

High-Volume TSP Sampler  
5-Point Calibration Record

Location : AM1(ICC)  
 Calibrated by : K.T.Ho  
 Date : 30/12/2025

Sampler

Model : TE-5170  
 Serial Number : S/N 0767

Calibration Orifice and Standard Calibration Relationship

Serial Number : 2454  
 Next Calibration Due Date : 01 December 2026  
 Slope(m) : 2.07213  
 Intercept(b) : -0.03919  
 Correlation Coefficient(r) : 0.99999

Standard Condition

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

Calibration Condition

Pa (hpa) : 1015.4  
 Ta(K) : 292.5

Resistance Plate	dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (chart)	Y (corrected)
1   18 holes	11.2	3.382	1.651	58	58.62
2   13 holes	8.2	2.894	1.416	50	50.53
3   10 holes	6.2	2.517	1.233	42	42.45
4   7 holes	4.4	2.120	1.042	32	32.34
5   5 holes	2.6	1.630	0.805	20	20.21

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

Sampler Calibration Relationship

Slope(m): 45.961      Intercept(b): -15.679      Correlation Coefficient(r): 0.9960

Checked by:   
 \_\_\_\_\_  
 Magnum Fan

Date: 02/01/2026

# Certificate of Calibration

Calibration Certification Information			
Cal. Date: December 1, 2025	Rootsmeter S/N: 438320	Ta: 294	°K
Operator: Jim Tisch		Pa: 755.4	mm Hg
Calibration Model #: TE-5025A	Calibrator S/N: 2454		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4240	3.2	2.00
2	3	4	1	1.0130	6.4	4.00
3	5	6	1	0.9040	7.9	5.00
4	7	8	1	0.8620	8.8	5.50
5	9	10	1	0.7130	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)
1.0032	0.7045	1.4195	0.9958	0.6993	0.8823
0.9989	0.9861	2.0075	0.9915	0.9788	1.2477
0.9969	1.1028	2.2444	0.9895	1.0946	1.3950
0.9957	1.1551	2.3539	0.9884	1.1466	1.4631
0.9904	1.3891	2.8390	0.9831	1.3788	1.7645
<b>QSTD</b>	m=	<b>2.07213</b>	<b>QA</b>	m=	<b>1.29754</b>
	b=	<b>-0.03919</b>		b=	<b>-0.02436</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



---

### SUB-CONTRACTING REPORT

---

CONTACT	: MR MAGNUM FAN	WORK ORDER	: <b>HK2517350</b>
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	: 4-MAY-2025
		DATE OF ISSUE	: 12-MAY-2025
PROJECT	: ----	NO. OF SAMPLES	: 1
		CLIENT ORDER	: ----

---

#### *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

---

---

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**

WORK ORDER : HK2517350  
SUB-BATCH : 1  
CLIENT : ENVIROTECH SERVICES CO.  
PROJECT : ----



ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK2517350-001	Sibata LD-5R (831657)	Equipments	26-Apr-2025	S/N: 831657

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



Equipment Verification Report (TSP)

Equipment Calibrated:

Type: Laser Dust Monitor  
Manufacturer: Sibata LD-5R  
Serial No.: 831657  
Equipment Ref.: N/A  
ALS Job Order: HK2516538

Standard Equipment

Standard Equipment: High Volume Sampler (TSP)  
Location : Envirotech Room (Calibration Room)  
Equipment Ref.: HVS 8162  
Last Calibration Date: 17-Mar-2025

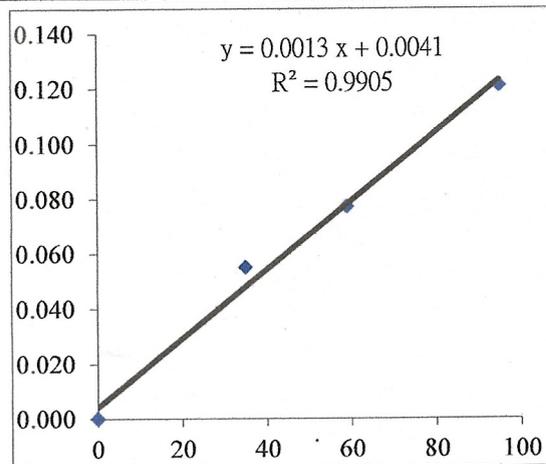
Equipment Verification Results:

Verification Date: 26-Apr-2025

Hour	Time	Mean Temp °C	Mean Pressure (hpa)	TSP Level in mg (Standard Equipment) (Y-Axis)	Total Count (Calibrated Equipment) (X-Axis)
1hr 00mins	0845-0945	23.8	1013.2	0.055	35
2hr 00mins	0950-1150	24.9	1013.4	0.077	59
3hr 00mins	1315-1615	28.2	1013.5	0.121	95

Linear Regression of Y or X

Slope (K-factor): 0.0013(mg)/Count  
Correlation Coefficient (R): 0.9905  
Date of Issue: 3-May-2025



Remarks:

- 1. Strong Correlation (>0.8)
- 2. Factor 0.0013(mg)/Count 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: 03 May 2025

QC Reviewer: K.F.Ho Signature *at* Date: 03 May 2025

## TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location : Rm. 712, My Loft, Tuen Mun	Date of Calibration:	17-Mar-25
HVS ID: 8162	Next Calibration Date:	16-May-25
Name and Model : TISCH HVS Model TE-5170	Operator:	K.F.Ho

### CONDITIONS

Sea Level Pressure (hpa)	1022	Corrected Pressure (mm Hg)	766.6
Temperature (°C)	18.0	Temperature (K)	291

### CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.08315
Model:	TE-5025A	Qstd Intercept	-0.04938
Serial#:	2454		

### CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.8	6.9	13.7	1.830	62	63.03	Slope= 39.645 Intercept= -8.4950 Corr. Coeff.= 0.9912
13	5.2	5.3	10.5	1.605	56	56.93	
10	4.8	4.8	9.6	1.536	50	50.83	
7	2.8	2.8	5.6	1.179	40	40.66	
5	1.6	1.6	3.2	0.897	25	25.41	

**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:**

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

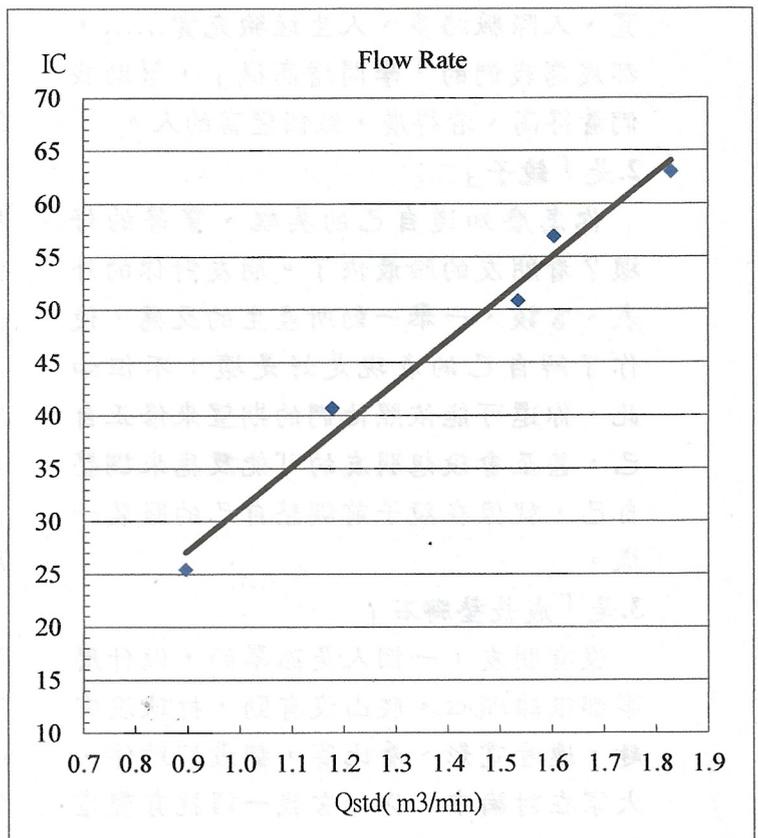
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure



# Certificate of Calibration

Calibration Certification Information			
Cal. Date: December 2, 2024	Rootsmeter S/N: 438320	Ta: 293	°K
Operator: Jim Tisch		Pa: 757.4	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	1.4200	3.2	2.00
2	3	4	1	1.0170	6.4	4.00
3	5	6	1	0.9090	7.9	5.00
4	7	8	1	0.8700	8.8	5.50
5	9	10	1	0.7140	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)
1.0093	0.7108	1.4238	0.9958	0.7013	0.8796
1.0051	0.9883	2.0136	0.9916	0.9750	1.2439
1.0031	1.1035	2.2512	0.9896	1.0886	1.3907
1.0018	1.1515	2.3611	0.9884	1.1361	1.4586
0.9965	1.3956	2.8476	0.9831	1.3769	1.7592
<b>QSTD</b>	m=	<b>2.08315</b>	<b>QA</b>	m=	<b>1.30443</b>
	b=	<b>-0.04938</b>		b=	<b>-0.03050</b>
	r=	<b>0.99985</b>		r=	<b>0.99985</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



---

### SUB-CONTRACTING REPORT

---

CONTACT	: MR MAGNUM FAN	WORK ORDER	: <b>HK2520194</b>
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	: 16-MAY-2025
		DATE OF ISSUE	: 23-MAY-2025
PROJECT	: ----	NO. OF SAMPLES	: 1
		CLIENT ORDER	: ----

---

#### *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

---

---

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**

WORK ORDER : HK2520194  
SUB-BATCH : 1  
CLIENT : ENVIROTECH SERVICES CO.  
PROJECT : ----



ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK2520194-001	Sibata LD-3B (1Y5546)	Equipments	10-May-2025	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: HK2518511

Standard Equipment

Standard Equipment: High Volume Sampler (TSP)  
Location : Envirotech Room (Calibration Room)  
Equipment Ref.: HVS 8162  
Last Calibration Date: 17-Mar-2025

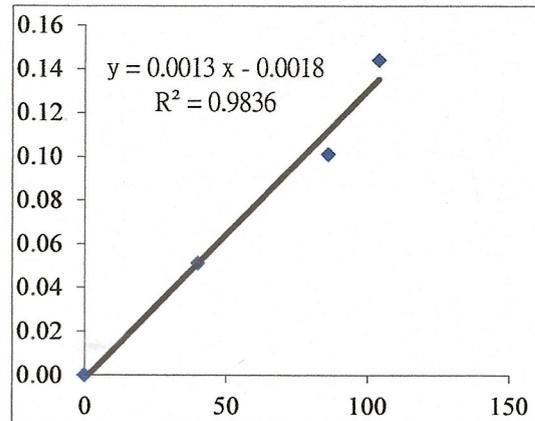
Equipment Verification Results:

Verification Date: 10-May-2025

Hour	Time	Mean Temp °C	Mean Pressure (hpa)	TSP Level in mg (Standard Equipment) (Y-Axis)	Total Count (Calibrated Equipment) (X-Axis)
1hr 00mins	0900-1000	24.2	1010.4	0.051	40
2hr 00mins	1005-1205	24.4	1010.2	0.101	86
3hr 00mins	1400-1700	27.1	1009.8	0.144	104

Linear Regression of Y or X

Slope (K-factor): 0.0013(mg)/Count  
Correlation Coefficient (R): 0.9918  
Date of Issue: 15-May-2025



Remarks:

1. Strong Correlation (>0.8)
2. Factor 0.0013(mg)/Count should be applied for TSP monitoring

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

Operator: P.F.Yeung Signature [Signature] Date: 15 May 2025

QC Reviewer: K.F.Ho Signature [Signature] Date: 15 May 2025

## TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location : Rm. 712, My Loft, Tuen Mun	Date of Calibration:	17-Mar-25
HVS ID: 8162	Next Calibration Date:	16-May-25
Name and Model : TISCH HVS Model TE-5170	Operator:	K.F.Ho

### CONDITIONS

Sea Level Pressure (hpa)	1022	Corrected Pressure (mm Hg)	766.6
Temperature (°C)	18.0	Temperature (K)	291

### CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.08315
Model:	TE-5025A	Qstd Intercept	-0.04938
Serial#:	2454		

### CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.8	6.9	13.7	1.830	62	63.03	Slope= 39.645 Intercept= -8.4950 Corr. Coeff.= 0.9912
13	5.2	5.3	10.5	1.605	56	56.93	
10	4.8	4.8	9.6	1.536	50	50.83	
7	2.8	2.8	5.6	1.179	40	40.66	
5	1.6	1.6	3.2	0.897	25	25.41	

**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:**

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

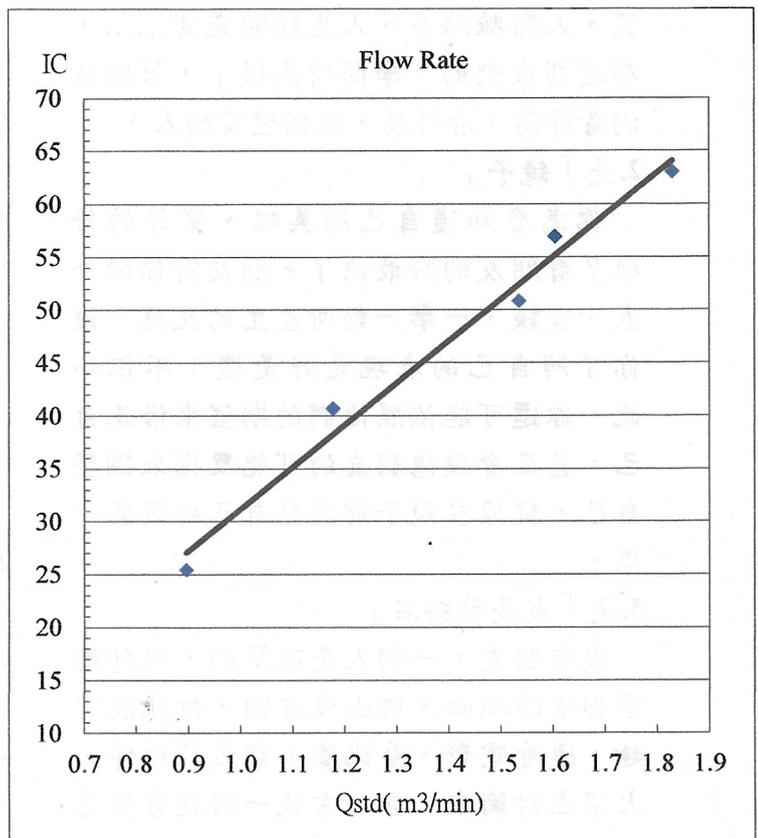
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure



# Certificate of Calibration

Calibration Certification Information			
Cal. Date: December 2, 2024	Rootsmeter S/N: 438320	Ta: 293	°K
Operator: Jim Tisch		Pa: 757.4	mm Hg
Calibration Model #: TE-5025A	Calibrator S/N: 2454		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4200	3.2	2.00
2	3	4	1	1.0170	6.4	4.00
3	5	6	1	0.9090	7.9	5.00
4	7	8	1	0.8700	8.8	5.50
5	9	10	1	0.7140	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)
1.0093	0.7108	1.4238	0.9958	0.7013	0.8796
1.0051	0.9883	2.0136	0.9916	0.9750	1.2439
1.0031	1.1035	2.2512	0.9896	1.0886	1.3907
1.0018	1.1515	2.3611	0.9884	1.1361	1.4586
0.9965	1.3956	2.8476	0.9831	1.3769	1.7592
<b>QSTD</b>	m=	<b>2.08315</b>	<b>QA</b>	m=	<b>1.30443</b>
	b=	<b>-0.04938</b>		b=	<b>-0.03050</b>
	r=	<b>0.99985</b>		r=	<b>0.99985</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= $\frac{1}{m} \left( \left( \sqrt{\Delta H \left( \frac{Pa}{Pstd} \right) \left( \frac{Tstd}{Ta} \right)} \right) - b \right)$	Qa= $\frac{1}{m} \left( \left( \sqrt{\Delta H \left( \frac{Ta}{Pa} \right)} \right) - b \right)$

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



---

### SUB-CONTRACTING REPORT

---

CONTACT	: MR MAGNUM FAN	WORK ORDER	: <b>HK2520196</b>
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	: 16-MAY-2025
		DATE OF ISSUE	: 23-MAY-2025
PROJECT	: ----	NO. OF SAMPLES	: 1
		CLIENT ORDER	: ----

---

#### *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

---

---

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**

WORK ORDER : HK2520196  
SUB-BATCH : 1  
CLIENT : ENVIROTECH SERVICES CO.  
PROJECT : ----



ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK2520196-001	Sibata LD-3B (2Z6239)	Equipments	10-May-2025	S/N: 2Z6239

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



Equipment Verification Report (TSP)

Equipment Calibrated:

Type: Laser Dust Monitor  
Manufacturer: Sibata LD-3B  
Serial No.: 2Z6239  
Equipment Ref.: N/A  
ALS Job Order: HK2518511

Standard Equipment

Standard Equipment: High Volume Sampler (TSP)  
Location: Envirotech Room (Calibration Room)  
Equipment Ref.: HVS 8162  
Last Calibration Date: 17-Mar-2025

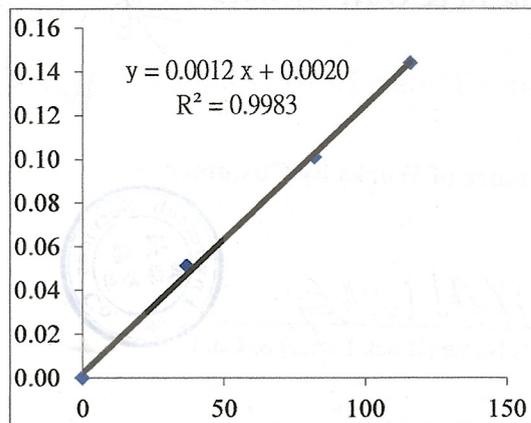
Equipment Verification Results:

Verification Date: 10-May-2025

Hour	Time	Mean Temp °C	Mean Pressure (hpa)	TSP Level in mg (Standard Equipment) (Y-Axis)	Total Count (Calibrated Equipment) (X-Axis)
1hr 00mins	0900-1000	24.2	1010.4	0.051	37
2hr 00mins	1005-1205	24.4	1010.2	0.101	82
3hr 00mins	1400-1700	27.1	1009.8	0.144	116

Linear Regression of Y or X

Slope (K-factor): 0.0012(mg)/Count  
Correlation Coefficient (R): 0.9992  
Date of Issue: 15-May-2025



Remarks:

1. Strong Correlation (>0.8)
2. Factor 0.0012(mg)/Count 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: 15 May 2025

QC Reviewer: K.F.Ho Signature at Date: 15 May 2025

## TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location : Rm. 712, My Loft, Tuen Mun	Date of Calibration:	17-Mar-25
HVS ID: 8162	Next Calibration Date:	16-May-25
Name and Model : TISCH HVS Model TE-5170	Operator:	K.F.Ho

### CONDITIONS

Sea Level Pressure (hpa)	1022	Corrected Pressure (mm Hg)	766.6
Temperature (°C)	18.0	Temperature (K)	291

### CALIBRATION ORIFICE

Make:	TISCH	Qstd Slope	2.08315
Model:	TE-5025A	Qstd Intercept	-0.04938
Serial#:	2454		

### CALIBRATION

Plate No.	H2O(L) (in)	H2O(R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.8	6.9	13.7	1.830	62	63.03	Slope= 39.645 Intercept= -8.4950 Corr. Coeff.= 0.9912
13	5.2	5.3	10.5	1.605	56	56.93	
10	4.8	4.8	9.6	1.536	50	50.83	
7	2.8	2.8	5.6	1.179	40	40.66	
5	1.6	1.6	3.2	0.897	25	25.41	

**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:**

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

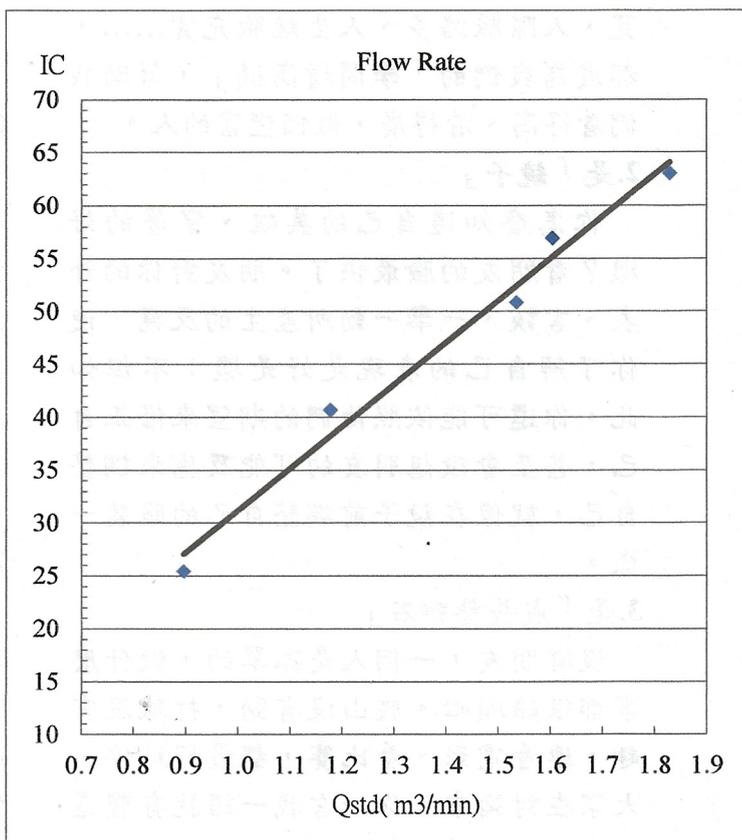
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure



# Certificate of Calibration

Calibration Certification Information			
Cal. Date: December 2, 2024	Rootsmeter S/N: 438320	Ta: 293 °K	
Operator: Jim Tisch		Pa: 757.4 mm Hg	
Calibration Model #: TE-5025A	Calibrator S/N: 2454		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4200	3.2	2.00
2	3	4	1	1.0170	6.4	4.00
3	5	6	1	0.9090	7.9	5.00
4	7	8	1	0.8700	8.8	5.50
5	9	10	1	0.7140	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)
1.0093	0.7108	1.4238	0.9958	0.7013	0.8796
1.0051	0.9883	2.0136	0.9916	0.9750	1.2439
1.0031	1.1035	2.2512	0.9896	1.0886	1.3907
1.0018	1.1515	2.3611	0.9884	1.1361	1.4586
0.9965	1.3956	2.8476	0.9831	1.3769	1.7592
<b>QSTD</b>	m=	<b>2.08315</b>	<b>QA</b>	m=	<b>1.30443</b>
	b=	<b>-0.04938</b>		b=	<b>-0.03050</b>
	r=	<b>0.99985</b>		r=	<b>0.99985</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

# Certificate of Calibration

for

*Description:*                      *Sound Level Calibrator*  
*Manufacturer:*                  *Larson Davis*  
*Type No.:*                          *CAL200*  
*Serial No.:*                        *16172*

## Submitted by:

*Customer:*                      *Envirotech Services Co.*  
*Address:*                        *Rm.712, 7/F., My Loft, 9 Hoi Wing Road,*  
*Tuen Mun, Hong Kong*

Upon receipt for calibration, the instrument was found to be:

**Within**

**Outside**

**the allowable tolerance.**

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

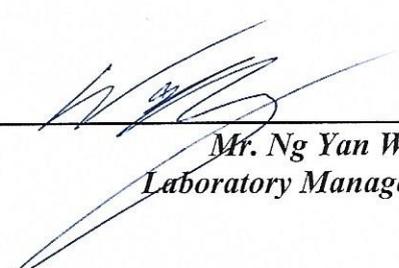
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory

**Date of receipt: 6 February 2025**

**Date of calibration: 7 February 2025**

**Date of NEXT calibration: 6 February 2026**

*Calibrated by:*   
*Calibration Technician*

*Certified by:*   
**Mr. Ng Yan Wa**  
**Laboratory Manager**

**Date of issue: 7 February 2025**

*Certificate No.: APJ24-143-CC002*



Page 1 of 2

**1. Calibration Precautions:**

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
- The results presented are the mean of 3 measurements at each calibration point.

**2. Calibration Specifications:**

Calibration check

**3. Calibration Conditions:**

Air Temperature: 24.3 °C  
Air Pressure: 1006 hPa  
Relative Humidity: 59.2 %

**4. Calibration Equipment:**

Test Equipment	Type	Serial No.	Calibration Report Number	Traceable to
Multifunction Calibrator	B&K 4226	2288467	AV240081	HOKLAS
Sound Level Meter	RION NA-28	30721812	AV240109	HOKLAS

**5. Calibration Results**

## 5.1 Sound Pressure Level

Nominal value dB	Accept lower level dB	Accept upper level dB	Measured value dB
94.0	93.6	94.4	93.7
114.0	113.6	114.4	113.7

**6. Calibration Results Applied**

The results apply to the particular unit-under-test only. All calibration points are within manufacture's specification as IEC 60942 Class 1.

Note:

The values given in this certification only related to the values measured at the time of the calibration.

Certificate No.: APJ24-143-CC002



Page 2 of 2

# Certificate of Calibration

Certificate No. ATS25-066-CC007

**Customer:** **Envirotech Services Company**

Room 712, 7/F, My Loft,  
9 Hoi Wing Road, Tuen Mun  
N.T., Hong Kong

**Unit-under-test (UUT):**

**Description:** Precision Acoustic Calibrator

**Manufacturer:** Larson Davis

**Type No.:** CAL 200

**Serial No.:** 11334

**Conditions during calibration:**

**Temperature:** 26°C

**Relative Humidity:** 57%

**Test Specifications:** Calibration Check

**Date of calibration:** 20 September 2025

**Test Results:** All calibration points are within manufacturer's specification.

**Certified by:**

  
**Mr. Y. T. LEUNG / Technical Manager**  
MIOA, MHKIOA, MHKIQEP



**Issue Date: 20 September 2025**

1. The instrument under test was allowed to stabilize in the laboratory for over 24 hours.

2. Calibration equipment:

<b>Description:</b>	Sound Analyzer	Reference Microphone
<b>Manufacturer:</b>	Brüel & Kjær	Brüel & Kjær
<b>Type No.:</b>	2270	4189
<b>Serial No.:</b>	3001883	2662797
<b>Last Calibration Date:</b>	11 March 2025	11 March 2025
<b>Certificate No.:</b>	AV250047	AV250047

The calibration equipment used for calibration is traceable to National Standards via Standards and Calibration Laboratory, the Government of the HKSAR.

3. The values given in this certification only related to the values measured at the time of the calibration and any uncertainties quoted, if any, will not allow for the equipment long-term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the calibration. Acoustic Testing Services Limited shall not be liable for any loss or damage resulting from the use of the equipment.

4. Calibration Results

Nominal value dB	Measured value dB	IEC 60942 Class 1 Tolerance Limits dB	Conclusion	Expanded Measurement Uncertainty of Reference Microphone B&K 4189 at 1000 Hz dB
94.00	94.07	± 0.25	PASS	0.20
114.0	113.76	± 0.25	PASS	0.20

All calibration points are within manufacturer's specification.

# Certificate of Calibration

Certificate No. ATS25-066-CC006

**Customer:** **Envirotech Services Company**

Room 712, 7/F, My Loft,  
9 Hoi Wing Road, Tuen Mun  
N.T., Hong Kong

**Unit-under-test (UUT):**

<b>Description:</b>	Sound Level Meter	,	Microphone	,	Pre-amplifier
<b>Manufacturer:</b>	RION	,	PCB Piezotronics	,	RION
<b>Type No.:</b>	NL-52	,	377B02	,	NH-25
<b>Serial No.:</b>	00643040	,	172764	,	21757

**Conditions during calibration:**

<b>Temperature:</b>	26°C
<b>Relative Humidity:</b>	57%

**Test Specifications:** Calibration Check

**Date of calibration:** 20 September 2025

**Test Results:** All calibration points are within manufacturer's specification.

**Certified by:**

   
**Mr. Y. T. LEUNG / Technical Manager**  
MIOA, MHKIOA, MHKIQEP

**Issue Date: 20 September 2025**

1. The instrument under test was allowed to stabilize in the laboratory for over 24 hours.

2. Calibration equipment:

**Description:** Acoustical Calibrator  
**Manufacturer & Type:** Brüel & Kjær 4231  
**Serial No.:** 2478237  
**Last Calibration Date:** 18 February 2025  
**Certificate No.:** AV250027

The calibration equipment used for calibration is traceable to National Standards via Standards and Calibration Laboratory, the Government of the HKSAR.

3. The Sound Analyzer has been calibrated in accordance with the requirements as specified in IEC 61672-1 Class 1, and vendor specific procedures.

4. The values given in this certification only related to the values measured at the time of the calibration and any uncertainties quoted, if any, will not allow for the equipment long-term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the calibration. Acoustic Testing Services Limited shall not be liable for any loss or damage resulting from the use of the equipment.

5. Calibration Results

Setting of unit-under-test (UUT)				Applied value		UUT Reading, dB	IEC 61672-1 Class 1 Tolerance Limits, dB	Conclusion		
Range, dB	Parameter*	Frequency Weighting	Response	Level, dB	Frequency, Hz					
30-130	Overall SPL	A	F	94.00	1000	94.0	± 0.7	PASS		
			S			94.0	± 0.7	PASS		
		C	F			94.0	± 0.7	PASS		
			S			94.0	± 0.7	PASS		
		L	F			94.0	± 0.7	PASS		
			S			94.0	± 0.7	PASS		
		A	F			114.00	1000	114.1	± 0.7	PASS
			S					114.1	± 0.7	PASS

\* Based on the setting of the UUT, the reading is overall sound pressure level in dB(A), dB(C) & dB.

All calibration points are within manufacturer's specification.