

Certificate of Calibration

for

Description: Sound Level Calibrator
Manufacturer: Bruel & Kjaer
Type No.: 4231
Serial No.: 3003246

Submitted by:

Customer: Atkins
Address: 13/F, Wharf T&T Centre,
Harbour City, Tsim Sha Tsui,
Kowloon, Hong Kong

The apparatus has been calibrated in accordance with the In-house method for acoustics calibrator calibration


Upon receipt for calibration, the instrument was found to be:

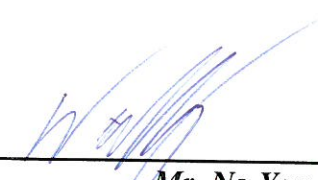
- Within
 Outside

the allowable tolerance.

The test equipments used for calibration are traceable to National Standards via:
- HOKLAS

Date of calibration: 20 May 2015

Calibrated by: 
Mr. Tang Cheuk Hang
Quality Manager

Certified by: 
Mr. Ng Yan Wa
Laboratory Manager

**1. Calibration Specifications:**

Calibration check.

2. Calibration Conditions:

Air Temperature: 21.5 °C
Air Pressure: 1008 hPa
Relative Humidity: 69.5 %

3. Calibration Equipment:

	Type	Serial No.	Last Calibration Date	Calibration Report Number	Traceable to
Multifunction Calibrator	B&K 4226	2288467	12 May 2015	PA150063	HOKLAS

*Engineering Unit of Reference Microphone: 54.4mV/Pa.

4. Calibration Results

4.1 Sound Pressure Level

Nominal value dB	Accept level lower dB	Accept level upper dB	Measured value dB
94.3	93.8	94.8	94.0

Certificate of Calibration

校正證書

Certificate No. : C153870
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC15-1591)

Date of Receipt / 收件日期 : 16 July 2015

Description / 儀器名稱 : Acoustical Calibrator
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 4231
Serial No. / 編號 : 3004068
Supplied By / 委託者 : Atkins China Limited
19/F., Tower 1, The Gateway Harbour City,
Tsim Sha Tsui, Kowloon

TEST CONDITIONS / 測試條件

Temperature / 溫度 : $(23 \pm 2)^{\circ}\text{C}$
Line Voltage / 電壓 : ---

Relative Humidity / 相對濕度 : $(55 \pm 20)\%$

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 18 July 2015

TEST RESULTS / 測試結果

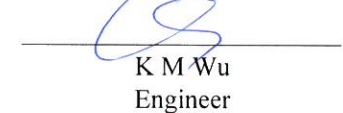
The results apply to the particular unit-under-test only.
All results are within manufacturer's specification.
The results are detailed in the subsequent page(s).

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
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By : 
測試 K O Lee

Project Engineer

Certified By : 
核證 K M Wu
Engineer

Date of Issue : 21 July 2015
簽發日期

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Certificate of Calibration

校正證書

Certificate No. : C153870

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	94.0	± 0.2	± 0.2
114 dB, 1 kHz	114.0		

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.000 0	1 kHz ± 0.1 %	± 0.1

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.

Certificate of Calibration

校正證書

Certificate No. : C145325
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC14-2125) Date of Receipt / 收件日期 : 19 August 2014

Description / 儀器名稱 : Integrating Sound Level Meter
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 2238
Serial No. / 編號 : 2808432
Supplied By / 委託者 : Atkins China Limited
13/F, Wharf T&T Centre, Harbour City, Tsim Sha Tsui, Kowloon

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 : 30 August 2014

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
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By : 
測試 : K C Lee
Project Engineer

Certified By : 
核證 : K M Wu
Engineer

Date of Issue : 30 August 2014
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.

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Certificate of Calibration

校正證書

Certificate No. : C145325

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 using laboratory acoustic calibrator was performed before the test from 6.1.1.2 to 6.4.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL280	40 MHz Arbitrary Waveform Generator	C140016
CL281	Multifunction Acoustic Calibrator	DC130171

5. Test procedure : MA101N.

6. Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

- 6.1.1.1 Before Self-calibration

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L _{AFP}	A	F	94.00	1	94.2

- 6.1.1.2 After Self-calibration

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L _{AFP}	A	F	94.00	1	94.1	± 0.7

- 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L _{AFP}	A	F	94.00	1	94.1 (Ref.)
				104.00		104.1
				114.00		114.1

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

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Certificate of Calibration

校正證書

Certificate No. : C145325
證書編號

6.2 Time Weighting

6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L _{AFP}	A	F	94.00	1	94.1	Ref.
	L _{ASP}		S			94.1	± 0.1
	L _{AIP}		I			94.1	± 0.1

6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
30 - 110	L _{AFP}	A	F	106.0	Continuous	106.0	Ref.
	L _{AFMax}				200 ms	105.0	-1.0 ± 1.0
	L _{ASP}	S	Continuous		106.0	Ref.	
	L _{ASMax}		500 ms		102.0	-4.1 ± 1.0	

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L _{AFP}	A	F	94.00	31.5 Hz	55.0	-39.4 ± 1.5
					63 Hz	68.0	-26.2 ± 1.5
					125 Hz	78.0	-16.1 ± 1.0
					250 Hz	85.5	-8.6 ± 1.0
					500 Hz	90.9	-3.2 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	95.3	+1.2 ± 1.0
					4 kHz	95.1	+1.0 ± 1.0
					8 kHz	93.0	-1.1 (+1.5 ; -3.0)
					12.5 kHz	89.8	-4.3 (+3.0 ; -6.0)

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Certificate of Calibration

校正證書

Certificate No. : C145325
證書編號

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L _{CFP}	C	F	94.00	31.5 Hz	91.3	-3.0 ± 1.5
					63 Hz	93.4	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.0
					250 Hz	94.1	0.0 ± 1.0
					500 Hz	94.1	0.0 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	93.9	-0.2 ± 1.0
					4 kHz	93.3	-0.8 ± 1.0
					8 kHz	91.0	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.9	-6.2 (+3.0 ; -6.0)

6.4 Time Averaging

UUT Setting				Applied Value					UUT Reading (dB)	IEC 60804 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Integrating Time	Frequency (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)		
30 - 110	L _{Aeq}	A	10 sec.	4	1		110.0	100	99.9	± 0.5
								90	89.9	± 0.5
								80	79.7	± 1.0
								70	69.7	± 1.0

Remarks : - UUT Microphone Model No. : 4188 & S/N : 2791442

- Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value :

94 dB	31.5 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)
	Burst equivalent level	± 0.2 dB (Ref. 110 dB continuous sound level)

- 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.

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Certificate of Calibration

校正證書

Certificate No. : C153871
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC15-1591)

Date of Receipt / 收件日期 : 16 July 2015

Description / 儀器名稱 : Integrating Sound Level Meter
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 2238
Serial No. / 編號 : 2800932
Supplied By / 委託者 : Atkins China Limited
19/F., Tower 1, The Gateway Harbour City,
Tsim Sha Tsui, Kowloon

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C
Line Voltage / 電壓 : ---

Relative Humidity / 相對濕度 : (55 ± 20)%

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 18 July 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
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By : 
測試

K O Lee
Project Engineer

Certified By : 
核證
K M Wu
Engineer

Date of Issue : 21 July 2015
簽發日期

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Certificate of Calibration

校正證書

Certificate No. : C153871
證書編號

- 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.
- Self-calibration using the B & K Acoustic Calibrator 4231, S/N : 3004068 was performed before 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>
CL280	40 MHz Arbitrary Waveform Generator	C150014
CL281	Multifunction Acoustic Calibrator	DC130171

- Test procedure : MA101N.

- Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L _{AFP}	A	F	94.00	1	94.1	± 0.7

6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L _{AFP}	A	F	94.00	1	94.1 (Ref.)
				104.00		104.1
				114.00		114.1

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

6.2 Time Weighting

6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L _{AFP}	A	F	94.00	1	94.1	Ref.
	L _{ASP}		S			94.1	± 0.1
	L _{AIP}		I			94.1	± 0.1

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Certificate of Calibration

校正證書

Certificate No. : C153871

證書編號

6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
30 - 110	L _{AFP}	A	F	106.0	Continuous	106.0	Ref.
	L _{AFMax}				200 ms	105.0	-1.0 ± 1.0
	L _{ASP}	S	Continuous		106.0	Ref.	
	L _{ASMax}		500 ms		102.0	-4.1 ± 1.0	

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L _{AFP}	A	F	94.00	31.5 Hz	54.8	-39.4 ± 1.5
					63 Hz	67.9	-26.2 ± 1.5
					125 Hz	77.9	-16.1 ± 1.0
					250 Hz	85.4	-8.6 ± 1.0
					500 Hz	90.8	-3.2 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	95.3	+1.2 ± 1.0
					4 kHz	95.1	+1.0 ± 1.0
					8 kHz	92.9	-1.1 (+1.5 ; -3.0)
					12.5 kHz	89.8	-4.3 (+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L _{CFP}	C	F	94.00	31.5 Hz	91.2	-3.0 ± 1.5
					63 Hz	93.3	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.0
					250 Hz	94.1	0.0 ± 1.0
					500 Hz	94.1	0.0 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	93.9	-0.2 ± 1.0
					4 kHz	93.2	-0.8 ± 1.0
					8 kHz	91.0	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.8	-6.2 (+3.0 ; -6.0)

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Certificate of Calibration

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Certificate No. : C153871
證書編號

6.4 Time Averaging

UUT Setting				Applied Value					UUT	IEC 60804
Range (dB)	Parameter	Frequency Weighting	Integrating Time	Frequency (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)	Reading (dB)	Type 1 Spec. (dB)
30 - 110	L _{Aeq}	A	10 sec.	4	1	1/10	110.0	100	100.0	± 0.5
			60 sec.					90	90.2	± 0.5
			60 sec.					80	79.7	± 1.0
			5 min.					70	69.8	± 1.0

Remarks : - UUT Microphone Model No. : 4188 & S/N : 2793 199

- Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value :

94 dB : 31.5 Hz - 125 Hz	: ± 0.35 dB
250 Hz - 500 Hz	: ± 0.30 dB
1 kHz	: ± 0.20 dB
2 kHz - 4kHz	: ± 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)
Burst equivalent level	: ± 0.2 dB (Ref. 110 dB continuous sound level)

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

Note :

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TISCH ENVIRONMENTAL, INC.
 145 SOUTH MIAMI AVE
 VILLAGE OF CLEVELAND, OH
 45002
 513.467.9000
 877.263.7610 TOLL FREE
 513.467.9009 FAX

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Mar 24, 2015 Rootmeter S/N 0438320 Ta (K) - 292
 Operator Tisch Orifice I.D. - 2454 Pa (mm) - 756.92

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	1.4460	3.2	2.00
2	NA	NA	1.00	1.0300	6.4	4.00
3	NA	NA	1.00	0.9180	7.9	5.00
4	NA	NA	1.00	0.8780	8.7	5.50
5	NA	NA	1.00	0.7240	12.6	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
1.0121	0.6999	1.4258	0.9958	0.6886	0.8784
1.0078	0.9785	2.0163	0.9916	0.9627	1.2422
1.0057	1.0955	2.2543	0.9895	1.0779	1.3888
1.0047	1.1443	2.3644	0.9885	1.1258	1.4566
0.9994	1.3805	2.8515	0.9833	1.3582	1.7568
Qstd slope (m) = 2.09532			Qa slope (m) = 1.31205		
intercept (b) = -0.03812			intercept (b) = -0.02349		
coefficient (r) = 0.99994			coefficient (r) = 0.99994		
y axis = SQRT[H2O(Pa/760) (298/Ta)]			y axis = SQRT[H2O(Ta/Pa)]		

CALCULATIONS

Vstd = Diff. Vol [(Pa-Diff. Hg) / 760] (298/Ta)
 Qstd = Vstd/Time

Va = Diff Vol [(Pa-Diff Hg) / Pa]
 Qa = Va/Time

For subsequent flow rate calculations:

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

ENVIROTECH SERVICES CO.

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS5(Ma Wan Chung Village)
Calibrated by : K.F.Ho
Date : 12/05/2015

Sampler

Model : TE-5170
Serial Number : S/N3640

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) : 1012
Ta(K) : 302

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1 18 holes	11.8	3.411	1.646	55	54.61
2 13 holes	9.3	3.028	1.463	49	48.65
3 10 holes	7.0	2.627	1.272	42	41.70
4 7 holes	4.2	2.035	0.989	33	32.76
5 5 holes	2.8	1.661	0.811	27	26.81

Notes: $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$, $X = Z/m - b$, $Y(\text{Corrected Flow}) = IC * \{\sqrt{Pa/Pstd}(Tstd/Ta)\}$

Sampler Calibration Relationship

Slope(m): 33.316 Intercept(b): 0.282

Correlation Coefficient(r): 0.9996

Checked by: Magnum Fan

Date: 18/05/2015

ENVIROTECH SERVICES
CO. .

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS5(Ma Wan Chung Village)
Calibrated by : K.F.Ho
Date : 07/07/2015

Sampler

Model : TE-5170
Serial Number : S/N3640

Calibration Office 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) : 1000
Ta(K) : 304

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1 18 holes	11.6	3.350	1.616	55	54.10
2 13 holes	9.2	2.984	1.440	49	48.20
3 10 holes	6.8	2.565	1.240	43	42.30
4 7 holes	4.3	2.040	0.989	36	35.41
5 5 holes	2.7	1.616	0.787	30	29.51

Notes: $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$, $X = Z/m - b$, $Y(\text{Corrected Flow}) = IC * \{\sqrt{Pa/Pstd}(Tstd/Ta)\}$

Sampler Calibration Relationship

Slope(m): 29.315 Intercept(b): 6.304

Correlation Coefficient(r): 0.9994

Checked by: Magnum Fan

Date: 10/07/2015

ENVIROTECH SERVICES CO.

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS6(Dragonair Building)
Calibrated by : P.F.Yeung
Date : 12/05/2015

Sampler

Model : TE-5170
Serial Number : S/N3639

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) : 1012
Ta(K) : 302

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1 18 holes	11.6	3.382	1.632	58	57.59
2 13 holes	9.0	2.979	1.410	50	49.64
3 10 holes	6.6	2.551	1.236	43	42.69
4 7 holes	4.5	2.106	1.023	36	35.74
5 5 holes	2.8	1.661	0.811	28	27.80

Notes: $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$, $X = Z/m - b$, $Y(\text{Corrected Flow}) = IC * \{\sqrt{Pa/Pstd}(Tstd/Ta)\}$

Sampler Calibration Relationship

Slope(m): 35.675 Intercept(b): 1.129

Correlation Coefficient(r): 0.9992

Checked by: Magnum Fan

Date: 18/05/2015

ENVIROTECH SERVICES CO.

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS6(Dragonair Building)
Calibrated by : P.F.Yeung
Date : 07/07/2015

Sampler

Model : TE-5170
Serial Number : S/N3639

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) : 1000
Ta(K) : 304

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1 18 holes	11.5	3.336	1.609	55	54.10
2 13 holes	9.2	2.984	1.440	50	49.19
3 10 holes	7.0	2.603	1.258	44	43.28
4 7 holes	4.5	2.087	1.012	36	35.41
5 5 holes	2.8	1.646	0.801	28	27.54

Notes: $Z = \sqrt{dH(Pa/Pstd)(Tstd/Ta)}$, $X = Z/m - b$, $Y(\text{Corrected Flow}) = IC * \{\sqrt{Pa/Pstd}(Tstd/Ta)\}$

Sampler Calibration Relationship

Slope(m): 32.765 Intercept(b): 1.803

Correlation Coefficient(r): 0.9992

Checked by: Magnum Fan

Date: 10/07/2015

EQUIPMENT CALIBRATION RECORD

Type :	Laser Dust Monitor
Manufacturer / Brand :	SIBATA
Model No.:	LD-3B
Equipment No.:	LD-3B-001
Serial No.:	934393
Sensitivity Adjustment Scale Setting :	640 CPM
Last Calibration Date	11/10/2013

Standard Equipment

Equipment :	MFC High Volume Air Sampler
Venue :	Tung Chung Development Pier
Model No.:	TE-5170 Total Suspended Particulate
Serial No.:	3641

Calibration Result

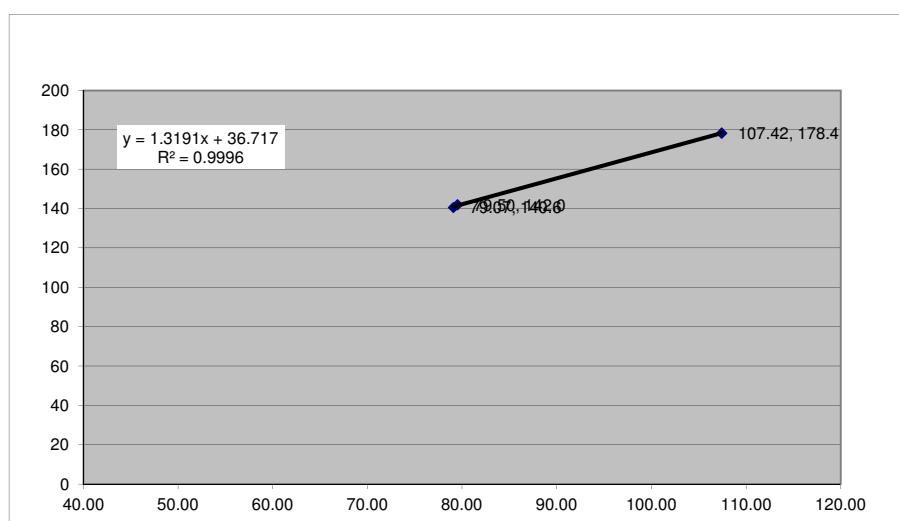
Sensitivity Adjustment Scale Setting (Before Calibration) :	640 CPM
Sensitivity Adjustment Scale Setting (After Calibration) :	640 CPM



Hour	Date (dd-mmm-yy)	Time		Ambient Condition		Concentration (ug/m ³) Y-axis	Total Count	Count/Minute X-axis
				Temp (°C)	R.H. (%)			
1	23-Sep-14	14:00	15:00	30	72%	178.4	6445	107.42
2	23-Sep-14	15:35	16:35	30	72%	140.6	4744	79.07
3	23-Sep-14	16:43	17:43	30	72%	142.0	4770	79.50

Be Linear Regression of Y or X

Slope (K-factor):	1.3191
Correlation coefficient :	0.9996

Remark: _____



Recorded by: <u>Billy Lao</u>	Signature: <u></u>	Date: <u>29/09/2014</u>
Checked by: <u>Keith Chau</u>	Signature: <u></u>	Date: <u>29/09/2014</u>

EQUIPMENT CALIBRATION RECORD

Type : Laser Dust Monitor
 Manufacturer / Brand : SIBATA
 Model No.: LD-3B
 Equipment No.: LD-3B-003
 Serial No.: 276018
 Sensitivity Adjustment Scale Setting : 799 CPM

Operator: _____

Standard Equipment

Equipment : MFC High Volume Air Sampler
 Venue : CB FM1a Western Wholesale Food Market
 Model No.: TE-5170 Total Suspended Particulate
 Serial No.: 2146

Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration) : 799 CPM
 Sensitivity Adjustment Scale Setting (After Calibration) : 799 CPM

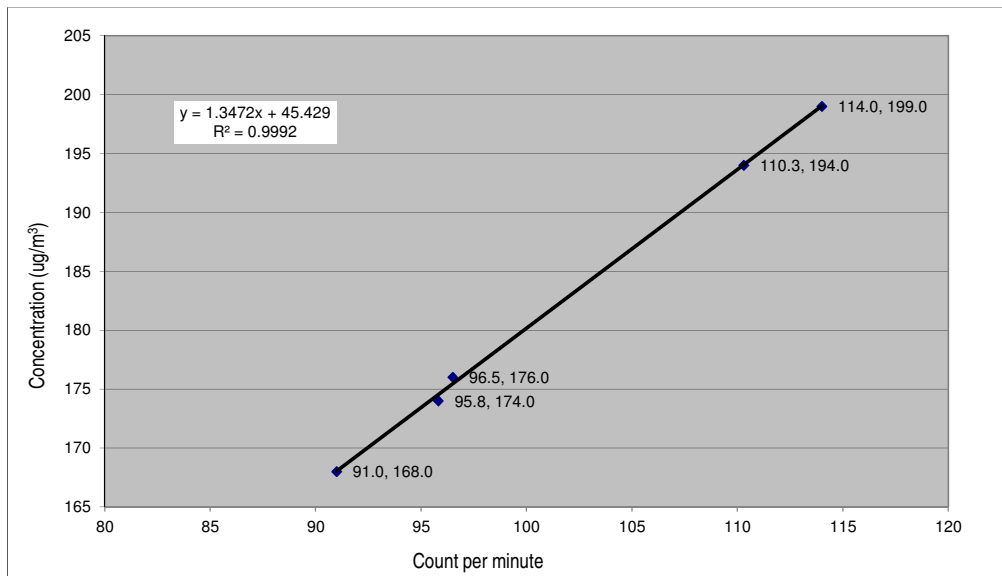
Hour	Date (dd-mmm-yy)	Time		Ambient Condition		Concentration (ug/m ³) Y-axis	Total Count	Count/Minute X-axis
				Temp (°C)	R.H. (%)			
1	11-Dec-14	09:30	10:30	19.5	62%	168	5460	91.00
2	11-Dec-14	10:40	11:40	19.5	62%	174	5749	95.82
3	11-Dec-14	11:46	12:46	19.5	62%	176	5790	96.50
4	11-Dec-14	13:00	14:00	19.5	62%	194	6618	110.30
5	11-Dec-14	14:50	15:50	19.5	62%	199	6840	114.00

Be Linear Regression of Y or X

Slope (K-factor): 1.3472

Correlation coefficient : 0.9992

Remark: _____



Recorded by: Ruby Law

Signature: 

Date: 19/12/2014

Checked by: Keith Chau

Signature: 

Date: 19/12/2014



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REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

CONTACT: MR MIKE SHEK
CLIENT: AECOM ASIA COMPANY LIMITED
ADDRESS: 1501-10, 15/F, TOWER 1,
GRAND CENTRAL PLAZA,
138 SHATIN RURAL COMMITTEE ROAD,
SHATIN, NEW TERRITORIES, HONG KONG

WORK ORDER: HK1514515
SUB-BATCH: 0
LABORATORY: HONG KONG
DATE RECEIVED: 05/05/2015
DATE OF ISSUE: 11/05/2015

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, Temperature, Dissolved Oxygen, Salinity, pH and Turbidity
Description: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12A101545
Equipment No.: W.026.35
Date of Calibration: 05 May, 2015

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: HK1514515
Sub-batch: 0
Date of Issue: 11/05/2015
Client: AECOM ASIA COMPANY LIMITED

Description: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12A101545
Equipment No.: W.026.35
Date of Calibration: 05 May, 2015

Date of next Calibration: 05 August, 2015

Parameters:

Conductivity

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

Expected Reading (uS/cm)	Displayed Reading (uS/cm)	Tolerance (%)
146.9	145.0	-1.3
6667	6610	-0.9
12890	12680	-1.6
58670	58050	-1.1
Tolerance Limit (%)		±10.0

Dissolved Oxygen

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
3.35	3.32	-0.03
5.75	5.71	-0.04
7.80	7.77	-0.03
Tolerance Limit (mg/L)		±0.20

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)
13.0	12.85	-0.2
26.0	25.91	-0.1
38.0	37.93	-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

REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION



Work Order: HK1514515
Sub-batch: 0
Date of Issue: 11/05/2015
Client: AECOM ASIA COMPANY LIMITED

Description: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12A101545
Equipment No.: W.026.35
Date of Calibration: 05 May, 2015

Date of next Calibration: 05 August, 2015

Parameters:

Salinity

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

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)
0	0.00	--
10	10.05	+0.5
20	20.08	+0.4
30	30.06	+0.2
Tolerance Limit (%)		±10.0

Turbidity

Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.0	--
4	4.1	+2.5
10	10.2	+2.0
20	20.1	+0.5
50	50.5	+1.0
100	100.8	+0.8
Tolerance Limit (%)		±10.0

pH Value

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

Expected Reading (pH Unit)	Displayed Reading (pH Unit)	Tolerance (pH unit)
4.0	4.01	+0.01
7.0	6.96	-0.04
10.0	9.99	-0.01
Tolerance Limit (pH Unit)		±0.20

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 MIKE SHEK
CLIENT: AECOM ASIA COMPANY LIMITED
ADDRESS: 1501-10, 15/F, TOWER 1,
GRAND CENTRAL PLAZA,
138 SHATIN RURAL COMMITTEE ROAD,
SHATIN, NEW TERRITORIES, HONG KONG

WORK ORDER: HK1514511
SUB-BATCH: 0
LABORATORY: HONG KONG
DATE RECEIVED: 05/05/2015
DATE OF ISSUE: 11/05/2015

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, Temperature, Dissolved Oxygen, Salinity, pH and Turbidity
Description: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12D100972
Equipment No.: W.026.36
Date of Calibration: 05 May, 2015

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: HK1514511
Sub-batch: 0
Date of Issue: 11/05/2015
Client: AECOM ASIA COMPANY LIMITED



Description: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12D100972
Equipment No.: W.026.36
Date of Calibration: 05 May, 2015

Date of next Calibration: 05 August, 2015

Parameters:

Conductivity

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

Expected Reading (uS/cm)	Displayed Reading (uS/cm)	Tolerance (%)
146.9	144.0	-2.0
6667	6630	-0.6
12890	12850	-0.3
58670	58520	-0.3
Tolerance Limit (%)		±10.0

Dissolved Oxygen

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
3.35	3.36	+0.01
5.75	5.77	+0.02
7.80	7.81	+0.01
Tolerance Limit (mg/L)		±0.20

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)
13.0	12.95	-0.1
26.0	26.04	+0.0
38.0	37.94	-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

REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION



Work Order: HK1514511
Sub-batch: 0
Date of Issue: 11/05/2015
Client: AECOM ASIA COMPANY LIMITED

Description: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12D100972
Equipment No.: W.026.36
Date of Calibration: 05 May, 2015

Date of next Calibration: 05 August, 2015

Parameters:

Salinity

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

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)
0	0.00	--
10	10.04	+0.4
20	20.02	+0.1
30	30.01	+0.0
Tolerance Limit (%)		±10.0

Turbidity

Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.0	--
4	4.2	+5.0
10	10.2	+2.0
20	19.9	-0.5
50	50.3	+0.6
100	100.6	+0.6
Tolerance Limit (%)		±10.0

pH Value

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

Expected Reading (pH Unit)	Displayed Reading (pH Unit)	Tolerance (pH unit)
4.0	4.02	+0.02
7.0	6.97	-0.03
10.0	9.96	-0.04
Tolerance Limit (pH Unit)		±0.20

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