

Appendix E. Calibration Certificates

Appendix E
Calibration Record
(Air Quality Monitoring)

High-Volume TSP Sampler
5-Point Calibration Record

Location : ASR1
 Calibrated by : T.K.Wong
 Date : 05/01/2016

Sampler

Model : GMWS-2310 ACCU-VOL
 Serial Number : S/N 1806

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
 Service Date : 24 Mar 2015
 Slope (m) : 2.09532
 Intercept (b) : -0.03812
 Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013
 Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1017
 Ta(K) : 299

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1 18 holes	12.6	3.551	1.712	61	61.02
2 13 holes	9.0	3.001	1.449	52	52.02
3 10 holes	7.0	2.647	1.279	45	45.01
4 7 holes	4.5	2.122	1.028	36	36.01
5 5 holes	2.8	1.674	0.814	27	27.01

Sampler Calibration Relationship

Slope(m): 37.875 Intercept(b): -3.372 Correlation Coefficient(r): 0.9997

Checked by: Magnum Fan

Date: 10/01/2016

High-Volume TSP Sampler
5-Point Calibration Record

Location : ASR2A
Calibrated by : T.K.Wong
Date : 05/01/2016

Sampler

Model : GMWS-2310 ACCU-VOL
Serial Number : S/N 1061

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
Service Date : 24 Mar 2015
Slope (m) : 2.09532
Intercept (b) : -0.03812
Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1017
Ta(K) : 299

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1 18 holes	12.7	3.565	1.718	58	58.02
2 13 holes	9.8	3.131	1.511	49	49.01
3 10 holes	7.4	2.721	1.315	42	42.01
4 7 holes	5.1	2.259	1.094	33	33.01
5 5 holes	3.2	1.789	0.869	25	25.01

Sampler Calibration Relationship

Slope(m):38.765 Intercept(b):-9.041 Correlation Coefficient(r): 0.9994

Checked by: Magnum Fan

Date: 10/01/2016

High-Volume TSP Sampler
5-Point Calibration Record

Location : ASR3
 Calibrated by : T.K.Wong
 Date : 05/01/2016

Sampler

Model : GMWS-2310 ACCU-VOL
 Serial Number : S/N 7577

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
 Service Date : 24 Mar 2015
 Slope (m) : 2.09532
 Intercept (b) : -0.03812
 Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013
 Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1017
 Ta(K) : 299

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1 18 holes	13.0	3.607	1.738	62	62.02
2 13 holes	10.1	3.179	1.534	54	54.02
3 10 holes	7.0	2.647	1.279	45	45.01
4 7 holes	4.3	2.074	1.006	36	36.01
5 5 holes	2.8	1.674	0.814	28	28.01

Sampler Calibration Relationship

Slope(m):36.122 Intercept(b):-1.013 Correlation Coefficient(r):0.9994

Checked by: Magnum Fan

Date: 10/01/2016

High-Volume TSP Sampler
5-Point Calibration Record

Location : ASR4
Calibrated by : T.K.Wong
Date : 05/01/2016

Sampler

Model : GMWS-2310 ACCU-VOL
Serial Number : S/N 1273

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
Service Date : 24 Mar 2015
Slope (m) : 2.09532
Intercept (b) : -0.03812
Correlation Coefficient(r) : 0.99994

Standard Condition

Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1017
Ta(K) : 299

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1 18 holes	12.5	3.537	1.705	58	58.02
2 13 holes	9.5	3.083	1.488	51	51.02
3 10 holes	7.1	2.665	1.288	44	44.01
4 7 holes	4.5	2.122	1.028	36	36.01
5 5 holes	3.1	1.761	0.856	29	29.01

Sampler Calibration Relationship

Slope(m):33.781 Intercept(b):0.608 Correlation Coefficient(r):0.9993

Checked by: Magnum Fan

Date: 10/01/2016

Appendix E
Calibration Record
(Noise Monitoring)

Certificate of Calibration

校正證書

Certificate No. : C157147

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC15-2872) Date of Receipt / 收件日期 : 17 December 2015

Description / 儀器名稱 : Sound Level Calibrator
Manufacturer / 製造商 : Rion
Model No. / 型號 : NC-73
Serial No. / 編號 : 10486660
Supplied By / 委託者 : Envirotech Services Co.
Room 113, 1/F, My Loft, 9 Hoi Wing Road, Tuen Mun,
New Territories, Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C

Relative Humidity / 相對濕度 : (55 ± 20)%

Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 28 December 2015

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA
- Rohde & Schwarz Laboratory, Germany

Tested By
測試


H T Wong
Technical Officer

Certified By
核證


K M Wu
Engineer

Date of Issue : 29 December 2015
簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗所書面批准。



Certificate of Calibration

校正證書

Certificate No. : C157147
證書編號

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL130	Universal Counter	C153519
CL281	Multifunction Acoustic Calibrator	DC130171
TST150A	Measuring Amplifier	C141558

- Test procedure : MA100N.

- Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	93.8	± 0.5	± 0.2

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	0.990	1 kHz ± 2 %	± 1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :

The values given in this 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 environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited 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 the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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Sun Creation Engineering Limited – Calibration & Testing Laboratory

c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong

輝創工程有限公司 – 校正及檢測實驗室

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輝創工程有限公司

Sun Creation Engineering Limited
Calibration and Testing Laboratory

Certificate of Calibration

校正證書

Certificate No. : C151415
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC15-0613) Date of Receipt / 收件日期 : 12 March 2015

Description / 儀器名稱 : Sound Level Meter
Manufacturer / 製造商 : Rion
Model No. / 型號 : NL-52
Serial No. / 編號 : 01010406
Supplied By / 委託者 : Envirotech Services Co.
Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : $(23 \pm 2)^{\circ}\text{C}$ Relative Humidity / 相對濕度 : $(55 \pm 20)\%$
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 15 March 2015

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
All results are within manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA
- Rohde & Schwarz Laboratory, Germany

Tested By :
測試


K O Lee
Project Engineer

Certified By :
核證


K M Wu
Engineer

Date of Issue : 17 March 2015
簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗所書面批准。

Sun Creation Engineering Limited – Calibration & Testing Laboratory

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c/o 香港新界屯門興安里一號青山灣機樓四樓

Tel/電話: 2927 2606

Fax/傳真: 2744 8986

E-mail/電郵: callab@suncreation.com

Website/網址: www.suncreation.com

Certificate of Calibration

校正證書

Certificate No. : C151415

證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. Self-calibration was performed before the test.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C150014
CL281	Multifunction Acoustic Calibrator	DC130171

5. Test procedure : MA101N.

6. Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L _A	A	Fast	94.00	1	93.8	± 1.1

- 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 130	L _A	A	Fast	94.00	1	93.8 (Ref.)
				104.00		103.8
				114.00		113.8

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

- 6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L _A	A	Fast	94.00	1	93.8	Ref.
			Slow				

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Certificate of Calibration

校正證書

Certificate No. : C151415

證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L _A	A	Fast	94.00	63 Hz	67.5	-26.2 ± 1.5
					125 Hz	77.5	-16.1 ± 1.5
					250 Hz	85.1	-8.6 ± 1.4
					500 Hz	90.6	-3.2 ± 1.4
					1 kHz	93.8	Ref.
					2 kHz	95.1	+1.2 ± 1.6
					4 kHz	94.8	+1.0 ± 1.6
					8 kHz	92.8	-1.1 (+2.1 ; -3.1)
					12.5 kHz	89.4	-4.3 (+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L _C	C	Fast	94.00	63 Hz	92.9	-0.8 ± 1.5
					125 Hz	93.6	-0.2 ± 1.5
					250 Hz	93.8	0.0 ± 1.4
					500 Hz	93.8	0.0 ± 1.4
					1 kHz	93.8	Ref.
					2 kHz	93.7	-0.2 ± 1.6
					4 kHz	93.0	-0.8 ± 1.6
					8 kHz	90.9	-3.0 (+2.1 ; -3.1)
					12.5 kHz	87.5	-6.2 (+3.0 ; -6.0)

Remarks : - UUT Microphone Model No. : UC-59 & S/N : 03017

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	63 Hz - 125 Hz	: ± 0.35 dB
	250 Hz - 500 Hz	: ± 0.30 dB
	1 kHz	: ± 0.20 dB
	2 kHz - 4 kHz	: ± 0.35 dB
	8 kHz	: ± 0.45 dB
	12.5 kHz	: ± 0.70 dB
104 dB	1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB	1 kHz	: ± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :

The values given in this 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 environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited 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 the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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Appendix E
Calibration Record
(Water Quality Monitoring)



ALS Technichem (HK) Pty Ltd
11/F, Chung Shun Knitting Centre
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Kwai Chung, N.T., Hong Kong
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www.alsglobal.com

REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

CONTACT: MR IVAN LEUNG
CLIENT: ALS TECHNICHEM (HK) PTY LTD
ADDRESS: 11/F., CHUNG SHUN KNITTING CENTRE,
1-3 WING YIP STREET,
KWAI CHUNG,
N.T., HONG KONG

WORK ORDER: HK1600625
SUB-BATCH: 0
LABORATORY: HONG KONG
DATE RECEIVED: 02/01/2016
DATE OF ISSUE: 08/01/2016

COMMENTS

The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the ALS Hong Kong laboratory or quoted from relevant international standards.

The "Next Calibration Date" is recommended according to best practice principals as practised by the ALS Hong Kong laboratory or quoted from relevant international standards.

Scope of Test: Conductivity, Dissolved Oxygen, pH, Salinity and Temperature
Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: Professional Plus
Serial No.: 10D101566
Equipment No.: --
Date of Calibration: 02 January, 2016

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.


Mr. Fung Lim Chee, Richard
General Manager -
Greater China & Hong Kong

REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION



Work Order: HK1600625
Sub-Batch: 0
Date of Issue: 08/01/2016
Client: ALS TECHNICHEM (HK) PTY LTD

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: Professional Plus
Serial No.: 10D101566
Equipment No.: --

Date of Calibration: 02 January, 2016 **Date of next Calibration:** 02 April, 2016

Parameters:

Conductivity

Method Ref: APHA (21st edition), 2510B

Expected Reading (uS/cm)	Displayed Reading (uS/cm)	Tolerance (%)
146.9	141.7	-3.5
6667	6681	+0.2
12890	12950	+0.5
58670	58793	+0.2
Tolerance Limit (%)		±10

Dissolved Oxygen

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
1.56	1.54	-0.02
4.68	4.70	+0.02
8.16	8.12	-0.04
Tolerance Limit (mg/L)		±0.20

pH Value

Method Ref: APHA 21st Ed. 4500H:B

Expected Reading (pH Unit)	Displayed Reading (pH Unit)	Tolerance (pH unit)
4.0	3.97	-0.03
7.0	6.98	-0.02
10.0	9.95	-0.05
Tolerance Limit (pH unit)		±0.20

Salinity

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

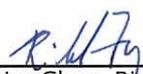
Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
10	9.93	-0.7
20	19.89	-0.5
30	29.90	-0.3
Tolerance Limit (%)		±10

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)
16	15.9	-0.1
23	23.1	+0.1
39	38.9	-0.1
Tolerance Limit (°C)		±2.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.


 Mr. Fung Lim Chee, Richard
 General Manager -
 Greater China & Hong Kong



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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT: MR IVAN LEUNG
CLIENT: ALS TECHNICHEM (HK) PTY LTD
ADDRESS: 11/F., CHUNG SHUN KNITTING CENTRE,
1-3 WING YIP STREET,
KWAI CHUNG,
N.T., HONG KONG

WORK ORDER: HK1600620
SUB-BATCH: 0
LABORATORY: HONG KONG
DATE RECEIVED: 02/01/2016
DATE OF ISSUE: 08/01/2016

COMMENTS

The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the ALS Hong Kong laboratory or quoted from relevant international standards.

The "Next Calibration Date" is recommended according to best practice principals as practised by the ALS Hong Kong laboratory or quoted from relevant international standards.

Scope of Test: Turbidity
Equipment Type: Turbidimeter
Brand Name: HACH
Model No.: 2100Q
Serial No.: 13120C029845
Equipment No.: --
Date of Calibration: 02 January, 2016

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.


Mr. Fung Lim Chee, Richard
General Manager -
Greater China & Hong Kong

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



Work Order: HK1600620
Sub-Batch: 0
Date of Issue: 08/01/2016
Client: ALS TECHNICHEM (HK) PTY LTD

Equipment Type: Turbidimeter
Brand Name: HACH
Model No.: 2100Q
Serial No.: 13120C029845

Equipment No.: --
Date of Calibration: 02 January, 2016 **Date of next Calibration:** 02 April, 2016

Parameters:

Turbidity

Method Ref: APHA 21st Ed. 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
4	4.03	+0.8
40	40.2	+0.5
80	80.1	+0.1
400	396	-1.0
800	788	-1.5
	Tolerance Limit (%)	±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.


Mr. Fung Lim Chee, Richard
General Manager -
Greater China & Hong Kong