19	--
4.00	3.78	-5.5
40.0	39.1	-2.3
80.0	79.3	-0.9
400	410	2.5
800	828	3.5
	Tolerance Limit (±%)	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	**WORK ORDER:**	HK1204240
CLIENT:	LAM GEOTECHNICS LIMITED	**LABORATORY:**	HONG KONG
ADDRESS:	11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG	**DATE RECEIVED:**	13/02/2012
		DATE OF ISSUE:	17/02/2012
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 aceptance criteria of ALS will be followed.

Scope of Test:	Turbidity
Description:	Turbidimeter
Brand Name:	HACH
Model No.:	2100P
Serial No.:	000032935
Equipment No.:	--
Date of Calibration:	16 February, 2012

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

Address

ALS Technichem (HK) Pty Ltd

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1-3 Wing Yip Street
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Phone: 852-2610 1044
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Email: hongkong@alsglobal.com

Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1204240
Date of Issue: 17/02/2012
Client: LAM GEOTECHNICS LIMITED

Description: Turbidimeter
Brand Name: HACH
Model No.: 2100P
Serial No.: 000032935
Equipment No.: --
Date of Calibration: 16 February, 2012 Date of next Calibration: 16 May, 2012

Parameters:

Turbidity **Method Ref: APHA 21st Ed. 2130B**

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.34	--
4	4.30	7.5
40	42.6	6.5
80	84.9	6.1
400	415	3.8
800	857	7.1
	Tolerance Limit (±%)	10.0

Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

Lam Geotechincs Limited

Calibration Data for High Volume Sampler (TSP Sampler)

Location	:	CMA3a	Calbration Date	:	28-Dec-11
Equipment no.	:	EL888	Calbration Due Dat	:	28-Feb-12

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition					
Temperature, T_a	291	Kelvin	Pressure, P_a	1020	mmHg

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

Calibration Point	Manometer Reading H (inches of water) (up)	(down)	(difference)	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
1	5.7	5.7	11.4	1.7202	50	50.7648
2	4.5	4.5	9.0	1.5306	45	45.6883
3	3.5	3.5	7.0	1.3522	40	40.6118
4	2.3	2.3	4.6	1.0999	32	32.4895
5	1.4	1.4	2.8	0.8625	22	22.3365

By Linear Regression of Y on X

Slope, m = 32.8319 Intercept, b = -4.7332

Correlation Coefficient* = 0.9953

Calibration Accepted = Yes/~~No~~**

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

** Delete as appropriate.

Remarks : _____

Calibrated by	:	Sam Lam	Checked by	:	Cherry Mak
Date	:	28-Dec-11	Date	:	28-Feb-12