High-Volume TSP Sampler
5-Point Calibration Record

| | | |
|---|---|---|
| Location | : | ASR 8(A) |
| Calibrated by | : | P.F.Yeung |
| Date | : | 05/05/2014 |

Sampler

| | | |
|---|---|---|
| Model | : | TE-5170 |
| Serial Number | : | S/N 3956 |

Calibration Orfice 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) | : | 1014 |
| Ta(K) | : | 295 |

| Resistance Plate | | dH [green liquid] (inch water) | Z | X=Qstd (cubic meter/min) | IC (chart) | Y (corrected) |
|---|---|---|---|---|---|---|
| 1 | 18 holes | 12.5 | 3.555 | 1.713 | 62 | 62.35 |
| 2 | 13 holes | 10.0 | 3.180 | 1.532 | 56 | 56.31 |
| 3 | 10 holes | 7.5 | 2.754 | 1.327 | 51 | 51.28 |
| 4 | 7 holes | 4.9 | 2.226 | 1.073 | 44 | 44.25 |
| 5 | 5 holes | 3.0 | 1.742 | 0.839 | 37 | 37.21 |

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

Sampler Calibration Relationship (Linear Regression)

Slope(m):28.230 Intercept(b): 13.666 Correlation Coefficient(r): 0.9992

Checked by: Magnum Fan Date: 15/05/2014

High-Volume TSP Sampler
5-Point Calibration Record

| | | |
|---|---|---|
| Location | : | ASR8 |
| Calibrated by | : | P.F.Yeung |
| Date | : | 05/05/2014 |

Sampler

| | | |
|---|---|---|
| Model | : | TE-5170 |
| Serial Number | : | S/N 3958 |

Calibration Orfice 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) | : | 1014 |
| Ta(K) | : | 295 |

| Resistance Plate | | dH [green liquid] (inch water) | Z | X=Qstd (cubic meter/min) | IC (chart) | Y (corrected) |
|---|---|---|---|---|---|---|
| 1 | 18 holes | 11.8 | 3.454 | 1.664 | 54 | 54.30 |
| 2 | 13 holes | 9.8 | 3.148 | 1.517 | 49 | 49.27 |
| 3 | 10 holes | 6.8 | 2.622 | 1.264 | 43 | 43.24 |
| 4 | 7 holes | 4.6 | 2.157 | 1.039 | 36 | 36.20 |
| 5 | 5 holes | 2.8 | 1.683 | 0.811 | 30 | 30.17 |

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

Sampler Calibration Relationship (Linear Regression)

Slope(m):28.017 Intercept(b): 7.361 Correlation Coefficient(r): 0.9990

Checked by: Magnum Fan Date: 15/05/2014

TISCH Environmental

TISCH ENVIRONMENTAL, INC.
145 SOUTH MIAMI AVE
VILLAGE OF CLEVES, 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) |
|---|---|---|
| 1.0103 | 0.6854 | 1.4245 |
| 1.0061 | 0.9730 | 2.0146 |
| 1.0040 | 1.0866 | 2.2524 |
| 1.0028 | 1.1370 | 2.3623 |
| 0.9976 | 1.3722 | 2.8491 |

Qstd slope (m) = 2.07593
intercept (b) = -0.00102
coefficient (r) = 0.99996

y axis = SQRT[H2O(Pa/760)(298/Ta)]

| Va | (x axis) Qa | (y axis) |
|---|---|---|
| 0.9958 | 0.6755 | 0.8791 |
| 0.9916 | 0.9590 | 1.2433 |
| 0.9895 | 1.0709 | 1.3900 |
| 0.9884 | 1.1206 | 1.4579 |
| 0.9832 | 1.3524 | 1.7583 |

Qa slope (m) = 1.29991
intercept (b) = -0.00063
coefficient (r) = 0.99996

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}

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. : C134307
證書編號

**ITEM TESTED / 送檢項目** ( Job No. / 序引編號 : IC13-1709 )

Description / 儀器名稱 : Sound Level Calibrator
Manufacturer / 製造商 : Rion
Model No. / 型號 : NC-73
Serial No. / 編號 : 10997142
Supplied By / 委託者 : Envirotech Services Co.
Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
Hong Kong

**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** : 12 July 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 簽發日期 : 15 July 2013



Sun Creation Engineering Limited – Calibration & Testing Laboratory
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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. : C134307
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 :

| Equipment ID | Description | Certificate No. |
|---|---|---|
| CL130 | Universal Counter | C133632 |
| CL281 | Multifunction Acoustic Calibrator | DC130171 |
| TST150A | Measuring Amplifier | C120886 |

4. Test procedure : MA100N.

5. 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 | 93.7 | ± 0.5 | ± 0.2 |

5.2 Frequency Accuracy

| UUT Nominal Value (kHz) | Measured Value (kHz) | Mfr's Spec. | Uncertainty of Measured Value (Hz) |
|---|---|---|---|
| 1 | 0.988 | 1 kHz ± 2 % | ± 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.



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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. : C141622
證書編號

**ITEM TESTED / 送檢項目** ( Job No. / 序引編號 : IC14-0645 ) Date of Receipt / 收件日期 : 11 March 2014

Description / 儀器名稱 : Sound Level Meter
Manufacturer / 製造商 : Rion
Model No. / 型號 : NL-52
Serial No. / 編號 : 00131627
Supplied By / 委託者 : Envirotech Services Co.
Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
Hong Kong

**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** : 17 March 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
- Agilent Technologies, USA
- Fluke Everett Service Center, USA
- Rohde & Schwarz Laboratory, Germany

Tested By 測試 : K C Lee
Project Engineer

Certified By 核證 : K M Wu
Engineer

Date of Issue 簽發日期 : 20 March 2014



Sun Creation Engineering Limited – Calibration & Testing Laboratory
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# Certificate of Calibration
# 校正證書

Certificate No. : C141622
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 was performed before the test.

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 | C140016 |
| CL281 | Multifunction Acoustic Calibrator | DC130171 |

5. Test procedure : MA101N.

6. 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) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. (kHz) | | |
| 30 - 130 | $L_A$ | A | Fast | 94.00 | 1 | 94.1 | ± 1.1 |

6.1.2 Linearity

| UUT Setting | | | | Applied Value | | UUT Reading (dB) |
|---|---|---|---|---|---|---|
| Range (dB) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. (kHz) | |
| 30 - 130 | $L_A$ | A | Fast | 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) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. (kHz) | | |
| 30 - 130 | $L_A$ | A | Fast | 94.00 | 1 | 94.1 | Ref. |
| | | | Slow | | | 94.1 | ± 0.3 |



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# Certificate of Calibration
# 校正證書

Certificate No. : C141622
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) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. | | |
| 30 - 130 | $L_A$ | A | Fast | 94.00 | 63 Hz | 67.8 | -26.2 ± 1.5 |
| | | | | | 125 Hz | 77.8 | -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 | 93.0 | -1.1 (+2.1 ; -3.1) |
| | | | | | 12.5 kHz | 89.6 | -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) | Function | Frequency Weighting | Time Weighting | Level (dB) | Freq. | | |
| 30 - 130 | $L_A$ | C | Fast | 94.00 | 63 Hz | 93.2 | -0.8 ± 1.5 |
| | | | | | 125 Hz | 93.8 | -0.2 ± 1.5 |
| | | | | | 250 Hz | 94.0 | 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 | 87.7 | -6.2 (+3.0 ; -6.0) |

Remarks : - UUT Microphone Model No. : UC-59 & S/N : 04663

- 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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東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED

# Performance Check of Turbidity Meter

Equipment Ref. No. : ET/0505/010 Manufacturer : HACH

Model No. : 2100Q Serial No. : 11110 C 014260

Date of Calibration : 07/04/2014 Due Date : 06/07/2014

| Theoretical Value of Turbidity Standard (NTU) | Measured Value (NTU) | Difference % * |
|---|---|---|
| 20 | 19.5 | -2.50 |
| 100 | 103 | 3.00 |
| 800 | 792 | -1.00 |

(*) Difference = (Measured Value – Theoretical Value) / Theoretical Value x 100

Acceptance Criteria

Difference : -5 % to 5 %

The turbidity meter complies * / ~~does not comply~~ * with the specified requirements and is deemed acceptable * / ~~unacceptable~~ * for use. Measurements are traceable to national standards.

Prepared by : _____ Checked by : _____

東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED

# Internal Calibration & Performance Check of pH Meter

Equipment Ref. No. : ET/EW/007/003 Manufacturer : HANNA

Model No. : HI 8314 Serial No. : 674469

Date of Calibration : 09/05/2014 Calibration Due Date : 08/06/2014

## *Liquid Junction Error*

Primary Standard Solution Used : Phosphate Ref No. of Primary Solution: 003/5.2/001/17

Temperature of Solution : 20.0 $\Delta pH_{½}$ = +0.08

pH value of diluted buffer : 6.78 pH (S) = 6.881

$\Delta pH$ = pH(S) - pH of diluted buffer = 0.101 (Observed Deviation)

Liquid Junction Error ($\Delta pH_j$) = $\Delta pH - \Delta pH_{½}$ = 0.021

## *Shift on Stirring*

pH of buffer solution (with stirring), $pH_s$ = 6.91

Shift on stirring, $\Delta pH_s = pH_s - pH(S) - \Delta pH_j$ = 0.008

## *Noise*

Noise, $\Delta pH_n$ = difference between max and min reading : 0.00

## *Verification of ATC*

Ref. No. of reference thermometer used: ET/0521/008

Temperature record from the reference thermometer ($T_R$): 20.0 °C

Temperature record from the ATC ($T_{ATC}$): 19.9 °C

Temperature Difference, $|T_R - T_{ATC}|$ 0.1 °C

## *Acceptance Criteria*

| Performance Characteristic | | Acceptable Range |
|---|---|---|
| Liquid Junction Error | ΔpHj | ≤0.05 |
| Shift on Stirring | ΔpHs | ≤0.02 |
| Noise | ΔpHn | ≤0.02 |
| Verifcation of ATC | Temperature Difference | ≤0.5°C |

The pH meter complies * / ~~does not comply~~ * with the specified requirements and is deemed acceptable * / ~~unacceptable~~ * for use. Measurements are traceable to national standards.

* Delete as appropriate

Calibrated by :  Checked by : 

東業德勤測試顧問有限公司
ETS-TESTCONSULT LIMITED

# Internal Calibration & Performance Check of pH Meter

Equipment Ref. No. : ET/EW/007/003 Manufacturer : HANNA

Model No. : HI 8314 Serial No. : 674469

Date of Calibration : 10/06/2014 Calibration Due Date : 09/07/2014

## *Liquid Junction Error*

Primary Standard Solution Used : Phosphate Ref No. of Primary Solution: 003/5.2/001/18

Temperature of Solution : 20.0 $\Delta pH_{½}$ = +0.08

pH value of diluted buffer : 6.77 pH (S) = 6.881

$\Delta pH$ = pH(S) - pH of diluted buffer = 0.111 (Observed Deviation)

Liquid Junction Error ($\Delta pH_j$) = $\Delta pH$ - $\Delta pH_{½}$ = 0.031

## *Shift on Stirring*

pH of buffer solution (with stirring), $pH_s$ = 6.92

Shift on stirring, $\Delta pH_s$= $pH_s$ - pH(S) - $\Delta pH_j$ = 0.008

## *Noise*

Noise, $\Delta pH_n$ = difference between max and min reading : 0.00

## *Verification of ATC*

Ref. No. of reference thermometer used: ET/0521/008

Temperature record from the reference thermometer ($T_R$): 19.6 °C

Temperature record from the ATC ($T_{ATC}$): 19.5 °C

Temperature Difference, $|T_R - T_{ATC}|$ 0.1 °C

## *Acceptance Criteria*

| Performance Characteristic | | Acceptable Range |
|---|---|---|
| Liquid Junction Error | $\Delta pHj$ | ≤0.05 |
| Shift on Stirring | $\Delta pHs$ | ≤0.02 |
| Noise | $\Delta pHn$ | ≤0.02 |
| Verifcation of ATC | Temperature Difference | ≤0.5°C |

The pH meter complies * / ~~does not comply~~ * with the specified requirements and is deemed acceptable * / ~~unacceptable~~ * for use. Measurements are traceable to national standards.

* Delete as appropriate

Calibrated by : Checked by :

CPE/015/W

# Internal Calibration Report of Dissolved Oxygen Meter

| | | | | | |
|---|---|---|---|---|---|
| Equipment Ref. No. | : | ET/EW/008/005 | Manufacturer | : | YSI |
| Model No. | : | Pro 2030 | Serial No. | : | 12A 100353 |
| Date of Calibration | : | 28/04/2014 | Calibration Due Date | : | 27/07/2014 |

***Temperature Verification***

Ref. No. of Reference Thermometer : ET/0521/008

Ref. No. of Water Bath : ---

| | Temperature (°C) | | | |
|---|---|---|---|---|
| Reference Thermometer reading | Measured | 20.1 | Corrected | 19.7 |
| DO Meter reading | Measured | 19.6 | Difference | 0.1 |

***Standardization of sodium thiosulphate ($Na_2S_2O_3$) solution***

| | | | |
|---|---|---|---|
| Reagent No. of $Na_2S_2O_3$ titrant | CPE/012/4.5/001/8 | Reagent No. of 0.025N $K_2Cr_2O_7$ | CPE/012/4.4/001/26 |

| | Trial 1 | Trial 2 |
|---|---|---|
| Initial Vol. of $Na_2S_2O_3$ (ml) | 0.00 | 10.20 |
| Final Vol. of $Na_2S_2O_3$ (ml) | 10.20 | 20.45 |
| Vol. of $Na_2S_2O_3$ used (ml) | 10.20 | 10.25 |
| Normality of $Na_2S_2O_3$ solution (N) | 0.02451 | 0.02439 |
| Average Normality (**N**) of $Na_2S_2O_3$ solution (N) | 0.02445 | |
| Acceptance criteria, Deviation | Less than ± 0.001N | |

Calculation: Normality of $Na_2S_2O_3$, **N** = 0.25 / ml $Na_2S_2O_3$ used

***Lineality Checking***

***Determination of dissolved oxygen content by Winkler Titration ****

| Purging Time (min) | 2 | | 5 | | 10 | |
|---|---|---|---|---|---|---|
| Trial | 1 | 2 | 1 | 2 | 1 | 2 |
| Initial Vol. of $Na_2S_2O_3$ (ml) | 0.00 | 12.00 | 24.00 | 0.00 | 8.10 | 12.90 |
| Final Vol. of $Na_2S_2O_3$ (ml) | 12.00 | 24.00 | 32.00 | 8.10 | 12.90 | 17.60 |
| Vol. (**V**) of $Na_2S_2O_3$ used (ml) | 12.00 | 12.00 | 8.00 | 8.10 | 4.80 | 4.70 |
| Dissolved Oxygen (**DO**), mg/L | 7.88 | 7.88 | 5.25 | 5.32 | 3.15 | 3.08 |
| Acceptance criteria, Deviation | Less than + 0.3mg/L | | Less than + 0.3mg/L | | Less than + 0.3mg/L | |

Calculation: DO (mg/L) = **V** x **N** x 8000/298

| Purging time, min | DO meter reading, mg/L | | | Winkler Titration result *, mg/L | | | Difference (%) of DO Content |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | Average | 1 | 2 | Average | |
| 2 | 7.65 | 7.58 | 7.62 | 7.88 | 7.88 | 7.88 | 3.35 |
| 5 | 5.34 | 5.39 | 5.37 | 5.25 | 5.32 | 5.29 | 1.50 |
| 10 | 3.21 | 3.17 | 3.19 | 3.15 | 3.08 | 3.12 | 2.22 |
| Linear regression coefficient | | | | 0.9983 | | | |

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# Internal Calibration Report of Dissolved Oxygen Meter

***Zero Point Checking***

| DO meter reading, mg/L | 0.00 |
|---|---|

***Salinity Checking***

| Reagent No. of NaCl (10ppt) | CPE/012/4.7/002/19 | Reagent No. of NaCl (30ppt) | CPE/012/4.8/002/19 |
|---|---|---|---|

***Determination of dissolved oxygen content by Winkler Titration*** **

| Salinity (ppt) | 10 | | 30 | |
|---|---|---|---|---|
| Trial | 1 | 2 | 1 | 2 |
| Initial Vol. of $Na_2S_2O_3$ (ml) | 0.00 | 11.90 | 23.70 | 34.20 |
| Final Vol. of $Na_2S_2O_3$ (ml) | 11.90 | 23.70 | 34.20 | 44.80 |
| Vol. (**V**) of $Na_2S_2O_3$ used (ml) | 11.90 | 11.80 | 10.50 | 10.60 |
| Dissolved Oxygen (**DO**), mg/L | 7.81 | 7.75 | 6.89 | 6.96 |
| Acceptance criteria, Deviation | Less than + 0.3mg/L | | Less than + 0.3mg/L | |

Calculation: DO (mg/L) = **V** x **N** x 8000/298

| Salinity (ppt) | DO meter reading, mg/L | | | Winkler Titration result**, mg/L | | | Difference (%) of DO Content |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | Average | 1 | 2 | Average | |
| 10 | 7.86 | 7.79 | 7.83 | 7.81 | 7.75 | 7.78 | 0.64 |
| 30 | 6.95 | 6.99 | 6.97 | 6.89 | 6.96 | 6.93 | 0.58 |

***Acceptance Criteria***

(1) Differenc between temperature readings from temperature sensor of DO probe and reference thermometer : < 0.5 °C
(2) Linear regression coefficient : >0.99
(3) Zero checking: 0.0mg/L
(4) Difference (%) of DO content from the meter reading and by winkler titration : within ± 5%

The equipment complies # / ~~does not comply~~ # with the specified requirements and is deemed acceptable # / ~~unacceptable~~ # for use.

# Delete as appropriate

Calibrated by : _____ Approved by : _____

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# Performance Check of Salinity Meter

| | | | |
|---|---|---|---|
| Equipment Ref. No. | : ET/EW/008/005 | Manufacturer | : YSI |
| Model No. | : Pro 2030 | Serial No. | : 12A 100353 |
| Date of Calibration | : 28/04/2014 | Due Date | : 27/07/2014 |

| Ref. No. of Salinity Standard used (30ppt) | S/001/5 |
|---|---|

| Salinity Standard (ppt) | Measured Salinity (ppt) | Difference * (%) |
|---|---|---|
| 30.0 | 31.1 | 3.67 |

(*) Difference (%) = (Measured Salinity – Salinity Standard value) / Salinity Standard value x 100

Acceptance Criteria

Difference : -10 % to 10 %

The salinity meter complies * / ~~does not comply~~ * with the specified requirements and is deemed acceptable * / ~~unacceptable~~ * for use. Measurements are traceable to national standards.

Checked by : _____ Approved by : _____

# Certification of Quality

This product has been tested in accordance with procedures established through Global Water Instrumentation's Quality Management System. This product meets or exceeds its manufacturing acceptance criteria.

| | |
|---|---|
| **ITEM DESCRIPTION:** | Wind Direction |
| **MODEL NAME/ NUMBER:** | WE570 |
| **PART NUMBER:** | ED0000 |
| **SENSOR RANGE:** | 0-360 ° |
| **SENSOR OUTPUT:** | 4.01-20.03 mA |
| **ACCURACY:** | 1% of full scale |
| **POWER REQUIRED** | 10-36 VDC |
| **SERIAL NUMBER:** | 1337005143 |
| **CABLE LENGTH:** | 25 ft |
| **CERTIFICATES:** | CE Compliant |



**Technician:** *Wright, Jess* **Date:** 9/12/2013

NOT Global Water Instrumentation warrants that its products are free from defects in material & workmanship under normal use & service for a period of one year from date of original shipment from factory. Repaired components are warranted for a period of 90 days from shipment. Contact us for complete warranty details.


Global Water
a xylem brand

In the U.S. call toll free at 1-800-876-1172
International 1-979-690-5560
Fax 1-979-690-0440
Email globalw@globalw.com

Visit our online catalog at www.globalw.com
Our Service Address
151 Graham Rd
College Station, TX 77845

**ENVIROTECH SERVICES CO.**

## Calibration Report of Wind Meter

Date of Calibration : 29 May 2014

Brand of Test Meter: Global Water

Model: Speed Sensor: WE550 (S/N:EC0000 )

Direction Senor: WE570 (S/N:ED0000)

Location : Pak Mong, Siu Ho Wan

Procedures :

1. Wind Still Test: The wind speed sensor was hold by hand until it keep still

2.Wind Speed Test: The wind meter was on-site calibrated against the Anemometer

3.Wind Direction Test : The wind meter was on-site calibrated against the marine compass at four directions

Results:

Wind Still Test

| Wind Speed (m/s) |
|---|
| 0.00 |

Wind Speed Test

| Global Wate (m/s) | Anemomete (m/s) |
|---|---|
| 0.23 | 0.2 |
| 1.25 | 1.2 |
| 2.06 | 2.2 |

Wind Direction Test

| Global Wate (o) | Marine Compass (o) |
|---|---|
| 269.99 | 270 |
| 0.00 | 0 |
| 90.01 | 90 |
| 180.01 | 180 |

Calibrated by: Fai

Yeung Ping Fai
(Technical Officer)

Checked by : Fat

Ho Kam Fat
(Senior Technical Officer)

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. : C143205
證書編號

**ITEM TESTED / 送檢項目** ( Job No. / 序引編號 : IC14-1304 ) Date of Receipt / 收件日期 : 19 May 2014

Description / 儀器名稱 : Anemometer
Manufacturer / 製造商 : Lutron
Model No. / 型號 : AM-4201
Serial No. / 編號 : AF.27513
Supplied By / 委託者 : Envirotech Services Co.
Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,
Hong Kong

**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** : 26 May 2014

**TEST RESULTS / 測試結果**

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

The test equipment used for calibration are traceable to National Standards via :
- Testo Industrial Services GmbH, Germany

Tested By / 測試 : H S Chung
Technician

Certified By / 核證 : H C Chan
Engineer

Date of Issue / 簽發日期 : 27 May 2014



Sun Creation Engineering Limited – Calibration & Testing Laboratory
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No. 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.suncreatio n.com

# Certificate of Calibration
# 校正證書

Certificate No. : C143205
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 10 measurements at each calibration point.

3. Test equipment :

| Equipment ID | Description | Certificate No. |
|---|---|---|
| CL386 | Multi-function Measuring Instrument | S12109 |

4. Test procedure : MA130N.

5. Results :

Air Velocity

| Applied Value (m/s) | UUT Reading (m/s) | Measured Correction | | |
|---|---|---|---|---|
| | | Value (m/s) | Measurement Uncertainty | |
| | | | Expanded Uncertainty (m/s) | Coverage Factor |
| 2.1 | 1.8 | +0.3 | 0.2 | 2.0 |
| 4.1 | 4.0 | +0.1 | 0.3 | 2.0 |
| 6.1 | 6.1 | 0.0 | 0.3 | 2.0 |
| 8.2 | 8.4 | -0.2 | 0.3 | 2.0 |
| 10.1 | 10.4 | -0.3 | 0.4 | 2.0 |

Remarks : - The Measured Corrections are defined as :
Value = Applied Value - UUT Reading

- The expanded uncertainties are for a level of confidence of 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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