



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. : C143157

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC14-1278) Date of Receipt / 收件日期 : 15 May 2014

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

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 : 24 May 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).

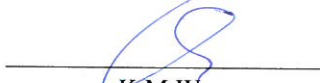
The test equipment used for calibration are traceable to National Standards via :

- 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 :
簽發日期

28 May 2014

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

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

Sun Creation Engineering Limited – Calibration & Testing Laboratory

c/o 4/F, Tsing Shan Wan Exchange Building, I 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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Page 1 of 2

Certificate of Calibration

校正證書

Certificate No. : C143157
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- 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	C133632
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. : C135382
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-2172)

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 ± 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 : 26 August 2013

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

Certified By : 
核證 : K M Wu

Date of Issue : 28 August 2013
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. : C135382

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 laboratory acoustic calibrator was performed before the test from 6.1.1.2 to 6.4.
- 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	C130019
CL281	Multifunction Acoustic Calibrator	DC130171

- Test procedure : MA101N.

- 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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輝創工程有限公司 – 校正及檢測實驗室

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Certificate of Calibration

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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			94.2	± 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	85.4	-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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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	1/10	110.0	100	99.9	± 0.5
			60 sec.					90	90.0	± 0.5
			5 min.					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 :

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ENVIROTECH SERVICES CO.

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS5(Ma Wan Chung Village)
Calibrated by : K.F.Ho
Date : 10/06/2014

Sampler

Model : TE-5170
Serial Number : S/N3640

Calibration Office and Standard Calibration Relationship

Serial Number : 2454
Service Date : 24 Mar 2014
Slope (m) : 2.07593
Intercept (b) : -0.00102
Correlation Coefficient(r) : 0.99996

Standard Condition

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

Calibration Condition

Pa (hpa) : 1002
Ta(K) : 302

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1 18 holes	11.4	3.357	1.618	58	57.66
2 13 holes	8.4	2.881	1.389	55	54.68
3 10 holes	6.7	2.573	1.240	46	45.73
4 7 holes	4.5	2.109	1.016	38	37.78
5 5 holes	2.5	1.572	0.758	25	24.85

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): 45.185 Intercept(b): -8.761

Correlation Coefficient(r): 0.9990

Checked by: Magnum Fan

Date: 17/06/2014

ENVIROTECH SERVICES CO.

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS6(Dragonair Building)
 Calibrated by : K.F.Ho
 Date : 10/06/2014

Sampler

Model : TE-5170
 Serial Number : S/N3639

Calibration Office and Standard Calibration Relationship

Serial Number : 2454
 Service Date : 24 Mar 2014
 Slope (m) : 2.07593
 Intercept (b) : -0.00102
 Correlation Coefficient(r) : 0.99996

Standard Condition

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

Calibration Condition

Pa (hpa) : 1002
 Ta(K) : 302

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1 18 holes	12	3.422	1.649	57	56.31
2 13 holes	9.6	3.061	1.475	50	49.40
3 10 holes	7.5	2.706	1.304	44	43.47
4 7 holes	5.1	2.231	1.075	36	35.57
5 5 holes	2.9	1.682	0.811	27	26.67

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): 35.127 Intercept(b): -2.075

Correlation Coefficient(r): 0.9995

Checked by: Magnum Fan

Date: 17/06/2014



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, 2014 Rootsmeter S/N 0438320 Ta (K) - 293
 Operator Tisch Orifice I.D. - 2454 Pa (mm) - 758.19

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	1.4740	3.2	2.00
2	NA	NA	1.00	1.0340	6.4	4.00
3	NA	NA	1.00	0.9240	7.9	5.00
4	NA	NA	1.00	0.8820	8.8	5.50
5	NA	NA	1.00	0.7270	12.7	8.00

DATA TABULATION

Vstd	(x axis) Qstd	(y axis)	Va	(x axis) Qa	(y axis)
1.0103	0.6854	1.4245	0.9958	0.6755	0.8791
1.0061	0.9730	2.0146	0.9916	0.9590	1.2433
1.0040	1.0866	2.2524	0.9895	1.0709	1.3900
1.0028	1.1370	2.3623	0.9884	1.1206	1.4579
0.9976	1.3722	2.8491	0.9832	1.3524	1.7583
Qstd slope (m) = 2.07593			Qa slope (m) = 1.29991		
intercept (b) = -0.00102			intercept (b) = -0.00063		
coefficient (r) = 0.99996			coefficient (r) = 0.99996		
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
 Sensitivity Adjustment Scale Setting : 799 CPM

Operator: _____

Standard Equipment

Equipment : MFC High Volume Air Sampler
 Venue : The Arcade, Cyberport
 Model No.: TE-5170 Total Suspended Particulated
 Serial No.: 276018

Last Calibration Date N/A

Calibration Result

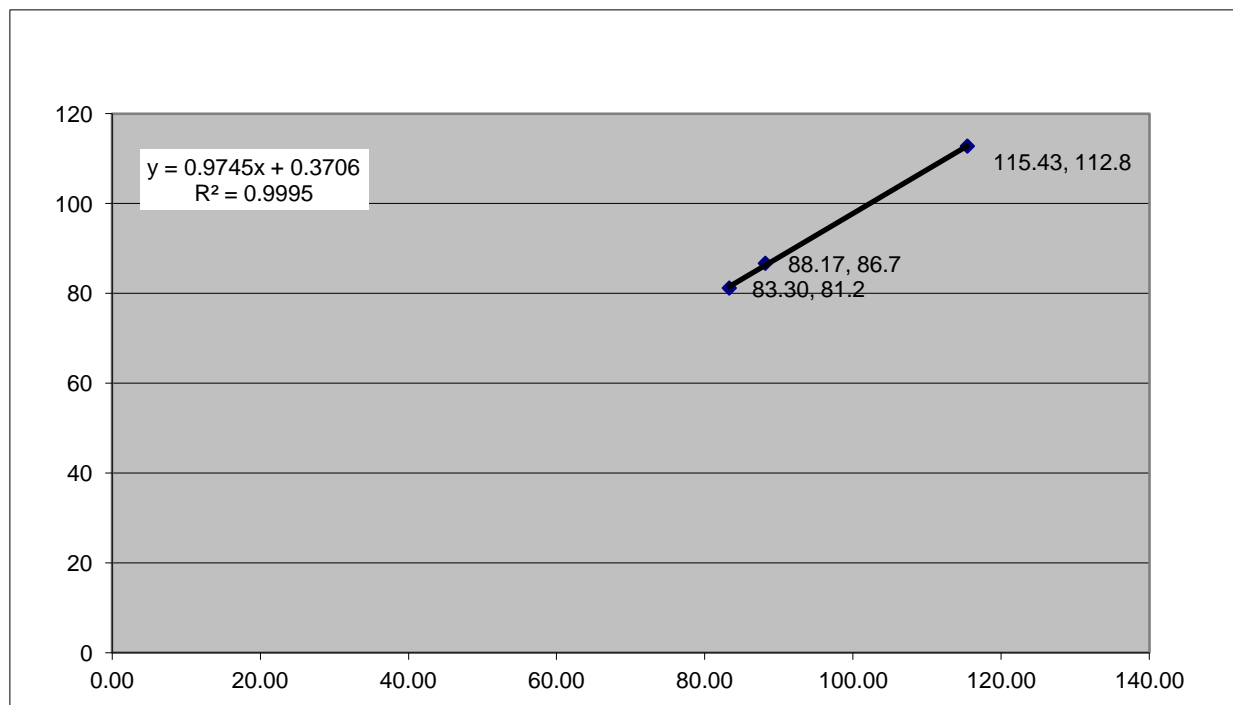
Sensitivity Adjustment Scale Setting (Before Calibration) : 799 CPM
 Sensitivity Adjustment Scale Setting (After Calibration) : 799 CPM

Hour	Date (dd-mmm-yy)	Time		Ambient Condition		Concentration (ug/m3) Y-axis	Total Count	Count/Minute X-axis
				Temp (C)	R.H. (%)			
1	04-Oct-13	09:34	10:34	26.2	72%	112.8	6926	115.43
2	04-Oct-13	10:45	11:45	26.2	72%	86.7	5290	88.17
3	04-Oct-13	11:50	12:50	26.2	72%	81.2	4998	83.30

Be Linear Regression of Y or X

Slope (K-factor): 0.975
 Correlation coefficient : 0.9995

Remark: _____



Recorded by: Ruby Law

Signature: *Ruby Law*

Date: 21/10/2013

Checked by: Keith Chau

Signature: *Keith Chau*

Date: 21/10/2013

REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

Work Order: HK1414464
Date of Issue: 19/05/2014
Client: AECOM ASIA COMPANY LIMITED



Description: Sonde
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12A101545
Equipment No.: W.026.35
Date of Calibration: 13 May, 2014

Date of next Calibration: 13 August, 2014

Parameters:

Conductivity

Method Ref: APHA (20th edition), 2510B

Expected Reading (uS/cm)	Displayed Reading (uS/cm)	Tolerance (%)
146.9	147.2	+0.2
6667	6710	+0.6
12890	12710	-1.4
58670	58520	-0.3
Tolerance Limit (%)		±10.0

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
3.66	3.70	+0.04
5.85	5.89	+0.04
7.65	7.70	+0.05
Tolerance Limit (mg/L)		±0.20

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	7.05	+0.05
10.0	9.94	-0.06
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

REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

Work Order: HK1414464
Date of Issue: 19/05/2014
Client: AECOM ASIA COMPANY LIMITED



Description: Sonde
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12A101545
Equipment No.: W.026.35
Date of Calibration: 13 May, 2014

Date of next Calibration: 13 August, 2014

Parameters:

Salinity

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

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)
0	0.00	--
10	9.68	-3.2
20	19.86	-0.7
30	29.72	-0.9
Tolerance Limit (%)		±10.0

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)
13.5	13.42	-0.1
25.5	24.40	-1.1
38.0	37.66	-0.3
Tolerance Limit (°C)		±2.0

Turbidity

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

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.0	--
4	4.1	+2.5
10	10.0	0.0
20	19.8	-1.0
50	49.5	-1.0
100	99.6	-0.4
Tolerance Limit (%)		±10.0

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

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

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

Work Order: HK1414461
Date of Issue: 19/05/2014
Client: AECOM ASIA COMPANY LIMITED



Description: Sonde
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12D100972
Equipment No.: W.026.36
Date of Calibration: 13 May, 2014

Date of next Calibration: 13 August, 2014

Parameters:

Conductivity

Method Ref: APHA (20th edition), 2510B

Expected Reading (uS/cm)	Displayed Reading (uS/cm)	Tolerance (%)
146.9	145.8	-0.7
6667	6640	-0.4
12890	12750	-1.1
58670	58200	-0.8
Tolerance Limit (%)		±10.0

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
3.66	3.69	+0.03
5.85	5.81	-0.04
7.65	7.60	-0.05
Tolerance Limit (mg/L)		±0.20

pH Value

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

Expected Reading (pH Unit)	Displayed Reading (pH Unit)	Tolerance (pH unit)
4.0	4.03	+0.03
7.0	7.05	+0.05
10.0	10.03	+0.03
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

REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

Work Order: HK1414461
Date of Issue: 19/05/2014
Client: AECOM ASIA COMPANY LIMITED



Description: Sonde
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12D100972
Equipment No.: W.026.36
Date of Calibration: 13 May, 2014

Date of next Calibration: 13 August, 2014

Parameters:

Salinity

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

Expected Reading (g/L)	Displayed Reading (g/L)	Tolerance (%)
0	0.02	--
10	9.94	-0.6
20	19.56	-2.2
30	29.76	-0.8
Tolerance Limit (%)		±10.0

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)
13.5	13.37	-0.1
25.5	25.53	+0.0
38.0	38.06	+0.1
Tolerance Limit (°C)		±2.0

Turbidity

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

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.0	--
4	3.9	-2.5
10	9.8	-2.0
20	20.4	+2.0
50	50.5	+1.0
100	101.2	+1.2
Tolerance Limit (%)		±10.0

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



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