



# Certificate of Calibration 校正證書

Certificate No. : C162569  
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC16-1066)

Date of Receipt / 收件日期 : 12 May 2016

Description / 儀器名稱 : Acoustical Calibrator  
Manufacturer / 製造商 : Brüel & Kjær  
Model No. / 型號 : 4231  
Serial No. / 編號 : 3003246  
Supplied By / 委託者 : Atkins China Limited  
13/F., Wharf T&T Centre, Harbour City,  
Tsim Sha Tsui, Kowloon, Hong Kong

## 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 : 16 May 2016

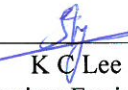
## TEST RESULTS / 測試結果

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

Tested By :   
測試 : H T Wong  
Technical Officer

Certified By :   
核證 : K C Lee  
Project Engineer

Date of Issue : 16 May 2016  
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. : C162569

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	PA160023
TST150A	Measuring Amplifier	C161175

- 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. : C163909  
證書編號

ITEM TESTED / 送檢項目 ( Job No. / 序引編號 : IC16-1579 )

Date of Receipt / 收件日期 : 13 July 2016

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  
13/F., Wharf T&T Centre, Harbour City,  
Tsim Sha Tsui, Kowloon, Hong Kong

## 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 : 19 July 2016

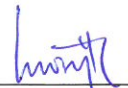
## TEST RESULTS / 測試結果

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).

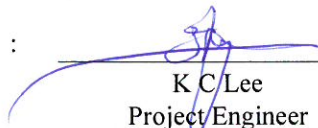
The test equipment used for calibration are traceable to National Standards via :

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

Tested By  
測試

  
H T Wong  
Technical Officer

Certified By  
核證

  
K C Lee  
Project Engineer

Date of Issue  
簽發日期

19 July 2016

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# Certificate of Calibration

## 校正證書

Certificate No. : C163909

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	C163709
CL281	Multifunction Acoustic Calibrator	PA160023
TST150A	Measuring Amplifier	C161175

- 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 :

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# Certificate of Calibration 校正證書

Certificate No. : C163910  
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC16-1579)

Date of Receipt / 收件日期 : 13 July 2016

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  
13/F., Wharf T&T Centre, Harbour City,  
Tsim Sha Tsui, Kowloon, Hong Kong

## 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

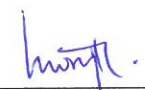
DATE OF TEST / 測試日期 : 19 July 2016


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

Tested By :   
測試 : \_\_\_\_\_  
H T Wong  
Technical Officer

Certified By :   
核證 : \_\_\_\_\_  
K C Lee  
Project Engineer

Date of Issue : 19 July 2016  
簽發日期

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# Certificate of Calibration

## 校正證書

Certificate No. : C163910  
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 :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C160077
CL281	Multifunction Acoustic Calibrator	PA160023

- Test procedure : MA101N.

- 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)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFP</sub>	A	F	94.00	1	94.1	± 1.1

- 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 <sub>AFP</sub>	A	F	94.00	1	94.1 (Ref.)
				104.00		104.1
				114.00		114.1

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)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFP</sub>	A	F	94.00	1	94.1	Ref.
	L <sub>ASP</sub>		S			94.2	± 0.3

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# Certificate of Calibration

## 校正證書

Certificate No. : C163910  
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)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>AFP</sub>	A	F	94.00	63 Hz	67.9	-26.2 ± 1.5
					125 Hz	77.9	-16.1 ± 1.5
					250 Hz	85.4	-8.6 ± 1.4
					500 Hz	90.8	-3.2 ± 1.4
					1 kHz	94.1	Ref.
					2 kHz	95.3	+1.2 ± 1.6
					4 kHz	95.1	+1.0 ± 1.6
					8 kHz	92.9	-1.1 (+2.1 ; -3.1)
					12.5 kHz	89.8	-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)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>CFP</sub>	C	F	94.00	63 Hz	93.3	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.5
					250 Hz	94.0	0.0 ± 1.4
					500 Hz	94.1	0.0 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	93.9	-0.2 ± 1.6
					4 kHz	93.2	-0.8 ± 1.6
					8 kHz	90.9	-3.0 (+2.1 ; -3.1)
					12.5 kHz	87.8	-6.2 (+3.0 ; -6.0)

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# Certificate of Calibration

## 校正證書

Certificate No. : C163910  
證書編號

Remarks : - UUT Microphone Model No. : 4188 & S/N : 2793199

- 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.

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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

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





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. : C156299

證書編號

**ITEM TESTED / 送檢項目** ( Job No. / 序引編號 : IC15-2523 )      Date of Receipt / 收件日期 : 6 November 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 : 2808432  
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      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** : 10 November 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
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By :   
測試 : \_\_\_\_\_  
H T Wong  
Technical Officer

Certified By :   
核證 : \_\_\_\_\_  
K C Lee  
Project Engineer

Date of Issue : 11 November 2015  
簽發日期

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# Certificate of Calibration

## 校正證書

Certificate No. : C156299

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 6.3.2.
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

- 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 <sub>AFF</sub>	A	F	94.00	1	95.2

- 6.1.1.2 After Self-calibration

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFF</sub>	A	F	94.00	1	94.1	± 1.1

- 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 <sub>AFF</sub>	A	F	94.00	1	94.1 (Ref.)
				104.00		104.1
				114.00		114.1

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

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# Certificate of Calibration

## 校正證書

Certificate No. : C156299

證書編號

### 6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFP</sub>	A	F	94.00	1	94.1	Ref.
	L <sub>ASP</sub>		S			94.1	± 0.3

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>AFP</sub>	A	F	94.00	63 Hz	68.0	-26.2 ± 1.5
					125 Hz	78.0	-16.1 ± 1.5
					250 Hz	85.4	-8.6 ± 1.4
					500 Hz	90.9	-3.2 ± 1.4
					1 kHz	94.1	Ref.
					2 kHz	95.3	+1.2 ± 1.6
					4 kHz	95.1	+1.0 ± 1.6
					8 kHz	92.9	-1.1 (+2.1 ; -3.1)
					12.5 kHz	89.8	-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)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>CFP</sub>	C	F	94.00	63 Hz	93.4	-0.8 ± 1.5
					125 Hz	94.0	-0.2 ± 1.5
					250 Hz	94.1	0.0 ± 1.4
					500 Hz	94.1	0.0 ± 1.4
					1 kHz	94.1	Ref.
					2 kHz	94.0	-0.2 ± 1.6
					4 kHz	93.3	-0.8 ± 1.6
					8 kHz	91.1	-3.0 (+2.1 ; -3.1)
					12.5 kHz	87.9	-6.2 (+3.0 ; -6.0)

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. : C156299  
證書編號

Remarks : - UUT Microphone Model No. : 4188 & S/N : 2929047

- 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 :

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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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E-mail/電郵: callab@suncreation.com

Website/網址: www.suncreation.com

ENVIROTECH SERVICES CO.

**High-Volume TSP Sampler**  
**5-Point Calibration Record**

Location : AMS5 (Ma Wan Chung Village)  
Calibrated by : K.F.Ho  
Date : 05/08/2016

**Sampler**

Model : TE-5170  
Serial Number : S/N3640

**Calibration Orifice and Standard Calibration Relationship**

Serial Number : 2454  
Service Date : 14 Mar 2016  
Slope (m) : 2.10326  
Intercept (b) : -0.06696  
Correlation Coefficient(r) : 0.99989

**Standard Condition**

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

**Calibration Condition**

Pa (hpa) : 1008  
Ta(K) : 301

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1   18 holes	11.0	3.292	1.597	56	55.58
2   13 holes	8.4	2.877	1.400	50	49.63
3   10 holes	6.6	2.550	1.244	45	44.66
4   7 holes	4.0	1.985	0.976	37	36.72
5   5 holes	2.7	1.631	0.807	31	30.77

**Sampler Calibration Relationship**

Slope(m):31.180 Intercept(b):5.910 Correlation Coefficient(r):0.9996

Checked by: Magnum Fan

Date: 05/08/2016

ENVIROTECH SERVICES CO.

**High-Volume TSP Sampler**  
**5-Point Calibration Record**

Location : AMS6(Dragonair Building)  
Calibrated by : P.F.Yeung  
Date : 13/07/2016

**Sampler**

Model : TE-5170  
Serial Number : S/N3639

**Calibration Orifice and Standard Calibration Relationship**

Serial Number : 2454  
Service Date : 14 Mar 2016  
Slope (m) : 2.10326  
Intercept (b) : -0.06696  
Correlation Coefficient(r) : 0.99989

**Standard Condition**

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

**Calibration Condition**

Pa (hpa) : 1005  
Ta(K) : 299

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1   18 holes	11.2	3.328	1.614	54	53.70
2   13 holes	9.0	2.983	1.450	48	47.73
3   10 holes	6.8	2.593	1.265	43	42.76
4   7 holes	4.4	2.086	1.024	35	34.80
5   5 holes	2.8	1.664	0.823	28	27.84

**Sampler Calibration Relationship**

Slope(m):32.180 Intercept(b): 1.621 Correlation Coefficient(r): 0.9992

Checked by: Magnum Fan

Date: 15/07/2016



ENVIROTECH SERVICES CO.

**High-Volume TSP Sampler**  
**5-Point Calibration Record**

Location : AMS6(Dragonair Building)  
Calibrated by : P.F.Yeung  
Date : 08/09/2016

**Sampler**

Model : TE-5170  
Serial Number : S/N3639

**Calibration Orifice and Standard Calibration Relationship**

Serial Number : 2454  
Service Date : 14 Mar 2016  
Slope (m) : 2.10326  
Intercept (b) : -0.06696  
Correlation Coefficient(r) : 0.99989

**Standard Condition**

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

**Calibration Condition**

Pa (hpa) : 1003  
Ta(K) : 304

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1 18 holes	11.3	3.312	1.606	52	51.23
2 13 holes	9.0	2.956	1.437	47	46.30
3 10 holes	6.5	2.512	1.226	41	40.39
4 7 holes	4.2	2.019	0.992	35	34.48
5 5 holes	2.7	1.619	0.802	29	28.57

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): 27.774 Intercept(b): 6.517

Correlation Coefficient(r): 0.9996

Checked by: Magnum Fan

Date: 15/09/2016



TISCH ENVIRONMENTAL, INC.  
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 VILLAGE OF CLEVELAND, OH  
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 513.467.9000  
 877.263.7610 TOLL FREE  
 513.467.9009 FAX

ORIFICE TRANSFER STANDARD CERTIFICATION WORKSHEET TE-5025A

Date - Mar 14, 2016 Rootsmeter S/N 0438320 Ta (K) - 295  
 Operator Tisch Orifice I.D. - 2454 Pa (mm) - 745.49

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	1.4020	3.2	2.00
2	NA	NA	1.00	1.0060	6.4	4.00
3	NA	NA	1.00	0.9010	7.9	5.00
4	NA	NA	1.00	0.8590	8.8	5.50
5	NA	NA	1.00	0.7090	12.8	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
0.9866	0.7037	1.4078	0.9957	0.7102	0.8896
0.9824	0.9765	1.9909	0.9914	0.9855	1.2581
0.9803	1.0880	2.2259	0.9893	1.0980	1.4066
0.9792	1.1399	2.3345	0.9882	1.1504	1.4753
0.9738	1.3735	2.8155	0.9828	1.3862	1.7792
Qstd slope (m) = 2.10326			Qa slope (m) = 1.31703		
intercept (b) = -0.06696			intercept (b) = -0.04232		
coefficient (r) = 0.99989			coefficient (r) = 0.99989		
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}

## 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

### Standard Equipment

Equipment : MFC High Volume Air Sampler  
 Venue : Tung Chung Pier  
 Model No.: TE-5170 Total Suspended Particulate  
 Serial No.: S/N3641

### Calibration Result

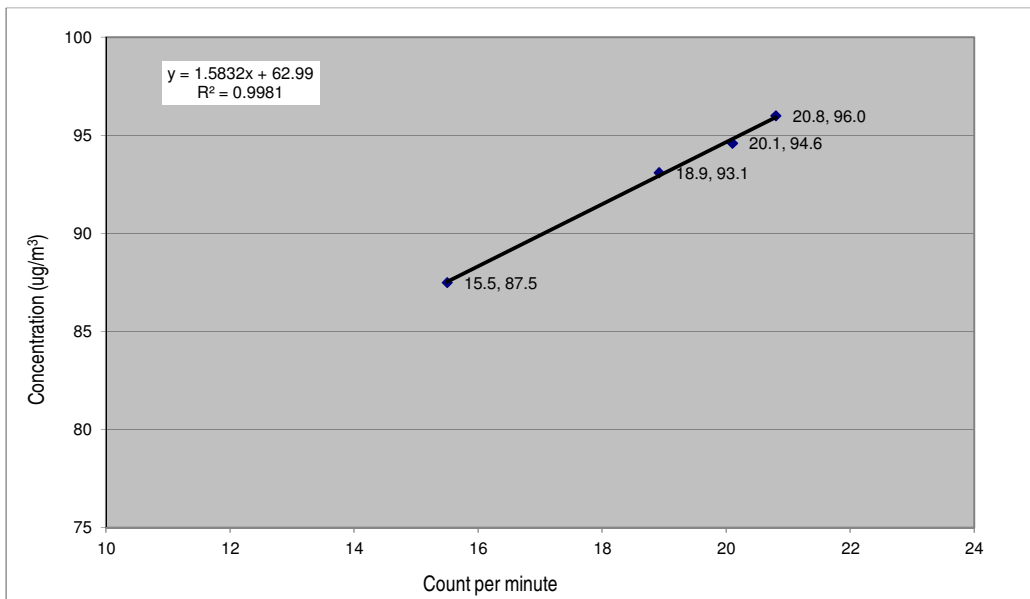
Sensitivity Adjustment Scale Setting (Before Calibration) : 799 CPM  
 Sensitivity Adjustment Scale Setting (After Calibration) : 799 CPM

Hour	Date (dd-mmm-yy)	Time		Ambient Condition		Concentration (ug/m <sup>3</sup> ) Y-axis	Total Count	Count/Minute X-axis
				Temp (°C)	R.H. (%)			
1	25-Nov-15	14:20	15:20	23.6	68%	87.5	930	15.5
2	25-Nov-15	15:34	16:34	24.8	60%	93.1	1135	18.9
3	25-Nov-15	16:50	17:50	23.8	60%	96.0	1248	20.8
4	25-Nov-15	18:00	19:00	23.5	50%	94.6	1206	20.1

Be Linear Regression of Y or X

Slope (K-factor): 1.5832  
 Correlation coefficient : 0.9981

Remark: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



Recorded by: Ray Cheng

Signature: 

Date: 30/11/2015

Checked by: Keith Chau

Signature: 

Date: 30/11/2015





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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:** HK1630169  
**SUB-BATCH:** 0  
**LABORATORY:** HONG KONG  
**DATE RECEIVED:** 26/07/2016  
**DATE OF ISSUE:** 27/07/2016

### 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, Salinity, pH, Turbidity and Temperature  
Description: Multifunctional Meter  
Brand Name: YSI  
Model No.: 6820 V2  
Serial No.: 12A101545  
Equipment No.: W.026.35  
Date of Calibration: 26 July, 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:** HK1630169  
**Sub-batch:** 0  
**Client:** AECOM ASIA COMPANY LIMITED  
**Date of Issue:** 27/07/2016



**Description:** Multifunctional Meter  
**Brand Name:** YSI  
**Model No.:** 6820 V2  
**Serial No.:** 12A101545  
**Equipment No.:** W.026.35  
**Date of Calibration:** 26 July, 2016

**Date of next Calibration:** 26 October, 2016

**Parameters:**

**Conductivity**

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

Expected Reading (uS/cm)	Displayed Reading (uS/cm)	Tolerance (%)
146.9	144.7	-1.5
6667	6630	-0.6
12890	12820	-0.5
58670	58660	-0.0
Tolerance Limit (%)		±10.0

**Dissolved Oxygen**

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
3.41	3.40	-0.01
5.52	5.56	+0.04
7.78	7.81	+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)
11.0	10.96	-0.0
22.0	22.04	+0.0
37.5	37.42	-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:** HK1630169  
**Sub-Batch:** 0  
**Client:** AECOM ASIA COMPANY LIMITED  
**Date of Issue:** 27/07/2016



**Description:** Multifunctional Meter  
**Brand Name:** YSI  
**Model No.:** 6820 V2  
**Serial No.:** 12A101545  
**Equipment No.:** W.026.35  
**Date of Calibration:** 26 July, 2016

**Date of next Calibration:** 26 October, 2016

**Parameters:**

**Salinity**

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

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)
0	0.00	--
10	10.3	+3.0
20	19.97	-0.2
30	29.87	-0.4
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	10.3	+3.0
20	19.7	-1.5
50	49.6	-0.8
100	100.5	+0.5
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	3.99	-0.01
7.0	7.03	+0.03
10.0	10.04	+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.

  
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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:** HK1630168  
**SUB-BATCH:** 0  
**LABORATORY:** HONG KONG  
**DATE RECEIVED:** 26/07/2016  
**DATE OF ISSUE:** 28/07/2016

### 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: pH, Turbidity, Dissolved Oxygen, Conductivity, Salinity, and Temperature  
Description: Sonde Environmental Monitoring System  
Brand Name: YSI  
Model No.: 6820 V2  
Serial No.: 12D100972  
Equipment No.: W.026.36  
Date of Calibration: 26 July, 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:** HK1630168  
**Sub-batch:** 0  
**Client:** AECOM ASIA COMPANY LIMITED  
**Date of Issue:** 28/07/216



**Description:** Sonde Environmental Monitoring System  
**Brand Name:** YSI  
**Model No.:** 6820 V2  
**Serial No.:** 12D100972  
**Equipment No.:** W.026.36  
**Date of Calibration:** 26 July, 2016

**Date of next Calibration:** 26 October, 2016

**Parameters:**

**Conductivity**

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

Expected Reading (uS/cm)	Displayed Reading (uS/cm )	Tolerance (%)
146.9	147.0	+0.1
6667	6680	+0.2
12890	12830	-0.5
58670	58700	+0.1
	Tolerance Limit (%)	±10.0

**Dissolved Oxygen**

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
3.41	3.42	+0.01
5.52	5.55	+0.03
7.78	7.76	-0.02
	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)
11.0	11.01	+0.0
22.0	22.09	+0.1
37.5	37.44	-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: HK1630168  
 Sub-Batch: 0  
 Client: AECOM ASIA COMPANY LIMITED  
 Date of Issue: 28/07/216



Description: Sonde Environmental Monitoring System  
 Brand Name: YSI  
 Model No.: 6820 V2  
 Serial No.: 12D100972  
 Equipment No.: W.026.36  
 Date of Calibration: 26 July, 2016

Date of next Calibration: 26 October, 2016

## Parameters:

### Salinity

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

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)
0	0.00	--
10	10.02	+0.2
20	19.98	-0.1
30	29.94	-0.2
Tolerance Limit (%)		±10.0

### Turbidity

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

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.0	--
4	4.2	+5.0
10	10.2	+2.0
20	20.3	+1.5
50	49.5	-1.0
100	100.4	+0.4
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	7.02	+0.02
10.0	10.02	+0.02
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