



Certificate of Calibration 校正證書

Certificate No. : C182424
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC18-0873)

Date of Receipt / 收件日期 : 27 April 2018

Description / 儀器名稱 : Integrating Sound Level Meter
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 2238
Serial No. / 編號 : 2381580
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 : (50 ± 25)%

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 10 May 2018

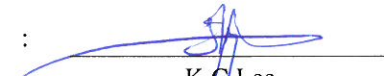
TEST RESULTS / 測試結果

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


K C Lee
Engineer

Certified By
核證


H C Chan
Engineer

Date of Issue
簽發日期

10 May 2018

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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。

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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 Acoustic Calibrator 4231, S/N : 3018753 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 | C180024 |
| 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 _{AFP} | 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 _{AFP} | A | F | 94.00 | 1 | 94.1 (Ref.) |
| | | | | 104.00 | | 104.1 |
| | | | | 114.00 | | 114.0 |

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 _{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 Spec. (dB) |
|-------------|------------------|---------------------|----------------|---------------|----------|------------------|------------------------------|
| Range (dB) | Parameter | Frequency Weighting | Time Weighting | Level (dB) | Freq. | | |
| 50 - 130 | L _{AFP} | A | F | 94.00 | 63 Hz | 68.0 | -26.2 ± 1.5 |
| | | | | | 125 Hz | 77.9 | -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 | 93.0 | -1.1 (+2.1 ; -3.1) |
| | | | | | 12.5 kHz | 89.9 | -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 _{CFP} | C | F | 94.00 | 63 Hz | 93.4 | -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 | 93.3 | -0.8 ± 1.6 |
| | | | | | 8 kHz | 91.1 | -3.0 (+2.1 ; -3.1) |
| | | | | | 12.5 kHz | 88.0 | -6.2 (+3.0 ; -6.0) |

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Remarks : - UUT Microphone Model No. : 4188 & S/N : 2379759

- 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 :

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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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

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輝創工程有限公司

Sun Creation Engineering Limited

Calibration & Testing Laboratory

Certificate of Calibration 校正證書

Certificate No. : C183438
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC18-1201)

Date of Receipt / 收件日期 : 12 June 2018

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 : $(23 \pm 2)^{\circ}\text{C}$

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 : 23 June 2018

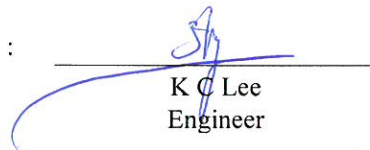
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The results are detailed in the subsequent page(s).

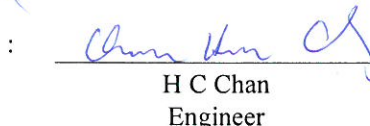
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- Fluke Everett Service Center, USA

Tested By
測試


K C Lee
Engineer

Certified By
核證


H C Chan
Engineer

Date of Issue
簽發日期

29 June 2018

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Sun Creation Engineering Limited – Calibration & Testing Laboratory

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Certificate of Calibration

校正證書

Certificate No. : C183438
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 | C173864 |
| CL281 | Multifunction Acoustic Calibrator | PA160023 |
| TST150A | Measuring Amplifier | C181288 |

- 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 %.

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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 : 04/10/2018

Sampler

Model : TE-5170
Serial Number : S/N3640

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
Service Date : 19 Mar 2018
Slope (m) : 2.05242
Intercept (b) : -0.01383
Correlation Coefficient(r) : 0.99994

Standard Condition

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

Calibration Condition

Pa (hpa) : 1015
Ta(K) : 301

| Resistance Plate | dH [green liquid] (inch water) | Z | X=Qstd (cubic meter/min) | IC | Y |
|------------------|--------------------------------|-------|--------------------------|----|-------|
| 1 18 holes | 12.4 | 3.507 | 1.716 | 55 | 54.78 |
| 2 13 holes | 9.6 | 3.086 | 1.510 | 50 | 49.80 |
| 3 10 holes | 7.2 | 2.673 | 1.309 | 44 | 43.82 |
| 4 7 holes | 4.8 | 2.182 | 1.070 | 38 | 37.85 |
| 5 5 holes | 2.8 | 1.667 | 0.819 | 30 | 29.88 |

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): 27.678 Intercept(b): 7.668 Correlation Coefficient(r): 0.9990

Checked by: Magnum Fan

Date: 04/10/2018

ENVIROTECH SERVICES CO.

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS6(Dragonair Building)
Calibrated by : P.F.Yeung
Date : 22/10/2018

Sampler

Model : TE-5170
Serial Number : S/N3639

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454
Service Date : 19 Mar 2018
Slope (m) : 2.05242
Intercept (b) : -0.01383
Correlation Coefficient(r) : 0.99994

Standard Condition

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

Calibration Condition

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

| Resistance Plate | dH [green liquid] (inch water) | Z | X=Qstd (cubic meter/min) | IC | Y |
|------------------|--------------------------------|-------|--------------------------|----|-------|
| 1 18 holes | 11.2 | 3.348 | 1.6383 | 52 | 52.02 |
| 2 13 holes | 9.0 | 3.001 | 1.469 | 48 | 48.01 |
| 3 10 holes | 6.2 | 2.491 | 1.221 | 43 | 43.01 |
| 4 7 holes | 4.4 | 2.098 | 1.029 | 36 | 36.01 |
| 5 5 holes | 2.5 | 1.582 | 0.777 | 28 | 28.01 |

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): 27.820 Intercept(b): 7.287 Correlation Coefficient(r): 0.9936

Checked by: Magnum Fan

Date: 23/10/2018



Certificate of Calibration

| Calibration Certification Information | | | |
|---------------------------------------|-----------------------------|-----------|-------|
| Cal. Date: March 19, 2018 | Rootsmeter S/N: 438320 | Ta: 294 | °K |
| Operator: Jim Tisch | | Pa: 746.8 | 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 | 1.4300 | 3.2 | 2.00 |
| 2 | 3 | 4 | 1 | 1.0040 | 6.4 | 4.00 |
| 3 | 5 | 6 | 1 | 0.9030 | 7.9 | 5.00 |
| 4 | 7 | 8 | 1 | 0.8590 | 8.7 | 5.50 |
| 5 | 9 | 10 | 1 | 0.7080 | 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) |
| 0.9917 | 0.6935 | 1.4113 | 0.9957 | 0.6963 | 0.8874 |
| 0.9874 | 0.9835 | 1.9959 | 0.9914 | 0.9875 | 1.2549 |
| 0.9854 | 1.0913 | 2.2315 | 0.9894 | 1.0957 | 1.4030 |
| 0.9843 | 1.1459 | 2.3405 | 0.9883 | 1.1506 | 1.4715 |
| 0.9789 | 1.3826 | 2.8227 | 0.9829 | 1.3882 | 1.7747 |
| QSTD | m= | 2.05242 | QA | m= | 1.28519 |
| | b= | -0.01383 | | b= | -0.00869 |
| | r= | 0.99994 | | r= | 0.99994 |

| Calculations | |
|---|--|
| Vstd= $\Delta Vol \left(\frac{Pa - \Delta P}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)$ | Va= $\Delta Vol \left(\frac{Pa - \Delta P}{Pa} \right)$ |
| 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 : 12-Jul-2018

Calibration Result

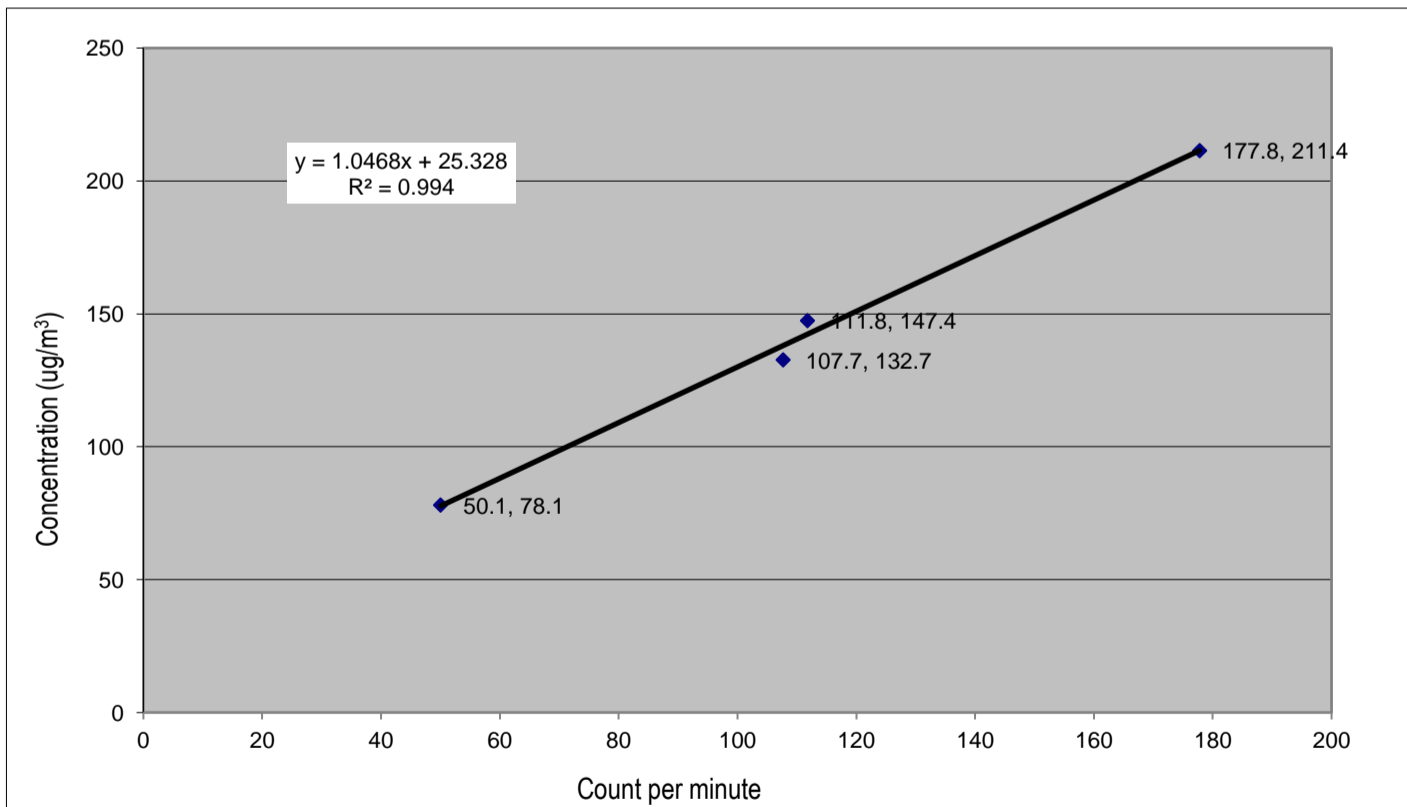
Sensitivity Adjustment Scale Setting (Before Calibration) : 622 CPM
 Sensitivity Adjustment Scale Setting (After Calibration) : 622 CPM

| 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 | 24-Aug-18 | 09:07 | 09:37 | 29.4 | 80% | 78.1 | 1502 | 50.1 |
| 2 | 24-Aug-18 | 10:00 | 11:00 | 30.5 | 76% | 132.7 | 6460 | 107.7 |
| 3 | 24-Aug-18 | 11:12 | 12:42 | 30.6 | 76% | 147.4 | 10065 | 111.8 |
| 4 | 24-Aug-18 | 13:21 | 15:21 | 31.0 | 71% | 211.4 | 21334 | 177.8 |

Be Linear Regression of Y or X

Slope (K-factor): 1.0468 Intercept,b: 25.328
 Correlation coefficient (R): 0.9970

Remark: _____



Recorded by: Icy Chan

Signature: *Icy*

Date: 07-Sep-2018

Checked by: Eva Keung

Signature: *Eva*

Date: 07-Sep-2018



REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

| | | | |
|-----------------|--|-----------------------|---------------|
| CONTACT: | MR MIKE SHEK | WORK ORDER: | HK1853965 |
| 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 | SUB-BATCH: | 0 |
| | | LABORATORY: | HONG KONG |
| | | DATE RECEIVED: | 11- Oct- 2018 |
| | | DATE OF ISSUE: | 18- Oct- 2018 |

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 principle as practised by the ALS Hong Kong laboratory or quoted from relevant international standards.

| | |
|----------------------|---|
| Scope of Test: | Conductivity, Dissolved Oxygen, pH Value, Turbidity, Salinity and Temperature |
| Equipment Type: | Multifunctional Meter |
| Brand Name: | YSI |
| Model No.: | 6820 V2 |
| Serial No.: | 12A101545 |
| Equipment No.: | W.026.35 |
| Date of Calibration: | 11 October, 2018 |

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 Chan Siu Ming, Vico
Manager - Inorganic

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK1853965
SUB-BATCH: 0
DATE OF ISSUE: 18-Oct-2018
CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12A101545
Equipment No.: W.026.35
Date of Calibration: 11 October, 2018
Date of Next Calibration: 11 January, 2019

PARAMETERS:

Conductivity

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

| Expected Reading ($\mu\text{S}/\text{cm}$) | Displayed Reading ($\mu\text{S}/\text{cm}$) | Tolerance (%) |
|--|---|---------------|
| 146.9 | 150.0 | + 2.1 |
| 6667 | 6650 | - 0.3 |
| 12890 | 12770 | - 0.9 |
| 58670 | 58050 | - 1.1 |
| | Tolerance Limit (%) | ± 10.0 |

Dissolved Oxygen

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

| Expected Reading (mg/L) | Displayed Reading (mg/L) | Tolerance (mg/L) |
|-------------------------|--------------------------|------------------|
| 3.50 | 3.46 | - 0.04 |
| 5.45 | 5.42 | - 0.03 |
| 7.60 | 7.58 | - 0.02 |
| | 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 | 3.98 | - 0.02 |
| 7.0 | 7.01 | + 0.01 |
| 10.0 | 10.00 | + 0.00 |
| | 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
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK1853965
SUB-BATCH: 0
DATE OF ISSUE: 18-Oct-2018
CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12A101545
Equipment No.: W.026.35
Date of Calibration: 11 October, 2018

Date of Next Calibration: 11 January, 2019

PARAMETERS:

Turbidity

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

| Expected Reading (NTU) | Displayed Reading (NTU) | Tolerance (%) |
|------------------------|-------------------------|---------------|
| 0 | 0.0 | -- |
| 4 | 4.1 | +2.5 |
| 10 | 9.7 | -3.0 |
| 20 | 19.7 | -1.5 |
| 50 | 50.1 | +0.2 |
| 100 | 99.7 | -0.3 |
| | Tolerance Limit (%) | ±10.0 |

Salinity

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

| Expected Reading (ppt) | Displayed Reading (ppt) | Tolerance (%) |
|------------------------|-------------------------|---------------|
| 0 | 0.01 | -- |
| 10 | 10.04 | +0.4 |
| 20 | 20.02 | +0.1 |
| 30 | 29.92 | -0.3 |
| | 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
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK1853965
SUB-BATCH: 0
DATE OF ISSUE: 18- Oct- 2018
CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 12A101545
Equipment No.: W.026.35
Date of Calibration: 11 October, 2018

Date of Next Calibration: 11 January, 2019

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 | 10.48 | - 0.0 |
| 20.0 | 20.07 | + 0.1 |
| 38.5 | 38.47 | - 0.0 |
| | Tolerance Limit (°C) | ± 2.0 |

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

A handwritten signature in black ink, appearing to read 'Chan Siu Ming'.

Mr Chan Siu Ming, Vico
Manager - Inorganic



REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

| | | | |
|----------|---|----------------|-------------|
| CONTACT: | MR MIKE SHEK | WORK ORDER: | HK1845427 |
| 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 | SUB-BATCH: | 0 |
| | | LABORATORY: | HONG KONG |
| | | DATE RECEIVED: | 21-Aug-2018 |
| | | DATE OF ISSUE: | 27-Aug-2018 |

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 principle as practised by the ALS Hong Kong laboratory or quoted from relevant international standards.

| | |
|----------------------|---|
| Scope of Test: | Conductivity, Dissolved Oxygen, pH Value, Turbidity, Salinity and Temperature |
| Equipment Type: | Multifunctional Meter |
| Brand Name: | YSI |
| Model No.: | 6820 V2 |
| Serial No.: | 00H1019 |
| Equipment No.: | W.026.09 |
| Date of Calibration: | 21 August, 2018 |

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.

Ms. Lin Wai Yu
Assistant Manager - Inorganic

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK1845427
SUB-BATCH: 0
DATE OF ISSUE: 27-Aug-2018
CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 00H1019
Equipment No.: W.026.09
Date of Calibration: 21 August, 2018

Date of Next Calibration: 21 November, 2018

PARAMETERS:

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

| Expected Reading ($\mu\text{S/cm}$) | Displayed Reading ($\mu\text{S/cm}$) | Tolerance (%) |
|---------------------------------------|--|---------------|
| 146.9 | 145.2 | -1.2 |
| 6667 | 6690 | +0.3 |
| 12890 | 12940 | +0.4 |
| 58670 | 58420 | -0.4 |
| | Tolerance Limit (%) | ± 10.0 |

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

| Expected Reading (mg/L) | Displayed Reading (mg/L) | Tolerance (mg/L) |
|-------------------------|--------------------------|------------------|
| 3.45 | 3.41 | -0.04 |
| 5.45 | 5.43 | -0.02 |
| 7.55 | 7.52 | -0.03 |
| | 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 | 4.02 | +0.02 |
| 7.0 | 7.01 | +0.01 |
| 10.0 | 10.00 | +0.00 |
| | 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.

Ms. Lin Wai Yu
 Assistant Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK1845427
 SUB-BATCH: 0
 DATE OF ISSUE: 27-Aug-2018
 CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
 Brand Name: YSI
 Model No.: 6820 V2
 Serial No.: 00H1019
 Equipment No.: W.026.09
 Date of Calibration: 21 August, 2018 Date of Next Calibration: 21 November, 2018

PARAMETERS:

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

| Expected Reading (NTU) | Displayed Reading (NTU) | Tolerance (%) |
|------------------------|----------------------------|---------------|
| 0 | 0.00 | -- |
| 4 | 3.80 | -5.0 |
| 10 | 9.70 | -3.0 |
| 20 | 20.1 | +0.5 |
| 50 | 50.5 | +1.0 |
| 100 | 99.4 | -0.6 |
| | Tolerance Limit (%) | ±10.0 |

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

| Expected Reading (ppt) | Displayed Reading (ppt) | Tolerance (%) |
|------------------------|----------------------------|---------------|
| 0 | 0.00 | -- |
| 10 | 10.02 | +0.2 |
| 20 | 19.96 | -0.2 |
| 30 | 29.94 | -0.2 |
| | Tolerance Limit (%) | ±10.0 |

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

 Ms. Lin Wai Yu
 Assistant Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK1845427
SUB-BATCH: 0
DATE OF ISSUE: 27-Aug-2018
CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 00H1019
Equipment No.: W.026.09
Date of Calibration: 21 August, 2018

Date of Next Calibration: 21 November, 2018

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 | 10.48 | -0.0 |
| 20.0 | 19.97 | -0.0 |
| 39.0 | 39.03 | +0.0 |
| | Tolerance Limit (°C) | ±2.0 |

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

Ms. Lin Wai Yu
Assistant Manager - Inorganic



REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

| | | | |
|----------|---|----------------|-------------|
| CONTACT: | MR MIKE SHEK | WORK ORDER: | HK1860334 |
| 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 | SUB-BATCH: | 0 |
| | | LABORATORY: | HONG KONG |
| | | DATE RECEIVED: | 20-Nov-2018 |
| | | DATE OF ISSUE: | 26-Nov-2018 |

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 principle as practised by the ALS Hong Kong laboratory or quoted from relevant international standards.

| | |
|----------------------|---|
| Scope of Test: | Conductivity, Dissolved Oxygen, pH Value, Turbidity, Salinity and Temperature |
| Equipment Type: | Multifunctional Meter |
| Brand Name: | YSI |
| Model No.: | 6820 V2 |
| Serial No.: | 00H1019 |
| Equipment No.: | W.026.09 |
| Date of Calibration: | 20 November, 2018 |

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.

Ms. Lin Wai Yu
Assistant Manager - Inorganic

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK1860334
SUB-BATCH: 0
DATE OF ISSUE: 26-Nov-2018
CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 00H1019
Equipment No.: W.026.09
Date of Calibration: 20 November, 2018 **Date of Next Calibration:** 20 February, 2019

PARAMETERS:

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

| Expected Reading (µS/cm) | Displayed Reading (µS/cm) | Tolerance (%) |
|--------------------------|---------------------------|---------------|
| 146.9 | 140.0 | -4.7 |
| 6667 | 6660 | -0.1 |
| 12890 | 12960 | +0.5 |
| 58670 | 58500 | -0.3 |
| | Tolerance Limit (%) | ±10.0 |

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

| Expected Reading (mg/L) | Displayed Reading (mg/L) | Tolerance (mg/L) |
|-------------------------|--------------------------|------------------|
| 3.42 | 3.45 | +0.03 |
| 5.51 | 5.50 | -0.01 |
| 7.48 | 7.52 | +0.04 |
| | 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 | 3.97 | -0.03 |
| 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.

Ms. Lin Wai Yu
 Assistant Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK1860334
SUB-BATCH: 0
DATE OF ISSUE: 26-Nov-2018
CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 00H1019
Equipment No.: W.026.09
Date of Calibration: 20 November, 2018 **Date of Next Calibration:** 20 February, 2019

PARAMETERS:

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

| Expected Reading (NTU) | Displayed Reading (NTU) | Tolerance (%) |
|------------------------|----------------------------|---------------|
| 0 | 0.0 | -- |
| 4 | 4.0 | +0.0 |
| 10 | 9.5 | -5.0 |
| 20 | 19.6 | -2.0 |
| 50 | 49.8 | -0.4 |
| 100 | 100.5 | +0.5 |
| | Tolerance Limit (%) | ±10.0 |

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

| Expected Reading (ppt) | Displayed Reading (ppt) | Tolerance (%) |
|------------------------|----------------------------|---------------|
| 0 | 0.00 | -- |
| 10 | 9.99 | -0.1 |
| 20 | 19.96 | -0.2 |
| 30 | 29.95 | -0.2 |
| | Tolerance Limit (%) | ±10.0 |

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

Ms. Lin Wai Yu
 Assistant Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK1860334
SUB-BATCH: 0
DATE OF ISSUE: 26-Nov-2018
CLIENT: AECOM ASIA COMPANY LIMITED

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: 6820 V2
Serial No.: 00H1019
Equipment No.: W.026.09
Date of Calibration: 20 November, 2018 Date of Next Calibration: 20 February, 2019

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 | 10.04 | +0.0 |
| 19.5 | 19.48 | -0.0 |
| 38.5 | 38.46 | -0.0 |
| | Tolerance Limit (°C) | ±2.0 |

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

Ms. Lin Wai Yu
Assistant Manager - Inorganic