



輝創工程有限公司

Sun Creation Engineering Limited

Calibration & Testing Laboratory

Certificate of Calibration

校正證書

Certificate No. : C231907

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC23-0587)

Date of Receipt / 收件日期 : 20 March 2023

Description / 儀器名稱 : Integrating Sound Level Meter
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 2238
Serial No. / 編號 : 2684503
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 : $(50 \pm 25)\%$

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 1 April 2023


TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed specified limits.
These limits refer to manufacturer's published tolerances as requested by the customer.
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

Tested By
測試

: 
K C Lee
Engineer

Certified By
核證

: 
K K Wong
Engineer

Date of Issue
簽發日期

6 April 2023

The test equipment used for calibration is traceable to the National 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室書面批准。

Sun Creation Engineering Limited – Calibration & Testing Laboratory

c/o 4/F, 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四樓

Tel/電話: (852) 2927 2606 Fax/傳真: (852) 2744 8986

E-mail/電郵: callab@suncreation.com

Website/網址: www.suncreation.com

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- 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 Sound 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	C230306
CL281	Multifunction Acoustic Calibrator	AV210017

- Test procedure : MA101N.

- Results :

- Sound Pressure Level :

- Reference Sound Pressure Level

UUT Setting				Applied Value		UUT	IEC 61672 Class 1
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	Reading (dB)	Limit (dB)
50 - 130	L _{AFP}	A	F	94.00	1	94.1	± 1.1

- Linearity

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

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

- Time Weighting

UUT Setting				Applied Value		UUT	IEC 61672 Class 1
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	Reading (dB)	Limit (dB)
50 - 130	L _{AFP}	A	F	94.00	1	94.1	Ref.
	L _{ASP}		S			94.1	± 0.3

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6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Limit (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L _{AFP}	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 Limit (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L _{CFP}	C	F	94.00	63 Hz	93.3	-0.8 ± 1.5
					125 Hz	93.9	-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	93.9	-0.2 ± 1.6
					4 kHz	93.2	-0.8 ± 1.6
					8 kHz	91.0	-3.0 (+2.1 ; -3.1)
					12.5 kHz	87.9	-6.2 (+3.0 ; -6.0)

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Certificate of Calibration

校正證書

Certificate No. : C231907

證書編號

Remarks : - UUT Microphone Model No. : 4188 & S/N : 2682524

- Mfr's Limit : 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 :

Only the original copy or the laboratory's certified true copy is valid.

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. : C231906

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC23-0587)

Date of Receipt / 收件日期 : 20 March 2023

Description / 儀器名稱 : Sound 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 : $(23 \pm 2)^{\circ}\text{C}$

Relative Humidity / 相對濕度 : $(50 \pm 25)\%$

Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 1 April 2023

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.

The results do not exceed specified limits.

These limits refer to manufacturer's published tolerances as requested by the customer.

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

Tested By
測試

:

K C Lee
Engineer

Certified By
核證

:

K K Wong
Engineer

Date of Issue
簽發日期

:

6 April 2023

The test equipment used for calibration is traceable to the National 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. : C231906

證書編號

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

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL130	Universal Counter	C223647
CL281	Multifunction Acoustic Calibrator	AV210017
TST150A	Measuring Amplifier	C221750

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Limit (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.1	± 0.2	± 0.2
114 dB, 1 kHz	114.1		

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Limit	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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Calibration Certificate

Certificate No. **300621**

Page 1 of 3 Pages

Customer : Enovative Environmental Service Limited

Address : Room 23, 6/F, Block C, Goldfield Industrial Centre, 1 Siu Wo Road, Shatin, N.T.

Order No. : Q30275

Date of receipt : 30-Jan-23

Item Tested

Description : Sound Level Meter

Manufacturer : RION

Model : NL-52

I.D. : N15-RION-008

Serial No. : 01143485

Test Conditions

Date of Test : 10-Feb-23

Ambient Temperature : $(23 \pm 3)^{\circ}\text{C}$

Supply Voltage : --

Relative Humidity : $(50 \pm 25) \%$

Test Specifications

Calibration check.

The UUT has an indication that it conforms to IEC 61672-1:2013 Class 1

Ref. Document/Procedure: Z01, IEC 61672-1:2013.

Test Results

The results are shown in the attached page(s).

Main Test equipment used:

Equipment No. Description

S240 Sound Level Calibrator

S017 Multi-Function Generator

Cert. No.

203900

C211339

Traceable to

NIM-PRC & SCL-HKSAR

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), or by reference to a natural constant.
The test results apply to the above Unit-Under-Test only

Calibrated by : 

Elva Chong

Approved by : 

Kin Wong

Date: 10-Feb-23

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

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Calibration Certificate

Certificate No. 300621

Page 2 of 3 Pages

Results :

Acoustical signal test

1. Indication at the Calibration Check Frequency (1kHz)

UUT Setting		Applied Value (dB)	UUT Reading (dB)
Weight.	Response		After Adjust.*
A	F	94.0	93.9
	S		93.9
C	F		93.9
Z			93.9

*Adjustment using the customer's sound calibrator was performed immediately before test.

Tolerance : ± 1.0 dB

Uncertainty : ± 0.1 dB

2. Self-generated noise (Microphone Installed, most sensitive range) : 17.1 dBA

Electrical signal tests

3. Frequency weightings (A ,F)

Frequency	Attenuation (dB)	IEC 61672-1 Class 1 Spec.
31.5 Hz	-39.5	- 39.4 dB, ± 1.5 dB
63 Hz	-26.2	- 26.2 dB, ± 1.0 dB
125 Hz	-16.1	- 16.1 dB, ± 1.0 dB
250 Hz	-8.6	- 8.6 dB, ± 1.0 dB
500 Hz	-3.2	- 3.2 dB, ± 1.0 dB
1 kHz	0.0 (Ref)	0 dB, ± 0.7 dB
2 kHz	+1.2	+ 1.2 dB, ± 1.0 dB
4 kHz	+1.3	+ 1.0 dB, ± 1.0 dB
8 kHz	+1.0	- 1.1 dB, + 1.5 dB ~ -2.5 dB
16 kHz	-2.5	- 6.6 dB, + 2.5 dB ~ - 16.0 dB

Uncertainty : ± 0.1 dB



Calibration Certificate

Certificate No. 300621

Page 3 of 3 Pages

4. Frequency & Time weightings

4.1 Frequency Weighting (1kHz)

UUT Setting		Anticipated Value (dB)	UUT Reading (dB)	IEC 61672-1 Class 1 Spec.
Time Weight.	Freq. Weight.			
F	A	94.0	94.0 (Ref.)	--
	C		94.0	± 0.2 dB
	Z		94.0	

Uncertainty : ± 0.1 dB

4.2 Time Weighting (1kHz)

UUT Setting		Anticipated Value (dB)	UUT Reading (dB)	IEC 61672-1 Class 1 Spec.
Time Weight.	Freq. Weight.			
F	A	94.0	94.0 (Ref.)	--
S			94.0	± 0.1 dB
eq			94.0	

Uncertainty : ± 0.1 dB

5. Level Linearity on the Reference Level Range (8 kHz, A, F)

Anticipated Value (dB)	UUT Reading (dB)	IEC 61672-1 Class 1 Spec.
124.0	123.9	± 0.8 dB
114.0	114.0	
104.0	104.0	
94.0	94.0 (Ref.)	
84.0	84.0	
74.0	74.0	
64.0	64.0	
54.0	54.0	
44.0	44.1	

Uncertainty : ± 0.1 dB

6. Level Linearity including the level range control (1 kHz, A, F)

N.A. (UUT is single range)

Remarks : 1. UUT : Unit-Under-Test

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

3. Atmospheric Pressure: 1 006 hPa.

4. Microphone model: UC-59, S/N: 04030.

5. Preamplifier model: NH-25, S/N: 21113.

----- END -----



Calibration Certificate

Certificate No. **300623**

Page 1 of 2 Pages

Customer : Enovative Environmental Service Limited

Address : Room 23, 6/F, Block C, Goldfield Industrial Centre, 1 Siu Wo Road, Shatin, N.T.

Order No. : Q30275

Date of receipt : 30-Jan-23

Item Tested

Description : Sound Calibrator

Manufacturer : RION

Model : NC-74

I.D. : --

Serial No. : 34857296

Test Conditions

Date of Test : 10-Feb-23

Supply Voltage : --

Ambient Temperature : $(23 \pm 3)^{\circ}\text{C}$

Relative Humidity : $(50 \pm 25) \%$

Test Specifications

Calibration check.

The UUT has an indication that it conforms to IEC 60942:2003 Class 1.

Ref. Document/Procedure : F21, Z02, IEC 60942:2003.

Test Results

All results were within the IEC 60942 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>
S014	Spectrum Analyzer	206538	NIM-PRC & SCL-HKSAR
S240	Sound Level Calibrator	203900	NIM-PRC & SCL-HKSAR
S041	Universal Counter	201782	SCL-HKSAR
S206	Sound Level Meter	203311	SCL-HKSAR

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Calibrated by : 

Elva Chong

Approved by : 

Kin Wong

Date: 10-Feb-23

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Page 2 of 2 Pages

Results :

1. Generated Sound Pressure Level

UUT Nominal Value (dB)	Measured Value (dB)	IEC 60942 Class 1 Spec.
94.0	94.0	± 0.4 dB

Uncertainty : ± 0.2 dB

2. Short-term Level Fluctuation : 0.0 dB

IEC 60942 Class 1 Spec. : ± 0.1 dB

Uncertainty : ± 0.05 dB

3. Frequency

UUT Nominal Value (kHz)	Measured Value (kHz)	IEC 60942 Class 1 Spec.
1	1.002	± 1 %

Uncertainty : $\pm 3.6 \times 10^{-6}$

4. Total Distortion + Noise : < 1.3 %

IEC 60942 Class 1 Spec. : < 3.0 %

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 : 1 006 hPa.

----- END -----

ENVIROTECH SERVICES CO.

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS5(Ma Wan Chung Village)
Calibrated by : P.F.Yeung
Date : 18/10/2023

Sampler

Model : TE-5170
Serial Number : S/N3640

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
Service Date : 15 December 2022
Slope (m) : 2.06918
Intercept (b) : -0.04220
Correlation Coefficient(r) : 0.99997

Standard Condition

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

Calibration Condition

Pa (hpa) : 1015
Ta(K) : 299

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	11.8	2.973	1.457	60	59.97
2	13 holes	9.0	2.596	1.275	54	53.97
3	10 holes	6.6	2.223	1.095	48	47.97
4	7 holes	4.4	1.815	0.898	41	40.98
5	5 holes	2.7	1.422	0.708	33	32.98

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

Sampler Calibration Relationship

Slope(m): 35.709 Intercept(b): 8.375 Correlation Coefficient(r): 0.9987

Checked by: Magnum Fan

Date: 18/10/2023



RECALIBRATION

DUE DATE:

December 15, 2023

Certificate of Calibration

Calibration Certification Information

Cal. Date: December 15, 2022 Roots-meter S/N: 438320 Ta: 295 °K
Operator: Jim Tisch Pa: 742.4 mm Hg
Calibration Model #: TE-5025A Calibrator S/N: **2454**

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4060	3.2	2.00
2	3	4	1	0.9980	6.4	4.00
3	5	6	1	0.8900	7.9	5.00
4	7	8	1	0.8520	8.8	5.50
5	9	10	1	0.7040	12.7	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
0.9826	0.6988	1.4049	0.9957	0.7082	0.8914
0.9783	0.9803	1.9868	0.9914	0.9934	1.2607
0.9763	1.0970	2.2213	0.9894	1.1116	1.4095
0.9751	1.1445	2.3297	0.9881	1.1598	1.4783
0.9700	1.3778	2.8097	0.9829	1.3962	1.7829
QSTD	m=	2.06918	QA	m=	1.29568
	b=	-0.04220		b=	-0.02677
	r=	0.99997		r=	0.99997

Calculations

Vstd=	$\Delta Vol / ((Pa - \Delta P) / Pstd) (Tstd / Ta)$	Va=	$\Delta Vol / ((Pa - \Delta P) / Pa)$
Qstd=	Vstd / ΔTime	Qa=	Va / ΔTime
For subsequent flow rate calculations:			
Qstd=	$1/m \left(\left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} \right) - b \right)$	Qa=	$1/m \left(\left(\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)} \right) - b \right)$

Standard Conditions

Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH: calibrator manometer reading (in H2O)	
ΔP: roots-meter manometer reading (mm Hg)	
Ta: actual absolute temperature (°K)	
Pa: actual barometric pressure (mm Hg)	
b: intercept	
m: slope	

RECALIBRATION

US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30

ENVIROTECH SERVICES CO.

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS5(Ma Wan Chung Village)
Calibrated by : P.F.Yeung
Date : 18/12/2023

Sampler

Model : TE-5170
Serial Number : S/N3640

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
Next Calibration Date : 15 December 2024
Slope (m) : 2.07544
Intercept (b) : -0.03205
Correlation Coefficient(r) : 0.99999

Standard Condition

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

Calibration Condition

Pa (hpa) : 1025
Ta(K) : 291

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	11.4	3.437	1.672	58	59.05
2	13 holes	9.0	3.054	1.487	52	52.94
3	10 holes	6.5	2.596	1.266	45	45.81
4	7 holes	4.5	2.160	1.056	38	38.69
5	5 holes	2.8	1.704	0.836	30	30.54

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

Sampler Calibration Relationship

Slope(m): 33.920 Intercept(b): 2.552 Correlation Coefficient(r): 0.9996

Checked by: Magnum Fan

Date: 19/12/2023



Certificate of Calibration

Calibration Certification Information

Cal. Date: December 15, 2023 Rootsmeter S/N: 438320 Ta: 295 °K
Operator: Jim Tisch Pa: 748.5 mm Hg
Calibration Model #: TE-5025A Calibrator S/N: **2454**

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4250	3.2	2.00
2	3	4	1	1.0090	6.4	4.00
3	5	6	1	0.9040	7.9	5.00
4	7	8	1	0.8610	8.8	5.50
5	9	10	1	0.7110	12.8	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
0.9907	0.6952	1.4106	0.9957	0.6988	0.8878
0.9864	0.9776	1.9949	0.9914	0.9826	1.2556
0.9844	1.0890	2.2304	0.9894	1.0945	1.4037
0.9832	1.1420	2.3393	0.9882	1.1478	1.4723
0.9779	1.3754	2.8213	0.9829	1.3824	1.7756
QSTD	m=	2.07544	QA	m=	1.29961
	b=	-0.03205		b=	-0.02017
	r=	0.99999		r=	0.99999

Calculations

Vstd=	$\Delta Vol((Pa-\Delta P)/Pstd)(Tstd/Ta)$	Va=	$\Delta Vol((Pa-\Delta P)/Pa)$
Qstd=	Vstd/ΔTime	Qa=	Va/ΔTime
For subsequent flow rate calculations:			
Qstd= $1/m \left(\left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} \right) - b \right)$		Qa= $1/m \left(\left(\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)} \right) - b \right)$	

Standard Conditions

Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH: calibrator manometer reading (in H2O)	
ΔP: rootsmeter manometer reading (mm Hg)	
Ta: actual absolute temperature (°K)	
Pa: actual barometric pressure (mm Hg)	
b: intercept	
m: slope	

RECALIBRATION

US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30

EQUIPMENT CALIBRATION RECORD

Type :	Laser Dust Monitor
Manufacturer / Brand :	SIBATA
Model No.:	LD-5R
Equipment No.:	LD-5R-002
Serial No.:	861988
Sensitivity Adjustment Scale Setting :	621 CPM

Standard Equipment

Equipment :	MFC High Volume Air Sampler
Venue :	Tung Chung Pier
Model No.:	TE-5170 Total Suspended Particulate
Serial No.:	S/N3641
Previous Calibration Date:	24-Apr-2023

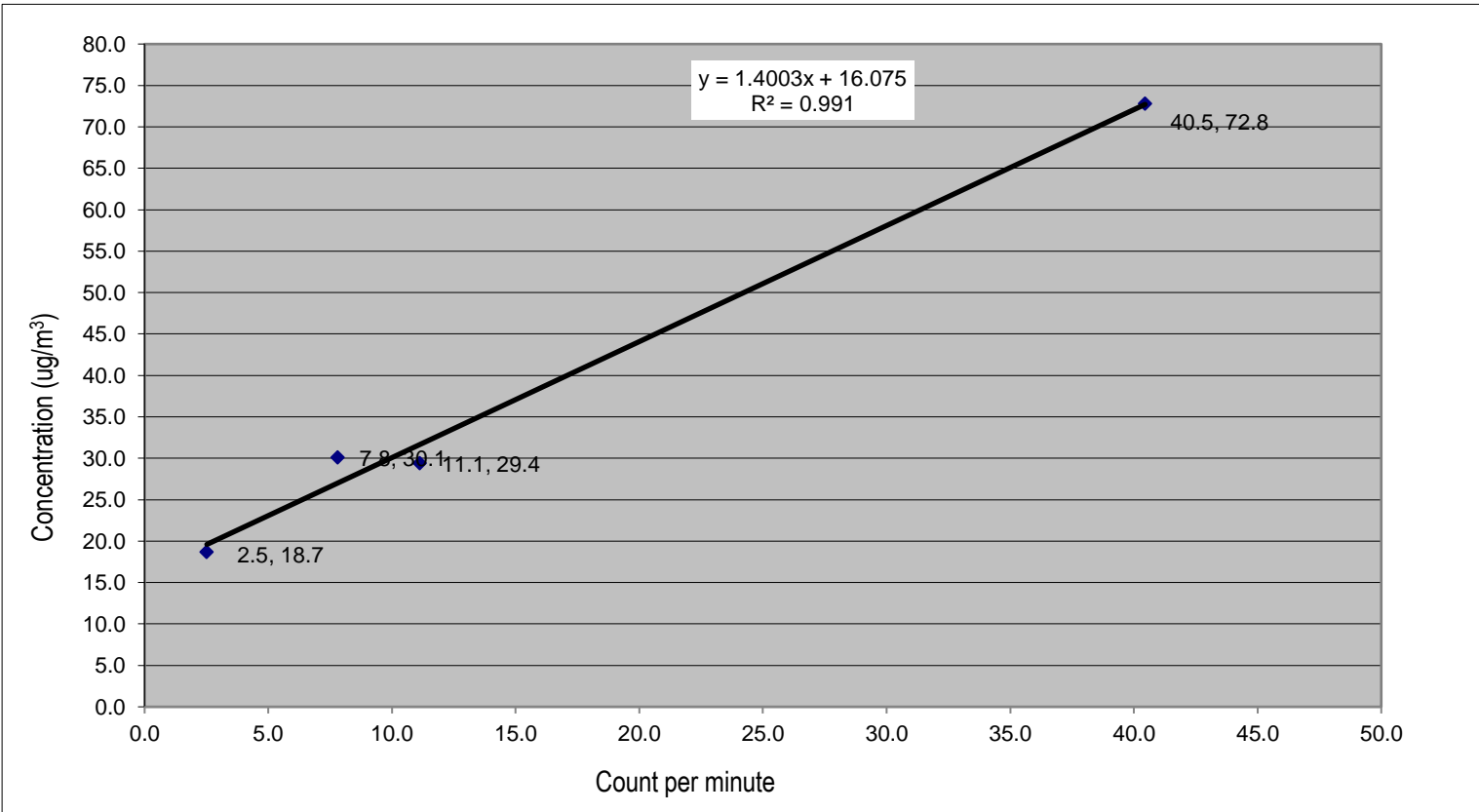
Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration) :	621 CPM
Sensitivity Adjustment Scale Setting (After Calibration) :	621 CPM

Date (dd-mmm-yy)	Time		Ambient Condition		Concentration (ug/m ³) Y-axis	Total Count	Count/Minute X-axis
			Temp (°C)	R.H. (%)			
10-May-23	9:25	11:25	31.4	68%	72.8	2427	40.5
16-May-23	9:00	11:00	25.2	87%	29.4	668	11.1
16-May-23	14:30	15:30	25.2	87%	30.1	469	7.8
16-May-23	15:35	16:35	25.2	87%	18.7	151	2.5

Be Linear Regression of Y or X
Slope (K-factor): 1.4003 Intercept,b: 16.0750
Correlation coefficient (R): 0.99550

Remark: Strong Correlation (R>0.8)



Recorded by: Irene Tsang

Signature:

Date: 01-Jun-23

Checked by: Ruby Law

Signature:

Date: 01-Jun-23



REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT: MR W S CHAN
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: HK2335176
SUB-BATCH: 0
LABORATORY: HONG KONG
DATE RECEIVED: 05-Sep-2023
DATE OF ISSUE: 11-Sep-2023

SPECIFIC COMMENTS

Equipment information (Brand name, Model No., Serial No. and Equipment No.) is provided by client. 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 laboratory or quoted from relevant international standards.

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

The validity of equipment/ meter performance only applies to the result(s) stated in the report.

Equipment Type: Multifunctional Meter
Service Nature: Performance Check
Scope: Conductivity, Dissolved Oxygen, pH Value, Turbidity, Salinity and Temperature
Brand Name/ Model No.: [YSI]/ [ProDSS]
Serial No./ Equipment No.: [22J104777/22H104506]/ [W.026.37]
Date of Calibration: 05-September-2023

GENERAL COMMENTS

This report superseded any previous report(s) with same work order number.

Mr Chan Siu Ming, Vico
Assistant Laboratory Manager
Environmental

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK2335176
SUB-BATCH: 0
DATE OF ISSUE: 11-Sep-2023
CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
Brand Name/ Model No.: [YSI]/ [ProDSS]
Serial No./ Equipment No.: [22J104777/22H104506]/ [W.026.37]
Date of Calibration: 05-September-2023 Date of Next Calibration: 05-December-2023

PARAMETERS:

Conductivity

Method Ref: APHA (23rd edition), 2510B

Expected Reading ($\mu\text{S}/\text{cm}$)	Displayed Reading ($\mu\text{S}/\text{cm}$)	Tolerance (%)
146.9	152.9	+4.1
6667	6524	-2.1
12890	12626	-2.0
58670	54061	-7.9
	Tolerance Limit (%)	± 10.0

Dissolved Oxygen

Method Ref: APHA (23rd edition), 4500O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
1.95	1.89	-0.06
3.95	4.02	+0.07
6.84	6.80	-0.04
	Tolerance Limit (mg/L)	± 0.20

pH Value

Method Ref: APHA (23rd edition), 4500H: B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	4.06	+0.06
7.0	7.10	+0.10
10.0	10.01	+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 Chan Siu Ming, Vico
Assistant Laboratory Manager
Environmental

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK2335176
SUB-BATCH: 0
DATE OF ISSUE: 11-Sep-2023
CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
Brand Name/ Model No.: [YSI]/ [ProDSS]
Serial No./ Equipment No.: [22J104777/22H104506]/ [W.026.37]
Date of Calibration: 05-September-2023 Date of Next Calibration: 05-December-2023

PARAMETERS:

Turbidity

Method Ref: APHA (23rd edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	-0.07	--
4	4.08	+2.0
10	9.91	-0.9
20	19.02	-4.9
50	48.20	-3.6
100	96.31	-3.7
Tolerance Limit (%)		±10.0

Salinity

Method Ref: APHA (23rd edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	--
10	9.78	-2.2
20	19.65	-1.8
30	29.39	-2.0
Tolerance Limit (%)		±10.0

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

Mr Chan Siu Ming, Vico
Assistant Laboratory Manager
Environmental

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK2335176
SUB-BATCH: 0
DATE OF ISSUE: 11-Sep-2023
CLIENT: AECOM ASIA COMPANY LIMITED


Equipment Type: Multifunctional Meter
Brand Name/ Model No.: [YSI]/ [ProDSS]
Serial No./ Equipment No.: [22J104777/22H104506]/ [W.026.37]
Date of Calibration: 05-September-2023 Date of Next Calibration: 05-December-2023

PARAMETERS:

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)
10.0	9.9	-0.1
20.5	19.8	-0.7
40.0	40.3	+0.3
	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 Chan Siu Ming, Vico
Assistant Laboratory Manager
Environmental



REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT: MR WS CHAN
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: HK2343329
SUB-BATCH: 0
LABORATORY: HONG KONG
DATE RECEIVED: 31-Oct-2023
DATE OF ISSUE: 02-Nov-2023

GENERAL 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 laboratory or quoted from relevant international standards.

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

The validity of equipment/ meter performance only applies to the result(s) stated in the report.

This report superseded any previous report(s) with same work order number.

EQUIPMENT INFORMATION

Equipment information (Brand name, Model No., Serial No. and Equipment No.) is provided by client.

Equipment Type: Multifunctional Meter

Service Nature: Performance Check

Scope: Conductivity, Dissolved Oxygen, pH Value, Turbidity, Salinity and Temperature

Brand Name/ Model No.: [YSI]/ [6820 V2]

Serial No./ Equipment No.: [00H1019]/ [W.026.09]

Date of Calibration: 31-October-2023

Mr Chan Siu Ming, Vico
Assistant Laboratory Manager
Environmental

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK2343329
SUB-BATCH: 0
DATE OF ISSUE: 02-Nov-2023
CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
Brand Name/ Model No.: [YSI]/ [6820 V2]
Serial No./ Equipment No.: [00H1019]/ [W.026.09]
Date of Calibration: 31-October-2023

Date of Next Calibration: 31-January-2024

PARAMETERS:

Conductivity

Method Ref: APHA (23rd edition), 2510B

Expected Reading ($\mu\text{S}/\text{cm}$)	Displayed Reading ($\mu\text{S}/\text{cm}$)	Tolerance (%)
146.9	143	-2.7
6667	6860	+2.9
12890	13362	+3.7
58670	60239	+2.7
	Tolerance Limit (%)	± 10.0

Dissolved Oxygen

Method Ref: APHA (23rd edition), 4500O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.20	2.16	-0.04
5.65	5.71	+0.06
7.80	7.86	+0.06
	Tolerance Limit (mg/L)	± 0.20

pH Value

Method Ref: APHA (23rd edition), 4500H: B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	4.00	+0.00
7.0	6.96	-0.04
10.0	10.01	+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 Chan Siu Ming, Vico
Assistant Laboratory Manager
Environmental

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK2343329
SUB-BATCH: 0
DATE OF ISSUE: 02-Nov-2023
CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
Brand Name/ Model No.: [YSI]/ [6820 V2]
Serial No./ Equipment No.: [00H1019]/ [W.026.09]
Date of Calibration: 31-October-2023 Date of Next Calibration: 31-January-2024

PARAMETERS:

Turbidity

Method Ref: APHA (23rd edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.2	--
4	4.0	+0.0
10	9.3	-7.0
20	18.8	-6.0
50	47.0	-6.0
100	95.7	-4.3
Tolerance Limit (%)		±10.0

Salinity

Method Ref: APHA (23rd edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.02	--
10	10.25	+2.5
20	20.35	+1.8
30	30.04	+0.1
Tolerance Limit (%)		±10.0

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

Mr Chan Siu Ming, Vico
Assistant Laboratory Manager
Environmental

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK2343329
SUB-BATCH: 0
DATE OF ISSUE: 02-Nov-2023
CLIENT: AECOM ASIA COMPANY LIMITED


Equipment Type: Multifunctional Meter
Brand Name/ Model No.: [YSI]/ [6820 V2]
Serial No./ Equipment No.: [00H1019]/ [W.026.09]
Date of Calibration: 31-October-2023 Date of Next Calibration: 31-January-2024

PARAMETERS:

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)
10.5	10.99	+0.5
19.5	19.96	+0.5
39.5	39.71	+0.2
	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 Chan Siu Ming, Vico
Assistant Laboratory Manager
Environmental