



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 ± 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:

<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 8646

The copyright of this certificate is owned by Hong Kong Calibration Ltd.. It may not be reproduced except in full.

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 -----



Calibration Certificate

Certificate No. **96128**

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

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 8646

Calibration Certificate

Certificate No. **96128**

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 -----



Calibration Certificate

Certificate No. **03250A**

Page 1 of 3 Pages

Customer : Lam Geotechnics Limited

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

Order No. : Q01282

Date of receipt : 14-Jun-10

Item Tested

Description : Precision Integrating Sound Level Meter

Manufacturer : ONO SOKKI

Model : LA-5110

Serial No. : 72302293

Test Conditions

Date of Test : 21-Jun-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 & IEC 804 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	93758	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

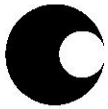
Calibrated by : 
P. F. Wong

Approved by : 
Dorothy Cheuk

This Certificate is issued by:
Hong Kong Calibration Ltd.

Date: 8-Oct-10

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

Certificate No. **03250A**

Page 2 of 3 Pages

Results :

1. SPL Accuracy

UUT Setting		Frequency Weighting	Dynamic Characteristic	Applied Value (dB)	UUT Reading (dB)
Level Range	Filter				
40 - 100 dB	OFF	A	FAST	94.03	94.0
			SLOW		94.0
		C	FAST		94.0
60 - 120 dB	OFF	A	FAST	94.03	94.0
			SLOW		94.0
		C	FAST		94.0
60 - 120 dB	OFF	A	FAST	113.97	113.9
			SLOW		113.9
		C	FAST		113.9

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

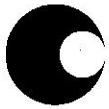
Uncertainty : ± 0.01 dB

3. Linearity

3.1 Level Linearity

UUT Range (dB)	Applied Value (dB)	UUT Reading (dB)	Variation (dB)	IEC 651 Type 1 Spec. (Primary Indicator Range)
130	114.0	114.1	+0.1	± 0.7 dB
130	104.0	104.1	+0.1	
120	94.0	94.0 (Ref.)	--	
110	84.0	84.0	0.0	
100	74.0	74.1	+0.1	
90	64.0	64.1	+0.1	
80	54.0	54.0	0.0	

Uncertainty : ± 0.1 dB



Calibration Certificate

Certificate No. 03250A

Page 3 of 3 Pages

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
	94.0	94.0 (Ref.)	--	
	95.0	95.0	0.0	± 0.2

Uncertainty : ± 0.1 dB

4. Frequency Weighting

A weighting

Frequency	Attenuation (dB)	IEC 651 Type 1 Spec.
31.5 Hz	-40.5	- 39.4 dB, ± 1.5 dB
63 Hz	-26.9	- 26.2 dB, ± 1.5 dB
125 Hz	-16.9	- 16.1 dB, ± 1 dB
250 Hz	-9.1	- 8.6 dB, ± 1 dB
500 Hz	-3.5	- 3.2 dB, ± 1 dB
1 kHz	0.0 (Ref.)	0 dB, ± 1 dB
2 kHz	+1.5	+ 1.2 dB, ± 1 dB
5 kHz	+1.2	+ 1.0 dB, ± 1 dB
8 kHz	-1.0	- 1.1 dB, + 1.5 dB ~ - 3 dB
16 kHz	-7.0	- 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	40.0	± 0.5 dB
1/10 ²	40.0	40.0	
1/10 ³	40.0	40.1	± 1.0 dB
1/10 ⁴	40.0	39.9	

Uncertainty : ± 0.1 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.

4. This certificate is supersede our former certificate no. 03250.

----- END -----



Calibration Certificate

Certificate No. **03445**

Page 1 of 2 Pages

Customer : Lam Geotechnics Limited

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

Order No. : Q01282

Date of receipt : 14-Jun-10

Item Tested

Description : Sound Level Calibrator (EL078)

Manufacturer : ONO SOKKI

Model : SC-2110

Serial No. : 00393

Test Conditions

Date of Test : 21-Jun-10

Supply Voltage : --

Ambient Temperature : (23 ± 3)°C

Relative Humidity : (50 ± 25) %

Test Specifications

Calibration check.

Ref. Document/Procedure: Z02.

Test Results

All results were within the IEC 942 Class 2 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>
S024	Sound Level Calibrator	93758	16-Jul-10	NIM-PRC & SCL-HKSAR
S041	Universal Counter	94005	6-Aug-10	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 8846

Date: 25-Jun-10



Calibration Certificate

Certificate No. 03445

Page 2 of 2 Pages

Results :

1. Level Accuracy (at 1 kHz)

UUT Nominal Value (dB)	Measured Value (dB)	IEC 942 Class 2 Spec.
94	94.05	± 0.5 dB

Uncertainty : ± 0.2 dB

2. Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	IEC 942 Class 2 Spec.
1	0.998	± 4 %

Uncertainty : ± 0.1 %

3. Level Stability : 0.0 dB

IEC 942 Class 2 Spec. : ± 1.2 dB

Uncertainty : ± 0.01 dB

4. Total Harmonic Distortion : < 1.2 %

IEC 942 Class 1 Spec. : < 3 %

Uncertainty : ± 2.3 % of reading

Remark : 1. UUT : Unit-Under-Test

2. The above measured values are the mean of 3 measurements.

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

4. Atmospheric Pressure : 1 000 hPa.

----- END -----



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:

Batch: HK1019486
AMENDMENT NO: 1
LABORATORY: HONG KONG
DATE RECEIVED: 24/08/2010
DATE OF ISSUE: 12/10/2010
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

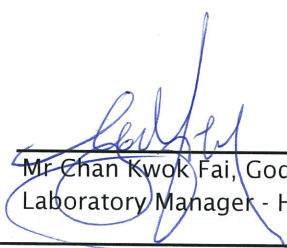
This is the Final Report and supersedes any preliminary report with this batch number.
Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

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
Fax: 852-2610 2021
Email: hongkong@alsenviro.com


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

Other ALS Environmental Laboratories**AUSTRALIA**

Brisbane
Melbourne
Sydney
Newcastle

Hong Kong
Singapore
Kuala Lumpur
Bogor

AMERICAS

Vancouver
Santiago
Amtofagasta
Lima

This report may not be reproduced except with prior written approval from ALS Technichem (HK) Pty Ltd.

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

ALS Technichem (HK) Pty Ltd

Part of the **ALS Laboratory Group**

11/F, Chung Shun Knitting Centre, 1-3 Wing Yip Street, Kwai Chung, N.T., H.K.

Phone: 852-2610 1044 Fax: 852-2610 2021 www.alsenviro.com

A Campbell Brothers Limited Company

CERTIFICATE OF ANALYSIS



Batch: HK1019486
Amendment No: 1
Date of Issue: 12/10/2010
Client: LAM GEOTECHNICS LIMITED
Client Reference:

Calibration of Multimeter

Item : Multimeter Model No.: HACH SEASION 156
ALS Lab ID: HK1019486 -001 Equipment No.: EN07
Date of Calibration: 25 August, 2010 Serial No.: 1010228

Testing Results :

pH

Expected Reading	Recording Reading
4.00	4.12
7.00	7.13
10.0	9.97
Allowing Deviation	± 0.2 unit

Testing Method:

APHA (20th edition), 4500-H⁺B

Conductivity

Expected Reading	Recording Reading
146.9 uS/cm	142.4 uS/cm
6667 uS/cm	6640 uS/cm
12890 uS/cm	13100 uS/cm
58670 uS/cm	60400 uS/cm
Allowing Deviation	± 10%

Testing Method:

APHA (20th edition), 2510B

Temperature

Expected Reading	Recording Reading
15.5 °C	16.1 °C
26.5 °C	25.8 °C
37.0 °C	36.3 °C
Allowing Deviation	±2.0°C

Testing Method:

In-House Method

Salinity

Expected Reading	Recording Reading
0 g/L	0 g/L
10.0 g/L	10.6 g/L
20.0 g/L	20.8 g/L
30.0 g/L	31.8 g/L
Allowing Deviation	± 10%

Testing Method:

APHA (20th edition), 2520 A and B

DO

Expected Reading	Recording Reading
4.71 mg/L	4.74 mg/L
5.82 mg/L	5.81 mg/L
6.81 mg/L	6.93 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.

PROJECT:

Batch: HK1022442
AMENDMENT NO: 1
LABORATORY: HONG KONG
DATE RECEIVED: 27/09/2010
DATE OF ISSUE: 12/10/2010
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.

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
Fax: 852-2610 2021
Email: hongkong@alsenviro.com


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

Other ALS Environmental Laboratories

AUSTRALIA

Brisbane
Melbourne
Sydney
Newcastle

Hong Kong
Singapore
Kuala Lumpur
Bogor

AMERICAS

Vancouver
Santiago
Atofagasta
Lima

This report may not be reproduced except with prior written approval from ALS Technichem (HK) Pty Ltd.

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: HK1022442
Amendment No: 1
Date of Issue: 12/10/2010
Client: LAM GEOTECHNICS LIMITED
Client Reference:

Calibration of Multimeter

Item : Multimeter **Model No.:** YSI Sonde 600XL
ALS Lab ID: HK1022442-001 **Equipment No.:** EL424
Date of Calibration: 28 September, 2010 **Serial No.:** 05C1607

Testing Results :

pH	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 50%;">Expected Reading</th> <th style="width: 50%;">Recording Reading</th> </tr> </thead> <tbody> <tr> <td>4.00</td> <td>3.98</td> </tr> <tr> <td>7.00</td> <td>7.10</td> </tr> <tr> <td>10.0</td> <td>9.93</td> </tr> <tr> <td>Allowing Deviation</td> <td>± 0.2 unit</td> </tr> </tbody> </table>	Expected Reading	Recording Reading	4.00	3.98	7.00	7.10	10.0	9.93	Allowing Deviation	± 0.2 unit	Testing Method: APHA (20th edition), 4500-H ⁺ B		
Expected Reading	Recording Reading													
4.00	3.98													
7.00	7.10													
10.0	9.93													
Allowing Deviation	± 0.2 unit													
Conductivity	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 50%;">Expected Reading</th> <th style="width: 50%;">Recording Reading</th> </tr> </thead> <tbody> <tr> <td>146.9 uS/cm</td> <td>144.0 uS/cm</td> </tr> <tr> <td>6667 uS/cm</td> <td>6302 uS/cm</td> </tr> <tr> <td>12890 uS/cm</td> <td>12303 uS/cm</td> </tr> <tr> <td>58670 uS/cm</td> <td>55501 uS/cm</td> </tr> <tr> <td>Allowing Deviation</td> <td>± 10%</td> </tr> </tbody> </table>	Expected Reading	Recording Reading	146.9 uS/cm	144.0 uS/cm	6667 uS/cm	6302 uS/cm	12890 uS/cm	12303 uS/cm	58670 uS/cm	55501 uS/cm	Allowing Deviation	± 10%	Testing Method: APHA (20th edition), 2510B
Expected Reading	Recording Reading													
146.9 uS/cm	144.0 uS/cm													
6667 uS/cm	6302 uS/cm													
12890 uS/cm	12303 uS/cm													
58670 uS/cm	55501 uS/cm													
Allowing Deviation	± 10%													
Temperature	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 50%;">Expected Reading</th> <th style="width: 50%;">Recording Reading</th> </tr> </thead> <tbody> <tr> <td>15.0 °C</td> <td>14.8 °C</td> </tr> <tr> <td>23.0 °C</td> <td>22.7 °C</td> </tr> <tr> <td>35.0 °C</td> <td>34.5 °C</td> </tr> <tr> <td>Allowing Deviation</td> <td>±2.0°C</td> </tr> </tbody> </table>	Expected Reading	Recording Reading	15.0 °C	14.8 °C	23.0 °C	22.7 °C	35.0 °C	34.5 °C	Allowing Deviation	±2.0°C	Testing Method: In-House Method		
Expected Reading	Recording Reading													
15.0 °C	14.8 °C													
23.0 °C	22.7 °C													
35.0 °C	34.5 °C													
Allowing Deviation	±2.0°C													
Salinity	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 50%;">Expected Reading</th> <th style="width: 50%;">Recording Reading</th> </tr> </thead> <tbody> <tr> <td>0 g/L</td> <td>0 g/L</td> </tr> <tr> <td>10.0 g/L</td> <td>9.84 g/L</td> </tr> <tr> <td>20.0 g/L</td> <td>20.1 g/L</td> </tr> <tr> <td>30.0 g/L</td> <td>30.9 g/L</td> </tr> <tr> <td>Allowing Deviation</td> <td>± 10%</td> </tr> </tbody> </table>	Expected Reading	Recording Reading	0 g/L	0 g/L	10.0 g/L	9.84 g/L	20.0 g/L	20.1 g/L	30.0 g/L	30.9 g/L	Allowing Deviation	± 10%	Testing Method: APHA (20th edition), 2520 A and B
Expected Reading	Recording Reading													
0 g/L	0 g/L													
10.0 g/L	9.84 g/L													
20.0 g/L	20.1 g/L													
30.0 g/L	30.9 g/L													
Allowing Deviation	± 10%													
DO	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 50%;">Expected Reading</th> <th style="width: 50%;">Recording Reading</th> </tr> </thead> <tbody> <tr> <td>5.63 mg/L</td> <td>5.55 mg/L</td> </tr> <tr> <td>6.63 mg/L</td> <td>6.60 mg/L</td> </tr> <tr> <td>7.81 mg/L</td> <td>7.92 mg/L</td> </tr> <tr> <td>Allowing Deviation</td> <td>± 0.2 mg/L</td> </tr> </tbody> </table>	Expected Reading	Recording Reading	5.63 mg/L	5.55 mg/L	6.63 mg/L	6.60 mg/L	7.81 mg/L	7.92 mg/L	Allowing Deviation	± 0.2 mg/L	Testing Method: APHA (20th edition), 4500-OC & G		
Expected Reading	Recording Reading													
5.63 mg/L	5.55 mg/L													
6.63 mg/L	6.60 mg/L													
7.81 mg/L	7.92 mg/L													
Allowing Deviation	± 0.2 mg/L													

 Mr Chan Kwok Fai, Godfrey
 Laboratory Manager - Hong Kong



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 - Jun 28, 2010 Rootsometer S/N 9833620 Ta (K) - 298
 Operator Tisch Orifice I.D. - 0005 Pa (mm) - 745.49

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	1.3860	3.2	2.00
2	NA	NA	1.00	0.9740	6.4	4.00
3	NA	NA	1.00	0.8730	7.9	5.00
4	NA	NA	1.00	0.8320	8.8	5.50
5	NA	NA	1.00	0.6850	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9767	0.7047	1.4006	0.9957	0.7184	0.8941
0.9725	0.9985	1.9808	0.9914	1.0179	1.2645
0.9704	1.1116	2.2146	0.9893	1.1332	1.4137
0.9693	1.1650	2.3227	0.9882	1.1877	1.4828
0.9641	1.4075	2.8013	0.9829	1.4349	1.7883
Qstd slope (m) = 1.99628			Qa slope (m) = 1.25003		
intercept (b) = -0.00699			intercept (b) = -0.00446		
coefficient (r) = 0.99995			coefficient (r) = 0.99995		
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:

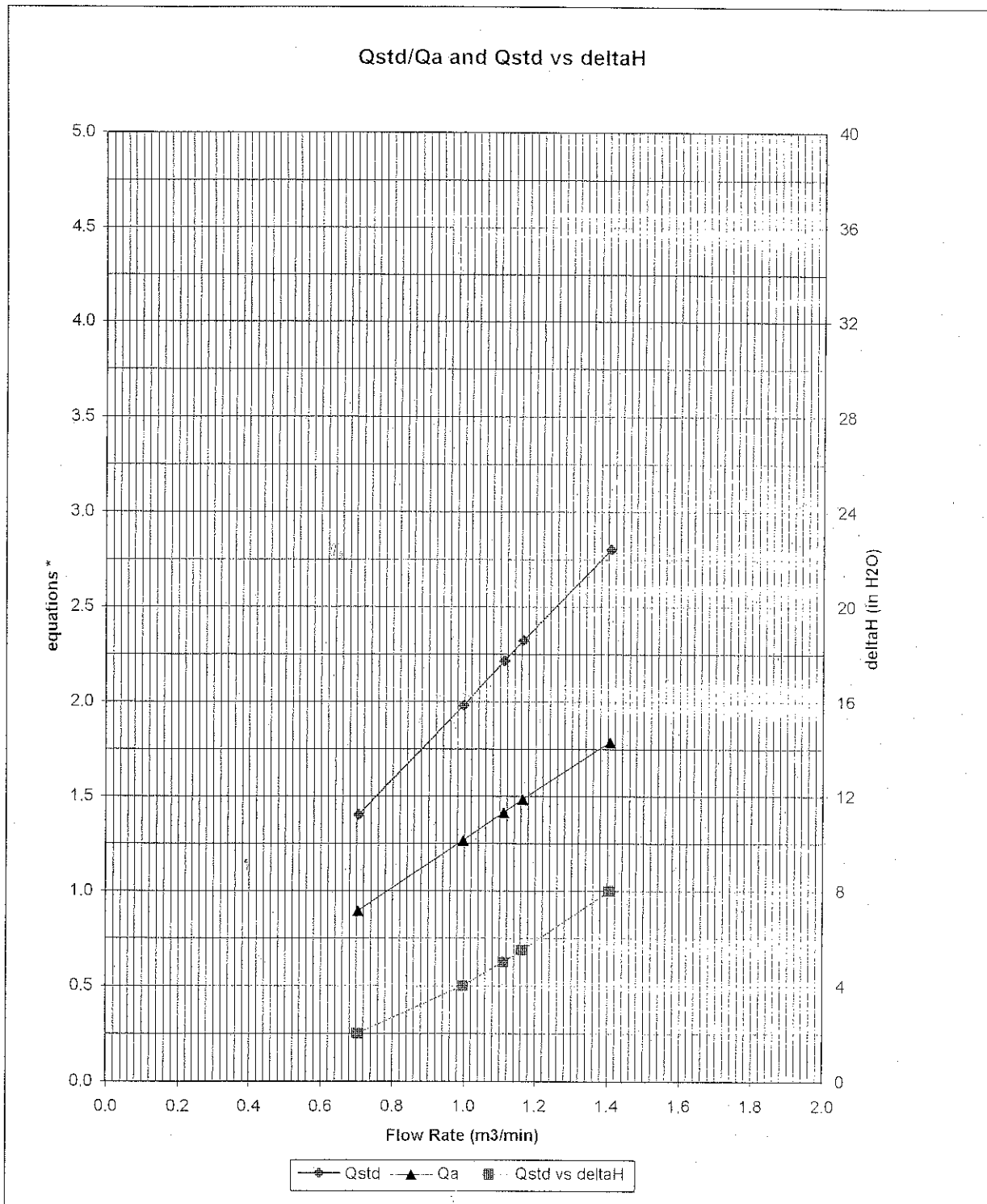
$$Qstd = 1/m \{ [\text{SQRT}(\text{H2O}(\text{Pa}/760)(298/\text{Ta}))] - b \}$$

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



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



* 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 : CMA1b
 Equipment no. : EL452

Calibration Date : 10-Aug-10
 Calibration Due Date : 10-Oct-10

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T_a	305	Kelvin	Pressure, P_a
			1008 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086 (Serial no. 9833620)	Slope, m_c	1.99628	Intercept, b_c	-0.00699
Last Calibration Date	28-Jun-10	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	28-Jun-11				

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	6.1	6.1	12.2	1.7285	59	58.1663
2	4.8	4.8	9.6	1.5337	52	51.2652
3	3.8	3.8	7.6	1.3650	43	42.3924
4	2.4	2.4	4.8	1.0855	33	32.5337
5	1.5	1.5	3.0	0.8589	21	20.7033

By Linear Regression of Y on X

Slope, m = 42.7671 Intercept, b = -15.1960
 Correlation Coefficient* = 0.9977
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Derek Lo
 Date : 10-Aug-10

Checked by : Cherry Mak
 Date : 10-Aug-10

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

Location : CMA1b
 Equipment no. : EL452

Calibration Date : 09-Oct-10
 Calibration Due Date : 09-Dec-10

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T_a	303	Kelvin	Pressure, P_a
			1009 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086 (Serial no. 9833620)	Slope, m_c	1.99628	Intercept, b_c	-0.06990
Last Calibration Date	28-Jun-10	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	28-Jun-11				

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	6.4	6.4	12.8	1.8086	60	59.3765
2	5.1	5.1	10.2	1.6182	52	51.4596
3	4.0	4.0	8.0	1.4371	46	45.5220
4	2.4	2.4	4.8	1.1211	36	35.6259
5	1.5	1.5	3.0	0.8936	24	23.7506

By Linear Regression of Y on X

Slope, m = 37.3775 Intercept, b = -8.2748
 Correlation Coefficient* = 0.9958
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Derek Lo
 Date : 9-Oct-10

Checked by : Cherry Mak
 Date : 9-Oct-10

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

Location : CMA2a
 Equipment no. : EL449

Calibration Date : 02-Sep-10
 Calibration Due Date : 02-Nov-10

CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition			
Temperature, T_a	305	Kelvin	Pressure, P_a
			1001 mmHg

Orifice Transfer Standard Information					
Equipment No.	EL086 (Serial no. 9833620)	Slope, m_c	1.99628	Intercept, b_c	-0.06990
Last Calibration Date	28-Jun-10	$(H \times P_a / 1013.3 \times 298 / T_a)^{1/2}$ $= m_c \times Q_{std} + b_c$			
Next Calibration Date	28-Jun-11				

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	6.1	6.1	12.2	1.7540	55	54.0342
2	5.0	5.0	10.0	1.5913	47	46.1747
3	4.0	4.0	8.0	1.4270	39	38.3152
4	2.4	2.4	4.8	1.1132	25	24.5610
5	1.5	1.5	3.0	0.8874	14	13.7542

By Linear Regression of Y on X

Slope, m = 46.1153 Intercept, b = -27.0989
 Correlation Coefficient* = 0.9998
 Calibration Accepted = Yes/No**

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

** Delete as appropriate.

Remarks : _____

Calibrated by : Derek Lo
 Date : 2-Sep-10

Checked by : Cherry Mak
 Date : 2-Sep-10