



Calibration Certificate

Certificate No. **96127**

Page 1 of 4 Pages

Customer : Lam Environmental Services Ltd

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

Order No. : Q92434

Date of receipt : 24-Nov-09

Item Tested

Description : Precision Integrating Sound Level Meter

Manufacturer : ACO

Model : Type 6224

Serial No. : 30148

Test Conditions

Date of Test : 26-Nov-09

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 & 804 Type I 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>Due Date</u>	<u>Traceable to</u>
S017	Multi-Function Generator	C081456	18-Mar-10	SCL-HKSAR
S024	Sound Level Calibrator	93758	16-Jul-10	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: 27-Nov-09

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 9646



Calibration Certificate

Certificate No. 96127

Page 2 of 4 Pages

Results :

1. SPL Accuracy

UUT Setting			Applied Value (dB)	UUT Reading (dB)
Level Range (dB)	Weight	Time Const.		
20 – 100	L _A	Fast	94.03	94.3
		Slow		94.3
	L _C	Fast		94.3
30 – 120	L _A	Fast	94.03	94.5
		Slow		94.5
	L _C	Fast		94.5
30 – 120	L _A	Fast	113.97	114.2
		Slow		114.2
	L _C	Fast		114.2

IEC 651 Type 1 Spec. : ± 0.7 dB

Uncertainty : ± 0.1 dB

2. Level Stability : 0.0 dB

IEC 651 Type 1 Spec. : ± 0.3 dB

Uncertainty : ± 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	114.6	+0.1	± 0.7 dB
130	104.0	104.7	+0.2	
120	94.0	94.5 (Ref.)	--	
110	84.0	84.5	0.0	
100	74.0	74.2	-0.3	
90	64.0	64.0	-0.5	
80	54.0	54.0	-0.5	

Uncertainty : ± 0.1 dB

Calibration Certificate

Certificate No. 96127

Page 3 of 4 Pages

3.2 Differential level linearity

UUT Range	Applied Value (dB)	UUT Rdg (dB)	Variation (dB)	IEC 651 Type 1 Spec.
120	84.0	84.4	-0.1	± 0.4
	94.0	94.5 (Ref.)	- -	
	95.0	95.5	0.0	± 0.2
	104.0	104.5	0.0	± 0.3
	105.0	105.5	0.0	± 1.0

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	-25.8	- 26.2 dB, ± 1.5 dB
125 Hz	-15.7	- 16.1 dB, ± 1 dB
250 Hz	-8.3	- 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	+1.2	+ 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	-5.9	- 6.6 dB, + 3 dB ~ - ∞

Uncertainty : ± 0.1 dB

Calibration Certificate

Certificate No. 96127

Page 4 of 4 Pages

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 ²	40.0	40.1	
1/10 ³	40.0	40.2	± 1.0 dB
1/10 ⁴	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 : 1 010 hPa.

----- END -----



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Page **1** of **2** Pages

Customer : Lam Environmental Services Ltd

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

Order No. : Q92434

Date of receipt : 24-Nov-09

Item Tested

Description : Sound Level Calibrator (EL469)

Manufacturer : ACO

Model : --

Serial No. : 050213

Test Conditions

Date of Test : 26-Nov-09

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 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>Due Date</u>	<u>Traceable to</u>
S014	Spectrum Analyzer	93091	18-Jun-10	NIM-PRC & SCL-HKSAR
S024	Sound Level Calibrator	93758	16-Jul-10	NIM-PRC & SCL-HKSAR
S041	Universal Counter	94005	6-Aug-10	SCL-HKSAR
S206	Sound Level Meter	93966	5-Aug-10	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: 27-Nov-09

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.

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Page 2 of 2 Pages

Results :

1. Level

UUT Nominal Value (dB)	Measured Value (dB)		IEC 942 Class 1 Spec.
	Before adjust.	After adjust.	
94	*93.52	94.11	± 0.3 dB

The above measured values are the mean of 3 measurements.

Uncertainty : ± 0.1 dB

2. Frequency

UUT Nominal Value	Measured Value	IEC 942 Class 1 Spec.
1 kHz	1.016 kHz	± 2 %

Uncertainty : ± 3.6 x 10⁻⁶

3. Level Stability : 0.0 dB

IEC 942 Class 1 Spec. : ± 0.1 dB

Uncertainty : ± 0.01 dB

4. Total Harmonic Distortion : < 2.9 %

IEC 942 Class 1 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. Atmospheric Pressure : 1010 hPa.

4. *Out of Specification.

----- END -----

ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

ALS TECHNICHEM (HK) Pty Ltd

Environmental Division



CERTIFICATE OF ANALYSIS

CONTACT:	MS CHERRY MAK	Batch:	HK1013018
CLIENT:	LAM GEOTECHNICS LIMITED	LABORATORY:	HONG KONG
ADDRESS:	11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG.	DATE RECEIVED:	15/06/2010
PROJECT:	HK_2009_05 WAN CHAI DEVELOPMENT PHASE II AND CENTRAL-WAN CHAI BYPASS	DATE OF ISSUE:	22/06/2010
		SAMPLE TYPE:	EQUIPMENT
		No. of SAMPLES:	1

COMMENTS

The calibration procedure used for the analysis has been applied for the calibration of the above instrument.

NOTES

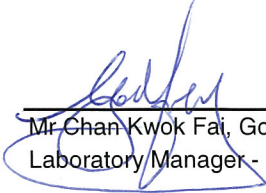
This is the Final Report and supersedes any preliminary report with this batch number.
Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

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Mr. Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong

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Abbreviations: % SPK REC denotes percentage spike recovery
CHK denotes duplicate check sample
LOR denotes limit of reporting
LCS % REC denotes Laboratory Control Sample percentage recovery

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Part of the ALS Laboratory Group

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Phone: 852-2610 1044 Fax: 852-2610 2021 www.alsenviro.com
A Campbell Brothers Limited Company

CERTIFICATE OF ANALYSIS



Batch: HK1013018
Date of Issue: 22/06/2010
Client: LAM GEOTECHNICS LIMITED
Client Reference:

Calibration of Multimeter

Item : pH , Temperature , Salinity , DO
ALS Lab ID: HK1013018 -001
Date of Calibration: 17 June,2010

Model No.: YSI Sonde 600XL
Serial No.: 05C1607

Testing Results :

pH

Expected Reading	Recording Reading
4.00	3.90
7.00	7.15
10.00	10.05
Allowing Deviation	± 0.2 unit

Testing Method:

APHA (20th edition), 4500-H⁺B

Conductivity

Expected Reading	Recording Reading
146.9 uS/cm	150 uS/cm
6667 uS/cm	6259 uS/cm
12890 uS/cm	12234 uS/cm
58670 uS/cm	55608 uS/cm
Allowing Deviation	± 10%

Testing Method:

APHA (20th edition), 2510B

Temperature

Expected Reading	Recording Reading
17.0 °C	16.9 °C
24.5 °C	24.6 °C
41.0 °C	40.6 °C
Allowing Deviation	±2.0°C

Testing Method:

In-House Method

Salinity

Expected Reading	Recording Reading
0 g/L	0.01 g/L
10.0 g/L	10.2 g/L
20.0 g/L	20.3 g/L
30.0 g/L	30.8 g/L
Allowing Deviation	± 10%

Testing Method:

APHA (20th edition), 2520 A and B

DO

Expected Reading	Recording Reading
7.67 mg/L	7.70 mg/L
5.97 mg/L	6.02 mg/L
4.70 mg/L	4.86 mg/L
Allowing Deviation	± 0.2 mg/L

Testing Method:

APHA (20th edition), 4500-OC & G



CERTIFICATE OF ANALYSIS

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

Batch: HK1010688
LABORATORY: HONG KONG
DATE RECEIVED: 19/05/2010
DATE OF ISSUE: 24/05/2010
SAMPLE TYPE: EQUIPMENT
No. of SAMPLES: 1

COMMENTS

The calibration procedure used for the analysis has been applied for the calibration of the above instrument.

NOTES

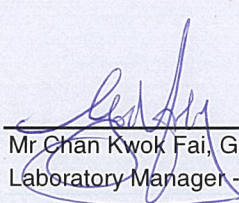
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LOR denotes limit of reporting

LCS % REC denotes Laboratory Control Sample percentage recovery

CERTIFICATE OF ANALYSIS



Batch: HK1010688
Date of Issue: 24/05/2010
Client: LAM GEOTECHNICS LIMITED
Client Reference:

Calibration of Turbidimeter

Item : TURBIDIMETER
ALS Lab ID: HK1010688 -001
Date of Calibration: 20 May, 2010
Model No.: 2100P
Equipment No.: G05-07R002
Serial No.: 930300002705

Testing Results :

Turbidity

Expected Reading	Recording Reading
0.00 NTU	0.34NTU
4.00 NTU	4.26 NTU
16.0 NTU	16.8 NTU
400 NTU	390 NTU
Allowing Deviation	± 10%

Testing Method:

APHA (19th edition), 2130B


Mr Chan Kwok Fai, Godfrey
Laboratory Manager - Hong Kong



CERTIFICATE OF ANALYSIS

CONTACT: MS CHERRY MAK
CLIENT: LAM GEOTECHNICS LIMITED
ADDRESS: 11/F., CENTRE POINT,
181-185 GLOUCESTER ROAD,
WAN CHAI, HONG KONG.
PROJECT: HK/2009/05 WAN CHAI DEVELOPMENT
PHASE II AND CENTRAL-WAN CHAI BYPASS

Batch: HK1017407
LABORATORY: HONG KONG
DATE RECEIVED: 02/08/2010
DATE OF ISSUE: 11/08/2010
SAMPLE TYPE: EQUIPMENT
No. of SAMPLES: 1

COMMENTS

The calibration procedure used for the analysis has been applied for the calibration of the above instrument.

NOTES

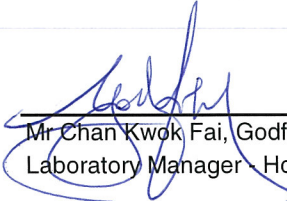
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Abbreviations: % SPK REC denotes percentage spike recovery

CHK denotes duplicate check sample

LOR denotes limit of reporting

LCS % REC denotes Laboratory Control Sample percentage recovery

CERTIFICATE OF ANALYSIS



Batch: HK1017407
Date of Issue: 11/08/2010
Client: LAM GEOTECHNICS LIMITED
Client Reference:

Calibration of Turbidity System

Item : Turbidimeter Model No.: Hach 2100P
ALS Lab ID: HK1017407 -001 Equipment No.: EN06
Date of Calibration: 02 August, 2010 Serial No.:

Testing Results :

Turbidity

Expected Reading	Recording Reading
0 NTU	0.20 NTU
4 NTU	3.98 NTU
40 NTU	38.1 NTU
80 NTU	79.3 NTU
400 NTU	375 NTU
Allowing Deviation	± 10%

Testing Method:

APHA (19th edition), 2130B



CERTIFICATE OF ANALYSIS

CONTACT:	MS CHERRY MAK	Batch:	HK1019685
CLIENT:	LAM GEOTECHNICS LIMITED	LABORATORY:	HONG KONG
ADDRESS:	11/F., CENTRE POINT, 181-185 GLOUCESTER ROAD, WAN CHAI, HONG KONG	DATE RECEIVED:	26/08/2010
PROJECT NO.:	HK/2009/05 WAN CHAI DEVELOPMENT PHASE II AND CENTRAL - WAN CHAI BYPASS	DATE OF ISSUE:	31/08/2010
		SAMPLE TYPE:	EQUIPMENT
		No. of SAMPLES:	1

COMMENTS

The calibration procedure used for the analysis has been applied for the calibration of the above instrument.

NOTES

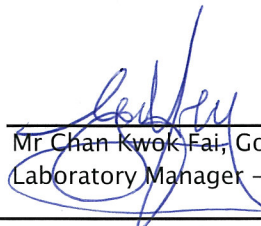
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Abbreviations: % SPK REC denotes percentage spike recovery
CHK denotes duplicate check sample
LOR denotes limit of reporting
LCS % REC denotes Laboratory Control Sample percentage recovery

CERTIFICATE OF ANALYSIS



Batch: HK1019685
Date of Issue: 31/08/2010
Client: LAM GEOTECHNICS LIMITED
Client Reference: HK/2009/05 WAN CHAI DEVELOPMENT PHASE II AND CENTRAL - WAN CHAI BYPASS

Calibration of Turbidimeter

Item : TURBIDIMETER
ALS Lab ID: HK1019685 -001
Date of Calibration: 27 August, 2010
Model No.: 2100P
Equipment No.: 1010688-1
Serial No.: 930300002705

Testing Results :

Turbidity

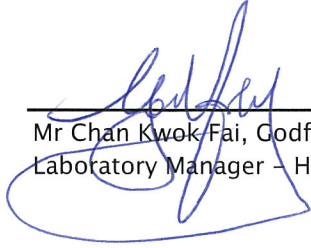
Expected Reading	Recording Reading
0.00 NTU	0.21NTU
4.00 NTU	3.84 NTU
40.0 NTU	39.4 NTU
80.0 NTU	76.5 NTU
400 NTU	386 NTU
Allowing Deviation	± 10%

Testing Method:

APHA (19th edition), 2130B

ALS Technichem (HK) Pty Ltd

ALS Environmental


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