

## **E. Calibration Certificates**



**Appendix E**  
**Calibration Record**  
**(Air Quality Monitoring)**

High-Volume TSP Sampler  
5-Point Calibration Record

Location : ASR1  
 Calibrated by : P. F. Yeung  
 Date : 16/08/2024

Sampler

Model : GMWS-2310 ACCU-VOL  
 Serial Number : S/N 0816

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
 Next Calibration Due 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) : 1005  
 Ta(K) : 300

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1   18 holes	12.4	3.479	1.692	56	55.32
2   13 holes	9.8	3.093	1.506	50	49.40
3   10 holes	6.8	2.576	1.257	43	42.48
4   7 holes	4.5	2.096	1.025	36	35.57
5   5 holes	2.7	1.623	0.798	26	25.69

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): 32.229                      Intercept(b): 1.231                      Correlation Coefficient(r): 0.9962

Checked by: Magnum Fan

Date: 17/08/2024

High-Volume TSP Sampler  
5-Point Calibration Record

Location : ASR2A  
 Calibrated by : P. F. Yeung  
 Date : 16/08/2024

Sampler

Model : GMWS-2310 ACCU-VOL  
 Serial Number : S/N 0890

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
 Next Calibration Due 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) : 1005  
 Ta(K) : 303

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1   18 holes	11.4	3.336	1.623	55	54.34
2   13 holes	9.2	2.997	1.459	49	48.41
3   10 holes	6.8	2.576	1.257	42	41.49
4   7 holes	4.6	2.119	1.036	33	32.60
5   5 holes	2.8	1.653	0.812	24	23.71

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): 37.755      Intercept(b): -6.607      Correlation Coefficient(r): 0.9995

Checked by: Magnum Fan

Date: 17/08/2024

High-Volume TSP Sampler  
5-Point Calibration Record

Location : ASR3  
 Calibrated by : P. F. Yeung  
 Date : 16/08/2024

Sampler

Model : GMWS-2310 ACCU-VOL  
 Serial Number : S/N 0764

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
 Next Calibration Due 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) : 1005  
 Ta(K) : 303

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1   18 holes	11.7	3.379	1.644	62	61.25
2   13 holes	9.3	3.013	1.467	55	54.34
3   10 holes	6.3	2.480	1.210	49	48.41
4   7 holes	4.7	2.142	1.047	41	40.50
5   5 holes	2.8	1.653	0.812	33	32.60

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): 33.972      Intercept(b): 5.429      Correlation Coefficient(r): 0.9953

Checked by: Magnum Fan

Date: 17/08/2024

High-Volume TSP Sampler  
5-Point Calibration Record

Location : ASR4  
 Calibrated by : P. F. Yeung  
 Date : 16/08/2024

Sampler

Model : GMWS-2310 ACCU-VOL  
 Serial Number : S/N 1068

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
 Next Calibration Due 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) : 105  
 Ta(K) : 303

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1   18 holes	11.6	3.365	1.637	54	53.35
2   13 holes	9.0	2.964	1.443	48	47.42
3   10 holes	6.5	2.519	1.229	42	41.49
4   7 holes	4.4	2.072	1.014	34	33.59
5   5 holes	2.5	1.562	0.768	27	26.67

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): 31.003      Intercept(b): 2.736      Correlation Coefficient(r): 0.9991

Checked by: Magnum Fan

Date: 17/08/2024

# 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: <b>2454</b>		

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)	$\sqrt{\Delta H (Ta/Pa)}$ (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
<b>QSTD</b>	m=	<b>2.07544</b>	<b>QA</b>	m=	<b>1.29961</b>
	b=	<b>-0.03205</b>		b=	<b>-0.02017</b>
	r=	<b>0.99999</b>		r=	<b>0.99999</b>

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= $1/m \left( \left( \sqrt{\Delta H (Ta/Pa)} \right) - b \right)$	

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



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### SUB-CONTRACTING REPORT

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CONTACT	: MR MAGNUM FAN	WORK ORDER	: HK2419604
CLIENT	: ENVIROTECH SERVICES CO.		
ADDRESS	: RM 712, 7/F, MY LOFT 9 HOI WING ROAD, TUEN MUN, N.T. HK	SUB-BATCH	: 1
		DATE RECEIVED	: 20-MAY-2024
		DATE OF ISSUE	: 24-MAY-2024
PROJECT	: ----	NO. OF SAMPLES	: 1
		CLIENT ORDER	: ----

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#### General Comments

- Sample Information (Project name, Sample ID, Sampling date/time, etc.) is provided by client.
  - Result(s) of sample(s) is/are reported on as received basis, unless otherwise specified. The result(s) is/are related only to the item(s) tested.
  - Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in ambient condition.
  - Calibration was subcontracted to Envirotech Services Company.
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#### Signatories

This document has been signed by those names that appear on this report and are the authorised signatories

Signatories

Position

Richard Fung

Managing Director

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

All pages of this report have been checked and approved for release.

**ALS Technichem (HK) Pty Ltd**  
Part of the **ALS Laboratory Group**

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Tel. +852 2610 1044 Fax +852 2610 2021 www.alsglobal.com

WORK ORDER : HK2419604  
SUB-BATCH : 1  
CLIENT : ENVIROTECH SERVICES CO.  
PROJECT : ----



ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK2419604-001	Sibata LD-3B (235786)	Equipments	11-May-2024	S/N: 235786

----- END OF REPORT -----



Equipment Verification Report (TSP)

Equipment Calibrated:

Type: Laser Dust Monitor  
Manufacturer: Sibata LD-3B  
Serial No.: 235786  
Equipment Ref.: N/A  
ALS Job Order: HK2418944

Standard Equipment

Standard Equipment: High Volume Sampler (TSP)  
Location: Envirotech Room (Calibration Room)  
Equipment Ref.: HVS 8162  
Last Calibration Date: 25-Mar-2024

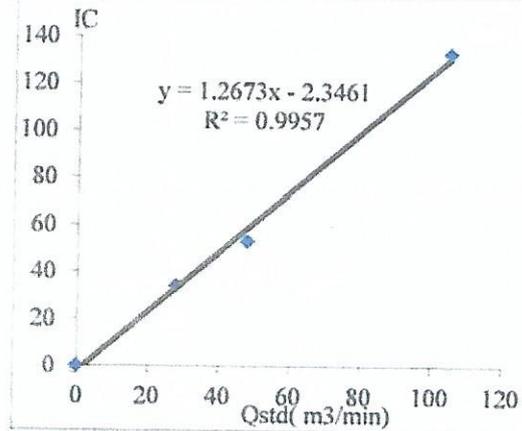
Equipment Verification Results:

Verification Date: 11-May-2024

Hour	Time	Mean Temp °C	Mean Pressure (hpa)	Concentration in µg/m <sup>3</sup> (Standard Equipment) (Y-Axis)	Concentration in µg/m <sup>3</sup> (Calibrated Equipment) (X-Axis)
1hr 00mins	0830-0930	26.8	1015	34	28
2hr 00mins	0935-1135	28.5	1015	53	48
3hr 00mins	1310-1610	29.5	1016	133	105

Linear Regression of Y or X

Slope (K-factor): 1.2673(µg/m<sup>3</sup>)/CPM  
Correlation Coefficient (R): 0.9978  
Date of Issue: 19-May-2024



Remarks:

- Strong Correlation (>0.8)
- Factor 1.2673(µg/m<sup>3</sup>)/CPM should be applied for TSP monitoring

\*If R<0.5, repair or verification is required for the equipment

Operator: P.F.Yeung Signature Tai Date: 19 May 2024

QC Reviewer: K.F.Ho Signature Ho Date: 19 May 2024

## TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location : Rm. 712, My Loft, Tuen Mun	Date of Calibration: 25-Mar-24
HVS ID: 8162	Next Calibration Date: 24-May-24
Name and Model : TISCH HVS Model TE-5170	Operator: P.F. Yeung

### CONDITIONS

Sea Level Pressure (hpa)	1016	Corrected Pressure (mm Hg)	762.1
Temperature (°C)	24.5	Temperature (K)	297.5

### CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.07544
Model:	TE-5025A	Qstd Intercept	-0.03205
Serial#:	2454		

### CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope= 30.471 Intercept= 5.514 Corr. Coeff.= 0.9994
18	6.7	6.8	13.5	1.790	60	60.15	
13	5.5	5.6	11.1	1.625	55	55.13	
10	4.3	4.5	8.8	1.448	49	49.12	
7	2.5	2.7	5.2	1.117	40	40.10	
5	1.5	1.7	3.2	0.879	32	32.08	

**Calculations:**

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

**For subsequent calculation of sampler flow:**

$$1/m(I[\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

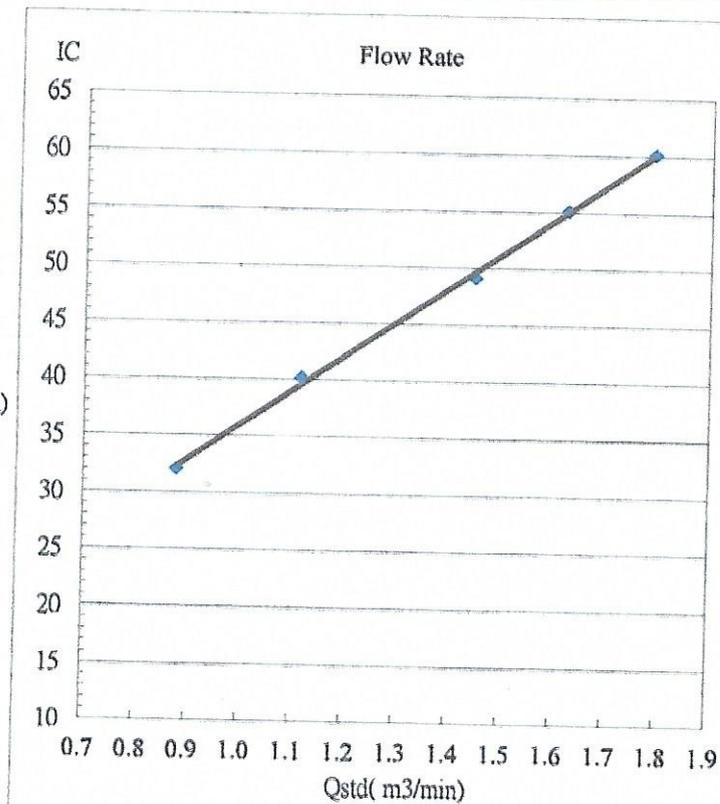
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure





# 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: <b>2454</b>		

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
<b>QSTD</b>	m=	<b>2.07544</b>	<b>QA</b>	m=	<b>1.29961</b>
	b=	<b>-0.03205</b>		b=	<b>-0.02017</b>
	r=	<b>0.99999</b>		r=	<b>0.99999</b>

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



## ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

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### SUB-CONTRACTING REPORT

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CONTACT	: MR MAGNUM FAN	WORK ORDER	: HK2420361
CLIENT	: ENVIROTECH SERVICES CO.		
ADDRESS	: RM 712, 7/F, MY LOFT 9 HOI WING ROAD, TUEN MUN, N.T. HK	SUB-BATCH	: 1
		DATE RECEIVED	: 22-MAY-2024
		DATE OF ISSUE	: 29-MAY-2024
PROJECT	: ----	NO. OF SAMPLES	: 1
		CLIENT ORDER	: ----

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#### General Comments

- Sample information (Project name, Sample ID, Sampling date/time, etc.) is provided by client.
  - Result(s) of sample(s) is/are reported on as received basis, unless otherwise specified. The result(s) is/are related only to the item(s) tested.
  - Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in ambient condition.
  - Calibration was subcontracted to Envirotech Services Company.
- 

#### Signatories

This document has been signed by those names that appear on this report and are the authorised signatories

Signatories

Position

Richard Fung

Managing Director

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

All pages of this report have been checked and approved for release.

**ALS Technichem (HK) Pty Ltd**  
Part of the **ALS Laboratory Group**

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WORK ORDER : HK2420361  
SUB-BATCH : 1  
CLIENT : ENVIROTECH SERVICES CO.  
PROJECT : ----



ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK2420361-001	Sibata LD-3B (1Y5546)	Equipments	18-May-2024	S/N: 1Y5546

----- END OF REPORT -----



Equipment Verification Report (TSP)

Equipment Calibrated:

Type: Laser Dust Monitor  
Manufacturer: Sibata LD-3B  
Serial No.: 1Y5546  
Equipment Ref.: N/A  
ALS Job Order: HK2419692

Standard Equipment

Standard Equipment: High Volume Sampler (TSP)  
Location: Envirotech Room (Calibration Room)  
Equipment Ref.: HVS 8162  
Last Calibration Date: 25-Mar-2024

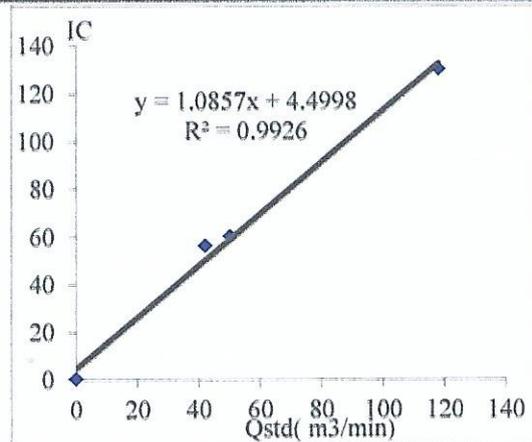
Equipment Verification Results:

Verification Date: 18-May-2024

Hour	Time	Mean Temp °C	Mean Pressure (hpa)	Concentration in µg/m³ (Standard Equipment) (Y-Axis)	Concentration in µg/m³ (Calibrated Equipment) (X-Axis)
1hr 00mins	0900-1000	24.2	1006	56	42
2hr 00mins	1005-1205	24.4	1006	60	50
3hr 00mins	1400-1700	27.1	1007	130	118

Linear Regression of Y or X

Slope (K-factor): 1.0857(µg/m³)/CPM  
Correlation Coefficient (R): 0.9963  
Date of Issue: 22-May-2024



Remarks:

- 1. Strong Correlation (>0.8)
- 2. Factor 1.0856(µg/m³)/CPM should be applied for TSP monitoring

\*If R<0.5, repair or verification is required for the equipment

Operator: P.F.Yeung Signature: Fai Date: 22 May 2024

QC Reviewer: K.F.Ho Signature: [Signature] Date: 22 May 2024

## TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location : Rm. 712, My Loft, Tuen Mun	Date of Calibration:	25-Mar-24
HVS ID: 8162	Next Calibration Date:	24-May-24
Name and Model : TISCH HVS Model TE-5170	Operator:	P.F.Yeung

### CONDITIONS

Sea Level Pressure (hpa)	1016	Corrected Pressure (mm Hg)	762.1
Temperature (°C)	24.5	Temperature (K)	297.5

### CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.07544
Model:	TE-5025A	Qstd Intercept	-0.03205
Serial#:	2454		

### CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.7	6.8	13.5	1.790	60	60.15	
13	5.5	5.6	11.1	1.625	55	55.13	
10	4.3	4.5	8.8	1.448	49	49.12	
7	2.5	2.7	5.2	1.117	40	40.10	
5	1.5	1.7	3.2	0.879	32	32.08	

**Calculations:**

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

**For subsequent calculation of sampler flow:**

$$1/m(I[\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

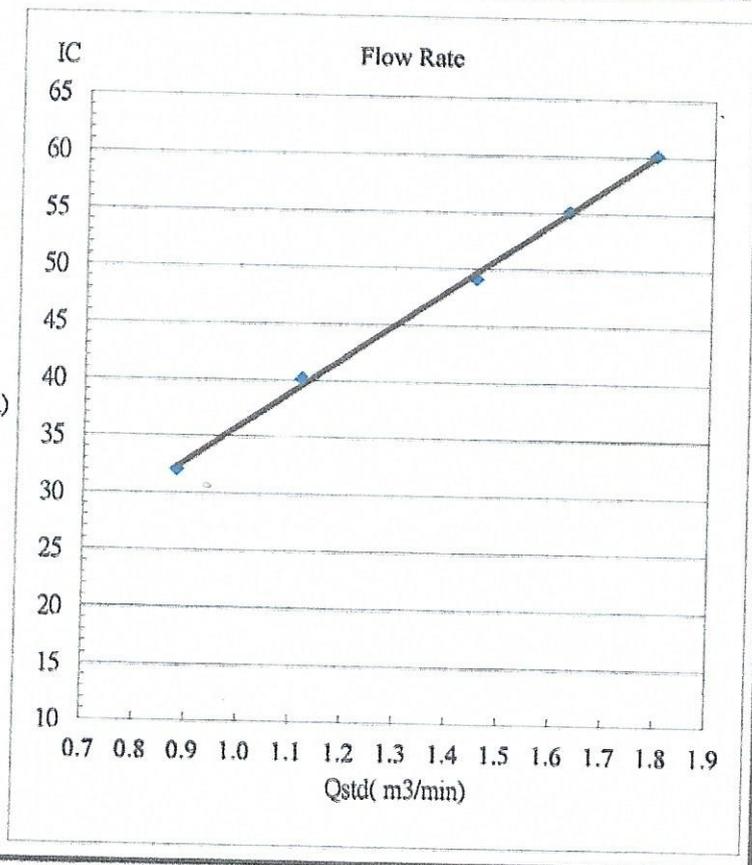
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure





# 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: <b>2454</b>		

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
<b>QSTD</b>	m=	<b>2.07544</b>	<b>QA</b>	m=	<b>1.29961</b>
	b=	<b>-0.03205</b>		b=	<b>-0.02017</b>
	r=	<b>0.99999</b>		r=	<b>0.99999</b>

Calculations			
$Vstd = \Delta Vol \left( \frac{Pa - \Delta P}{Pstd} \right) \left( \frac{Tstd}{Ta} \right)$	$Va = \Delta Vol \left( \frac{Pa - \Delta P}{Pa} \right)$		
$Qstd = Vstd / \Delta Time$	$Qa = Va / \Delta Time$		
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

**Appendix E**  
**Calibration Record**  
**(Noise Monitoring)**

# Certificate of Calibration

## 校正證書

Certificate No. : C237486

證書編號

ITEM TESTED / 送檢項目 ( Job No. / 序引編號 : IC23-2475 )

Date of Receipt / 收件日期 : 8 December 2023

Description / 儀器名稱 : Sound Level Meter

Manufacturer / 製造商 : Rion

Model No. / 型號 : NL-52

Serial No. / 編號 : 01010406

Supplied By / 委託者 : Envirotech Services Co.

Room 712, 7/F, My Loft, 9 Hoi Wing Road, Tuen Mun,  
New Territories, Hong Kong

### TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C

Relative Humidity / 相對濕度 : (50 ± 25)%

Line Voltage / 電壓 : ---

### TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 31 December 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
- Hottinger Brüel & Kjær Calibration Laboratory, Denmark
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA

Tested By

測試

:



H T Wong  
Assistant Engineer

Certified By

核證

:



K C Lee  
Engineer

Date of Issue

簽發日期

:

3 January 2024

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。

# Certificate of Calibration

## 校正證書

Certificate No. : C237486

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	C230306
CL281	Multifunction Acoustic Calibrator	CDK2302738

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 Limit (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L <sub>A</sub>	A	Fast	94.00	1	94.0	± 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 <sub>A</sub>	A	Fast	94.00	1	94.0 (Ref.)
				104.00		104.1
				114.00		114.0

IEC 61672 Class 1 Limit : ± 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 Limit (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L <sub>A</sub>	A	Fast	94.00	1	94.0	Ref.
			Slow			94.0	± 0.3

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。

# Certificate of Calibration

## 校正證書

Certificate No. : C237486

證書編號

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Limit (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L <sub>A</sub>	A	Fast	94.00	63 Hz	67.7	-26.2 ± 1.5
					125 Hz	77.8	-16.1 ± 1.5
					250 Hz	85.3	-8.6 ± 1.4
					500 Hz	90.7	-3.2 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	95.2	+1.2 ± 1.6
					4 kHz	95.0	+1.0 ± 1.6
					8 kHz	93.0	-1.1 (+2.1 ; -3.1)
					16 kHz	86.0	-6.6 (+3.5 ; -17.0)

#### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Limit (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L <sub>C</sub>	C	Fast	94.00	63 Hz	93.1	-0.8 ± 1.5
					125 Hz	93.8	-0.2 ± 1.5
					250 Hz	94.0	0.0 ± 1.4
					500 Hz	94.0	0.0 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	93.8	-0.2 ± 1.6
					4 kHz	93.2	-0.8 ± 1.6
					8 kHz	91.1	-3.0 (+2.1 ; -3.1)
					16 kHz	84.1	-8.5 (+3.5 ; -17.0)

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。



# Certificate of Calibration

## 校正證書

Certificate No. : C237486  
證書編號

Remarks : - UUT Microphone Model No. : UC-59 & S/N : 13748

- 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
	16 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.

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所書面批准。



# Certificate of Calibration 校正證書

Certificate No. : C235237  
證書編號

ITEM TESTED / 送檢項目 ( Job No. / 序引編號 : IC23-1753 )      Date of Receipt / 收件日期 : 22 August 2023

Description / 儀器名稱 : Precision Acoustic Calibrator  
Manufacturer / 製造商 : LARSON DAVIS  
Model No. / 型號 : CAL200  
Serial No. / 編號 : 16878  
Supplied By / 委託者 : Envirotech Services Co.  
Room 712, 7/F, My Loft, 9 Hoi Wing Road, Tuen Mun,  
New Territories, Hong Kong

## TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C      Relative Humidity / 相對濕度 : (50 ± 25)%  
Line Voltage / 電壓 : ---

## TEST SPECIFICATIONS / 測試規範

Calibration check

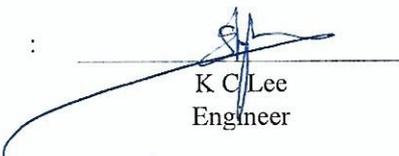
DATE OF TEST / 測試日期 : 9 September 2023

## 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
- Hottinger Brüel & Kjær Calibration Laboratory, Denmark
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA

Tested By :   
測試 : K C Lee  
Engineer

Certified By :   
核證 : H C Chan  
Engineer

Date of Issue : 12 September 2023  
簽發日期

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所書面批准。

# Certificate of Calibration

## 校正證書

Certificate No. : C235237  
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 :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C233799
CL281	Multifunction Acoustic Calibrator	CDK2302738
TST150A	Measuring Amplifier	C221750

- Test procedure : MA100N.

- 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	93.95	± 0.2	± 0.20
114 dB, 1 kHz	113.95		

### 5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Limit	Uncertainty of Measured Value (Hz)
1	1.000	1 kHz ± 1 %	± 1

Remark : 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.

**Appendix E**  
**Calibration Record**  
**(Water Quality Monitoring)**



專業化驗有限公司  
QUALITY PRO TEST-CONSULT LIMITED

Unit 10, 5/F, Wah Wai Centre, 38-40 Au Pui Wan St., Fotan, Hong Kong  
Email: info@qualityprotest.com; Website: www.qualityprotest.com  
Tel: (852) 3956 8717; Fax: (852) 3956 3928

## REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

Test Report No. : R-BD090003  
Date of Issue : 02 September 2024  
Page No. : 1 of 2

### PART A - CUSTOMER INFORMATION

Enovative Environmental Service Ltd.  
Flat 2207, Yu Fun House Yu Chui Court, Shatin  
New Territories (HK) Hong Kong

### PART B - SAMPLE INFORMATION

Name of Equipment : YSI ProDSS Multi Parameters  
Manufacturer : YSI  
Serial Number : 16H104233  
Date of Received : 30 August 2024  
Date of Calibration : 30 August 2024  
Date of Next Calibration : 30 November 2024  
Request No. : D-BD090003

### PART C - REFERENCE METHODS/ DOCUMENTS FOR THE CALIBRATION

Test Parameter	Reference Method
pH value	APHA 21e 4500-H <sup>+</sup> B
Temperature	Section 6 of international Accreditation New Zealand Technical Guide no. 3 Second edition March 2008: Working Thermometer Calibration Procedure
Salinity	APHA 21e 2520 B
Dissolved oxygen	APHA 23e 4500-O G (Membrane Electrode Method)
Conductivity	APHA 21e 2510 B
Turbidity	APHA 21e 2130 B (Nephelometric Method)

### PART D - CALIBRATION RESULT

#### (1) pH value

Target (pH unit)	Display Reading (pH unit)	Tolerance	Result
4.00	4.03	0.03	Satisfactory
7.42	7.46	0.04	Satisfactory
10.01	10.10	0.09	Satisfactory

Tolerance of pH value should be less than  $\pm 0.2$  (pH unit)

#### (2) Temperature

Reading of Ref. thermometer (°C)	Display Reading (°C)	Tolerance	Result
10.0	10.1	0.1	Satisfactory
20.0	20.0	0.0	Satisfactory
40.0	40.0	0.0	Satisfactory

Tolerance of Temperature should be less than  $\pm 2.0$  (°C)

#### (3) Salinity

Expected Reading (g/L)	Display Reading (g/L)	Tolerance (%)	Result
10	10.06	0.60	Satisfactory
20	19.98	-0.10	Satisfactory
30	29.93	-0.23	Satisfactory

Tolerance of Salinity should be less than  $\pm 10.0$  (%)

--- CONTINUED ON NEXT PAGE ---

AUTHORIZED  
SIGNATORY:

  
LEE Chun-ning  
Assistant Manager



## REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

Test Report No. : R-BD090003  
Date of Issue : 02 September 2024  
Page No. : 2 of 2

### (4) Dissolved oxygen

Expected Reading (mg/L)	Display Reading (mg/L)	Tolerance	Result
7.65	7.44	-0.21	Satisfactory
5.23	5.10	-0.13	Satisfactory
3.72	3.88	0.16	Satisfactory
0.30	0.10	-0.20	Satisfactory

Tolerance of Dissolved oxygen should be less than  $\pm 0.5$  (mg/L)

### (5) Conductivity

Expected Reading ( $\mu\text{S/cm}$ at 25°C)	Display Reading	Tolerance (%)	Result
146.9	151.7	3.3	Satisfactory
1412	1371	-2.9	Satisfactory
12890	12824	-0.5	Satisfactory
58670	59237	1.0	Satisfactory
111900	113225	1.2	Satisfactory

Tolerance of Conductivity should be less than  $\pm 10.0$  (%)

### (6) Turbidity

Expected Reading (NTU)	Display Reading (NTU)	Tolerance <sup>(a)</sup> (%)	Result
0	0.05	--	Satisfactory
10	9.84	-1.6	Satisfactory
20	19.52	-2.4	Satisfactory
100	97.41	-2.6	Satisfactory
800	811.20	1.4	Satisfactory

Tolerance of Turbidity should be less than  $\pm 10.0$  (%)

<sup>(a)</sup> For 0 NTU, Display Reading should be less than 1 NTU

### Remark(s)

- The "Date of Next Calibration" is recommended according to best practice principals as practiced by QPT or quoted from relevant international standards.
- The results relate only to the calibrated equipment as received
- The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.
- "Displayed Reading" denotes the figure shown on item under calibration/ checking regardless of equipment precision or significant figures.
- The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted from relevant international standards.

--- END OF REPORT ---



專業化驗有限公司  
QUALITY PRO TEST-CONSULT LIMITED

Unit 10, 5/F, Wah Wai Centre, 38-40 Au Pui Wan St., Fotan, Hong Kong  
Email: info@qualityprotest.com; Website: www.qualityprotest.com  
Tel: (852) 3956 8717; Fax: (852) 3956 3928

**REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION**

**Test Report No.** : R-BD090004  
**Date of Issue** : 02 September 2024  
**Page No.** : 1 of 2

**PART A - CUSTOMER INFORMATION**

Enovative Environmental Service Ltd.  
Flat 2207, Yu Fun House Yu Chui Court, Shatin  
New Territories (HK) Hong Kong

**PART B - SAMPLE INFORMATION**

Name of Equipment : YSI ProDSS Multi Parameters  
Manufacturer : YSI  
Serial Number : 21K101469  
Date of Received : 30 August 2024  
Date of Calibration : 30 August 2024  
Date of Next Calibration : 30 November 2024  
Request No. : D-BD090004

**PART C - REFERENCE METHODS/ DOCUMENTS FOR THE CALIBRATION**

<u>Test Parameter</u>	<u>Reference Method</u>
pH value	APHA 21e 4500-H <sup>+</sup> B
Temperature	Section 6 of international Accreditation New Zealand Technical Guide no. 3 Second edition March 2008: Working Thermometer Calibration Procedure
Salinity	APHA 21e 2520 B
Dissolved oxygen	APHA 23e 4500-O G (Membrane Electrode Method)
Conductivity	APHA 21e 2510 B
Turbidity	APHA 21e 2130 B (Nephelometric Method)

**PART D - CALIBRATION RESULT**

**(1) pH value**

Target (pH unit)	Display Reading (pH unit)	Tolerance	Result
4.00	4.06	0.06	Satisfactory
7.42	7.48	0.06	Satisfactory
10.01	10.09	0.08	Satisfactory

Tolerance of pH value should be less than  $\pm 0.2$  (pH unit)

**(2) Temperature**

Reading of Ref. thermometer (°C)	Display Reading (°C)	Tolerance	Result
10.0	10.0	0.0	Satisfactory
20.0	20.0	0.0	Satisfactory
40.0	40.0	0.0	Satisfactory

Tolerance of Temperature should be less than  $\pm 2.0$  (°C)

**(3) Salinity**

Expected Reading (g/L)	Display Reading (g/L)	Tolerance (%)	Result
10	10.04	0.40	Satisfactory
20	20.10	0.50	Satisfactory
30	30.12	0.40	Satisfactory

Tolerance of Salinity should be less than  $\pm 10.0$  (%)

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**AUTHORIZED  
SIGNATORY:**

  
LEE Chun-ning  
Assistant Manager



專業化驗有限公司

QUALITY PRO TEST-CONSULT LIMITED

Unit 10, 5/F, Wah Wai Centre, 38-40 Au Pui Wan St., Fotan, Hong Kong

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## REPORT OF EQUIPMENT PERFORMANCE CHECK/ CALIBRATION

Test Report No. : R-BD090004

Date of Issue : 02 September 2024

Page No. : 2 of 2

### (4) Dissolved oxygen

Expected Reading ( mg/L )	Display Reading ( mg/L )	Tolerance	Result
7.65	7.57	-0.08	Satisfactory
5.23	5.17	-0.06	Satisfactory
3.72	3.79	0.07	Satisfactory
0.30	0.10	-0.20	Satisfactory

Tolerance of Dissolved oxygen should be less than  $\pm 0.5$  ( mg/L )

### (5) Conductivity

Expected Reading ( $\mu\text{S}/\text{cm}$ at 25°C )	Display Reading	Tolerance ( % )	Result
146.9	151.0	2.8	Satisfactory
1412	1362	-3.5	Satisfactory
12890	12813	-0.6	Satisfactory
58670	58930	0.4	Satisfactory
111900	114176	2.0	Satisfactory

Tolerance of Conductivity should be less than  $\pm 10.0$  ( % )

### (6) Turbidity

Expected Reading ( NTU )	Display Reading ( NTU )	Tolerance <sup>(a)</sup> ( % )	Result
0	0.05	--	Satisfactory
10	9.85	-1.5	Satisfactory
20	19.66	-1.7	Satisfactory
100	97.39	-2.6	Satisfactory
800	811.10	1.4	Satisfactory

Tolerance of Turbidity should be less than  $\pm 10.0$  ( % )

<sup>(a)</sup> For 0 NTU, Display Reading should be less than 1 NTU

#### Remark(s)

- The "Date of Next Calibration" is recommended according to best practice principals as practiced by QPT or quoted from relevant international standards.
- The results relate only to the calibrated equipment as received
- The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.
- "Displayed Reading" denotes the figure shown on item under calibration/ checking regardless of equipment precision or significant figures.
- The "Tolerance Limit" mentioned is the acceptance criteria applicable for similar equipment used by Quality Pro Test-Consult Ltd. or quoted from relevant international standards.

--- END OF REPORT ---