

HIVOL SAMPLER CALIBRATION DATA SHEET (TSP)

Site Information

Location:	Tung Chung East	Site ID:	DM-1b	Date:	15-Aug-2025
Serial No:	1086	Model:	TE-5170X	Operator:	Andy Li

Ambient Condition

Actual Pressure during Calibration (P_a) (mm Hg):	756.7	Actual Temperature during Calibration (T_a) (deg K):	300.7
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Calibration Orifice

Model:	TE-5025A	Slope (m_c):	2.08107
Serial No.:	3465	Intercept (b_c):	-0.04295
Calibration Due Date:	2-Dec-25	Corr. Coeff:	0.99999

Calibration Data

Plate or Test #	ΔH_2O (in)	Qa, X-Axis (m^3/min)	I, CFM (chart)	IC, Y-Axis (corrected)
5	3.20	0.874	37.0	36.75
7	6.00	1.190	45.0	44.70
10	8.20	1.387	54.0	53.64
13	10.60	1.575	58.0	57.61
18	12.20	1.688	60.0	59.60

Sampler Calibration Relationship (Qa on x-axis, IC on y-axis)

$m = 29.3501$

$b = 11.0483$

Corr. Coeff = 0.9915

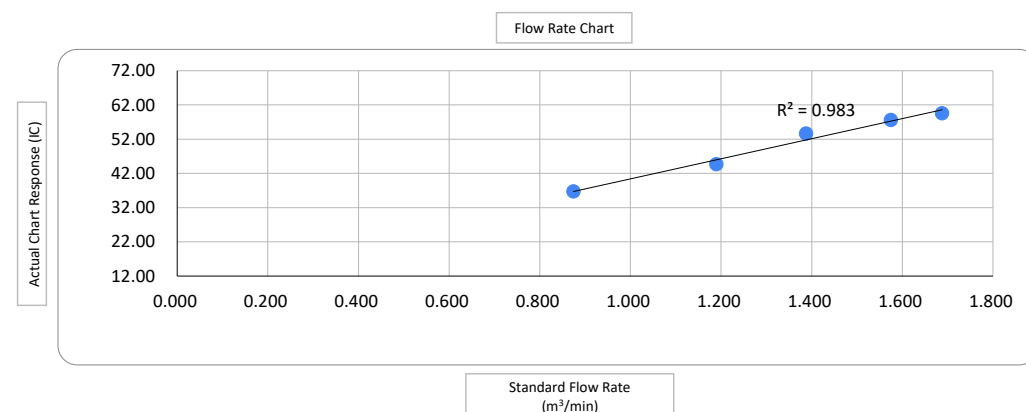
Calculations

$$Qa = 1/m_c \cdot [\text{Sqrt}(\Delta H_2O \cdot (P_a/P_{std}) \cdot (T_{std}/T_a)) - b_c]$$

$$IC = I \cdot (\text{Sqrt}(P_a/P_{std}) \cdot (T_{std}/T_a))$$

Qa = actual flow rate
IC = corrected chart response
I = actual chart response
 m_c = calibrator slope
 b_c = calibrator intercept

m = sampler slope
 b = sampler intercept
 T_{std} = 298 deg K
 P_{std} = 760 mm Hg
 T_a = actual temperature during calibration (deg K)
 P_a = actual pressure during calibration (mm Hg)



Checked by: Joe Ho
Lead Consultant, Environmental

Date: 15-Aug-2025

RECALIBRATION

DUE DATE:

December 2, 2025

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: 3465

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4300	3.2	2.00
2	3	4	1	1.0190	6.4	4.00
3	5	6	1	0.9090	7.9	5.00
4	7	8	1	0.8680	8.8	5.50
5	9	10	1	0.7170	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	0.7058	1.4238	0.9958	0.6963	0.8796
1.0051	0.9863	2.0136	0.9916	0.9731	1.2439
1.0031	1.1035	2.2512	0.9896	1.0886	1.3907
1.0018	1.1542	2.3611	0.9884	1.1387	1.4586
0.9965	1.3898	2.8476	0.9831	1.3711	1.7592
QSTD	m=	2.08107	QA	m=	1.30313
	b=	-0.04295		b=	-0.02653
	r=	0.99999		r=	0.99999

Calculations

Vstd=	$\Delta Vol((Pa-\Delta P)/Pstd)(Tstd/Ta)$	Va=	$\Delta Vol((Pa-\Delta P)/Pa)$
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

Certification of Calibration

Information of Unit-under-test (UUT)

Date of Calibration:	15-Aug-2025 and 21-Aug-2025	Next Calibration Date:	15-Oct-25
UUT Manufacturer:	Sibata	UUT Model No.:	LD-5R
UUT Serial No.:	467356	Report Reference No.:	RPT-25-HVS-0157
Calibration Location:	Tung Chung East		

Information of Reference Equipment

Reference Equipment Manufacturer:	Tisch Environmental	Tisch Environmental
Reference Equipment Model No.:	TE-5170X	TE-5025A
Reference Equipment Serial No.:	1086	3465
Last Calibration Date:	15-Aug-25	2-Dec-24
Next Calibration Date:	15-Oct-25	2-Dec-25

Calibration of 1-Hour TSP Result

Calibration Point	Results from UUT	Results from Standard Equipment
	Mass Concentration ($\mu\text{g}/\text{m}^3$) X-axis	Reference Concentration ($\mu\text{g}/\text{m}^3$) Y-axis
1	101	106
2	125	128
3	114	117
4	143	150
5	134	139
6	110	115
Average	121	126

Linear Regression of Y on X

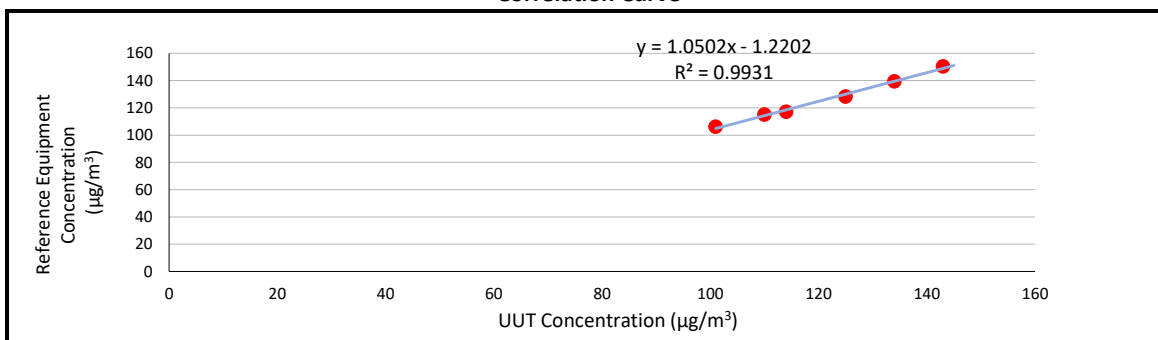
Slope, mv: 1.0502	Intercept: -1.2202	*Correlation Coefficient: 0.9965
Verification Test Result: Strong Correlation, Results were accepted.		

* If the Correlation Coefficient < 0.90, check and recalibrate.

Set Calibration Factor

Particulate Concentration by Reference Equipment ($\mu\text{g}/\text{m}^3$):	126
Particulate Concentration by UUT ($\mu\text{g}/\text{m}^3$):	121
Measuring Time, (min):	60
K Factor = High Volume Sampler / UUT, ($\mu\text{g}/\text{m}^3$):	1.04

Correlation Curve



Operated By: Andy Li
Project Technician,
Environmental

Signature: _____

Date: 28-08-2025

Checked By: Joe Ho
Lead Consultant,
Environmental

Signature: _____

Date: 28-08-2025

Certification of Calibration

Information of Unit-under-test (UUT)

Date of Calibration:	15-Aug-2025 and 21-Aug-2025	Next Calibration Date:	15-Oct-25
UUT Manufacturer:	Sibata	UUT Model No.:	LD-5R
UUT Serial No.:	467357	Report Reference No.:	RPT-25-HVS-0158
Calibration Location:	Tung Chung East		

Information of Reference Equipment

Reference Equipment Manufacturer:	Tisch Environmental	Tisch Environmental
Reference Equipment Model No.:	TE-5170X	TE-5025A
Reference Equipment Serial No.:	1086	3465
Last Calibration Date:	15-Aug-25	2-Dec-24
Next Calibration Date:	15-Oct-25	2-Dec-25

Calibration of 1-Hour TSP Result

Calibration Point	Results from UUT	Results from Standard Equipment
	Mass Concentration ($\mu\text{g}/\text{m}^3$) X-axis	Reference Concentration ($\mu\text{g}/\text{m}^3$) Y-axis
1	104	106
2	124	128
3	115	117
4	147	150
5	132	139
6	112	115
Average	122	126

Linear Regression of Y on X

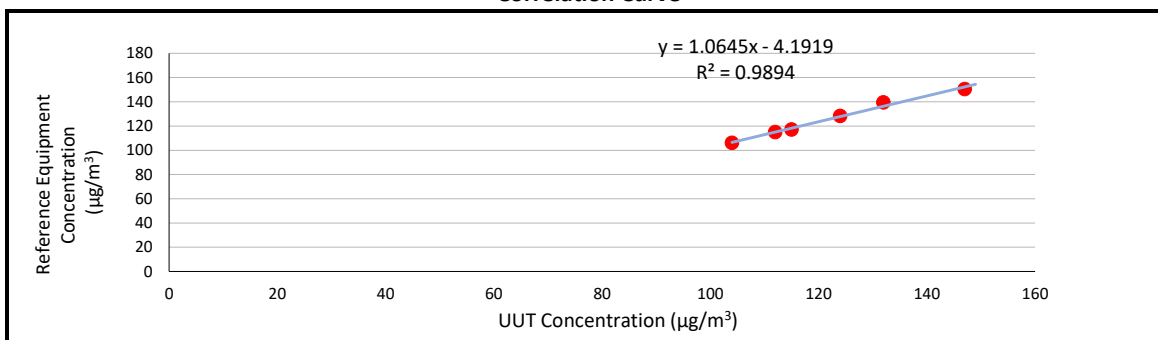
Slope, mv: 1.0645	Intercept: -4.1919	*Correlation Coefficient: 0.9947
Verification Test Result: Strong Correlation, Results were accepted.		

* If the Correlation Coefficient < 0.90, check and recalibrate.


Set Calibration Factor

Particulate Concentration by Reference Equipment ($\mu\text{g}/\text{m}^3$):	126
Particulate Concentration by UUT ($\mu\text{g}/\text{m}^3$):	122
Measuring Time, (min):	60
K Factor = High Volume Sampler / UUT, ($\mu\text{g}/\text{m}^3$):	1.03

Correlation Curve




Operated By: Andy Li
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Environmental

Signature: 

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Lead Consultant,
Environmental

Signature: 

Date: 28-08-2025

Certification of Calibration

Information of Unit-under-test (UUT)

Date of Calibration:	15-Aug-2025 and 21-Aug-2025	Next Calibration Date:	15-Oct-25
UUT Manufacturer:	Sibata	UUT Model No.:	LD-5R
UUT Serial No.:	467358	Report Reference No.:	RPT-25-HVS-0159
Calibration Location:	Tung Chung East		

Information of Reference Equipment

Reference Equipment Manufacturer:	Tisch Environmental	Tisch Environmental
Reference Equipment Model No.:	TE-5170X	TE-5025A
Reference Equipment Serial No.:	1086	3465
Last Calibration Date:	15-Aug-25	2-Dec-24
Next Calibration Date:	15-Oct-25	2-Dec-25

Calibration of 1-Hour TSP Result

Calibration Point	Results from UUT	Results from Standard Equipment
	Mass Concentration ($\mu\text{g}/\text{m}^3$) X-axis	Reference Concentration ($\mu\text{g}/\text{m}^3$) Y-axis
1	108	106
2	130	128
3	119	117
4	154	150
5	144	139
6	118	115
Average	129	126

Linear Regression of Y on X

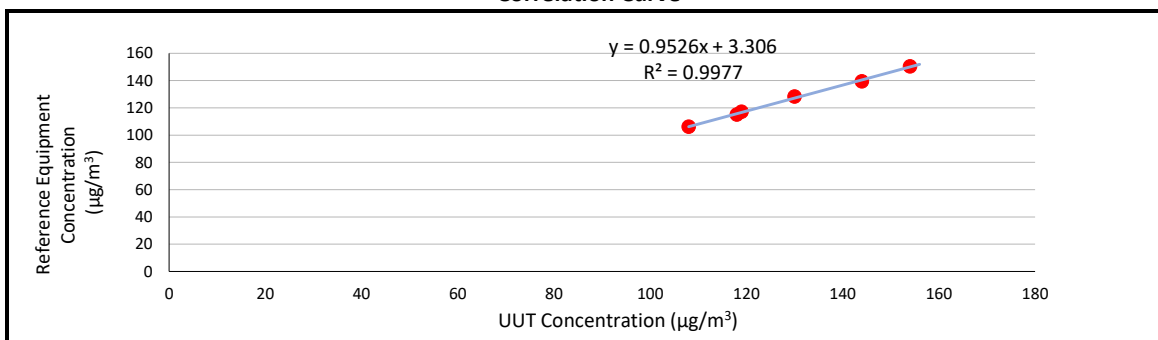
Slope, mv: 0.9526	Intercept: 3.3060	*Correlation Coefficient: 0.9989
Verification Test Result: Strong Correlation, Results were accepted.		

* If the Correlation Coefficient < 0.90, check and recalibrate.

Set Calibration Factor

Particulate Concentration by Reference Equipment ($\mu\text{g}/\text{m}^3$):	126
Particulate Concentration by UUT ($\mu\text{g}/\text{m}^3$):	129
Measuring Time, (min):	60
K Factor = High Volume Sampler / UUT, ($\mu\text{g}/\text{m}^3$):	0.98

Correlation Curve



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Project Technician,
Environmental

Signature: _____

Date: 28-08-2025

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Environmental

Signature: _____

Date: 28-08-2025

Certification of Calibration

Information of Unit-under-test (UUT)

Date of Calibration:	15-Aug-2025 and 21-Aug-2025	Next Calibration Date:	15-Oct-25
UUT Manufacturer:	Sibata	UUT Model No.:	LD-5R
UUT Serial No.:	467359	Report Reference No.:	RPT-25-HVS-0160
Calibration Location:	Tung Chung East		

Information of Reference Equipment

Reference Equipment Manufacturer:	Tisch Environmental	Tisch Environmental
Reference Equipment Model No.:	TE-5170X	TE-5025A
Reference Equipment Serial No.:	1086	3465
Last Calibration Date:	15-Aug-25	2-Dec-24
Next Calibration Date:	15-Oct-25	2-Dec-25

Calibration of 1-Hour TSP Result

Calibration Point	Results from UUT	Results from Standard Equipment
	Mass Concentration ($\mu\text{g}/\text{m}^3$) X-axis	Reference Concentration ($\mu\text{g}/\text{m}^3$) Y-axis
1	103	106
2	125	128
3	113	117
4	146	150
5	135	139
6	114	115
Average	123	126

Linear Regression of Y on X

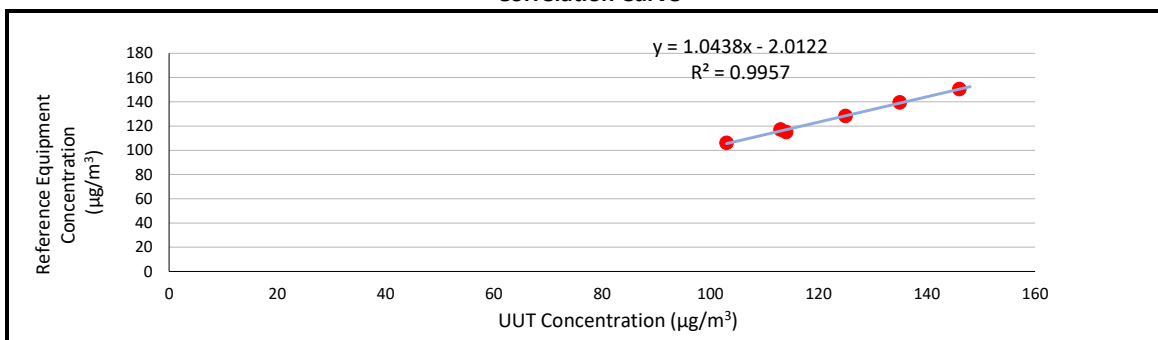
Slope, mv: 1.0438	Intercept: -2.0122	*Correlation Coefficient: 0.9978
Verification Test Result: Strong Correlation, Results were accepted.		

* If the Correlation Coefficient < 0.90, check and recalibrate.


Set Calibration Factor

Particulate Concentration by Reference Equipment ($\mu\text{g}/\text{m}^3$):	126
Particulate Concentration by UUT ($\mu\text{g}/\text{m}^3$):	123
Measuring Time, (min):	60
K Factor = High Volume Sampler / UUT, ($\mu\text{g}/\text{m}^3$):	1.03

Correlation Curve




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Project Technician,
Environmental

Signature: 

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Checked By: Joe Ho
Lead Consultant,
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Signature: 

Date: 28-08-2025

Certification of Calibration

Information of Unit-under-test (UUT)

Date of Calibration:	15-Aug-2025 and 21-Aug-2025	Next Calibration Date:	15-Oct-25
UUT Manufacturer:	Sibata	UUT Model No.:	LD-5R
UUT Serial No.:	467360	Report Reference No.:	RPT-25-HVS-0161
Calibration Location:	Tung Chung East		

Information of Reference Equipment

Reference Equipment Manufacturer:	Tisch Environmental	Tisch Environmental
Reference Equipment Model No.:	TE-5170X	TE-5025A
Reference Equipment Serial No.:	1086	3465
Last Calibration Date:	15-Aug-25	2-Dec-24
Next Calibration Date:	15-Oct-25	2-Dec-25

Calibration of 1-Hour TSP Result

Calibration Point	Results from UUT	Results from Standard Equipment
	Mass Concentration ($\mu\text{g}/\text{m}^3$) X-axis	Reference Concentration ($\mu\text{g}/\text{m}^3$) Y-axis
1	98	106
2	120	128
3	107	117
4	142	150
5	135	139
6	109	115
Average	119	126

Linear Regression of Y on X

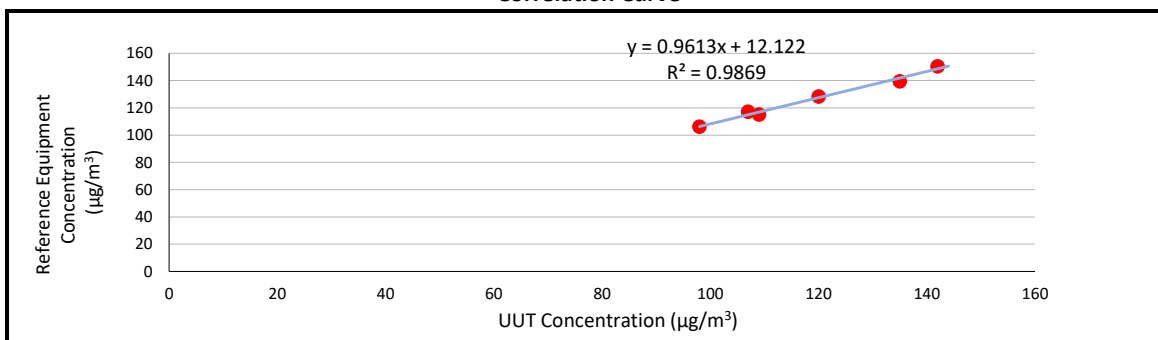
Slope, mv: 0.9613	Intercept: 12.1217	*Correlation Coefficient: 0.9934
Verification Test Result: Strong Correlation, Results were accepted.		

* If the Correlation Coefficient < 0.90, check and recalibrate.

Set Calibration Factor

Particulate Concentration by Reference Equipment ($\mu\text{g}/\text{m}^3$):	126
Particulate Concentration by UUT ($\mu\text{g}/\text{m}^3$):	119
Measuring Time, (min):	60
K Factor = High Volume Sampler / UUT, ($\mu\text{g}/\text{m}^3$):	1.06

Correlation Curve



Operated By: Andy Li
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Signature: _____

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Lead Consultant,
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Signature: _____

Date: 28-08-2025

Certification of Calibration

Information of Unit-under-test (UUT)

Date of Calibration:	15-Aug-2025 and 21-Aug-2025	Next Calibration Date:	15-Oct-25
UUT Manufacturer:	Sibata	UUT Model No.:	LD-5R
UUT Serial No.:	467361	Report Reference No.:	RPT-25-HVS-0162
Calibration Location:	Tung Chung East		

Information of Reference Equipment

Reference Equipment Manufacturer:	Tisch Environmental	Tisch Environmental
Reference Equipment Model No.:	TE-5170X	TE-5025A
Reference Equipment Serial No.:	1086	3465
Last Calibration Date:	15-Aug-25	2-Dec-24
Next Calibration Date:	15-Oct-25	2-Dec-25

Calibration of 1-Hour TSP Result

Calibration Point	Results from UUT	Results from Standard Equipment
	Mass Concentration ($\mu\text{g}/\text{m}^3$) X-axis	Reference Concentration ($\mu\text{g}/\text{m}^3$) Y-axis
1	108	106
2	130	128
3	118	117
4	152	150
5	138	139
6	119	115
Average	128	126

Linear Regression of Y on X

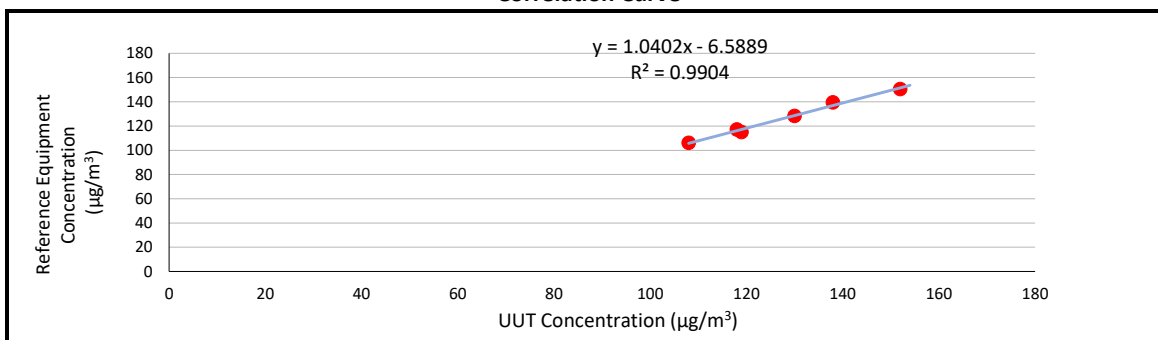
Slope, mv: 1.0402	Intercept: -6.5889	*Correlation Coefficient: 0.9952
Verification Test Result: Strong Correlation, Results were accepted.		

* If the Correlation Coefficient < 0.90, check and recalibrate.

Set Calibration Factor

Particulate Concentration by Reference Equipment ($\mu\text{g}/\text{m}^3$):	126
Particulate Concentration by UUT ($\mu\text{g}/\text{m}^3$):	128
Measuring Time, (min):	60
K Factor = High Volume Sampler / UUT, ($\mu\text{g}/\text{m}^3$):	0.99

Correlation Curve



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Signature: _____

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Lead Consultant,
Environmental

Signature: _____

Date: 28-08-2025

Certification of Calibration

Information of Unit-under-test (UUT)

Date of Calibration:	15-Aug-2025 and 21-Aug-2025	Next Calibration Date:	15-Oct-25
UUT Manufacturer:	Sibata	UUT Model No.:	LD-5R
UUT Serial No.:	882107	Report Reference No.:	RPT-25-HVS-0164
Calibration Location:	Tung Chung East		

Information of Reference Equipment

Reference Equipment Manufacturer:	Tisch Environmental	Tisch Environmental
Reference Equipment Model No.:	TE-5170X	TE-5025A
Reference Equipment Serial No.:	1086	3465
Last Calibration Date:	15-Aug-25	2-Dec-24
Next Calibration Date:	15-Oct-25	2-Dec-25

Calibration of 1-Hour TSP Result

Calibration Point	Results from UUT	Results from Standard Equipment
	Mass Concentration ($\mu\text{g}/\text{m}^3$) X-axis	Reference Concentration ($\mu\text{g}/\text{m}^3$) Y-axis
1	109	106
2	132	128
3	119	117
4	154	150
5	142	139
6	118	115
Average	129	126

Linear Regression of Y on X

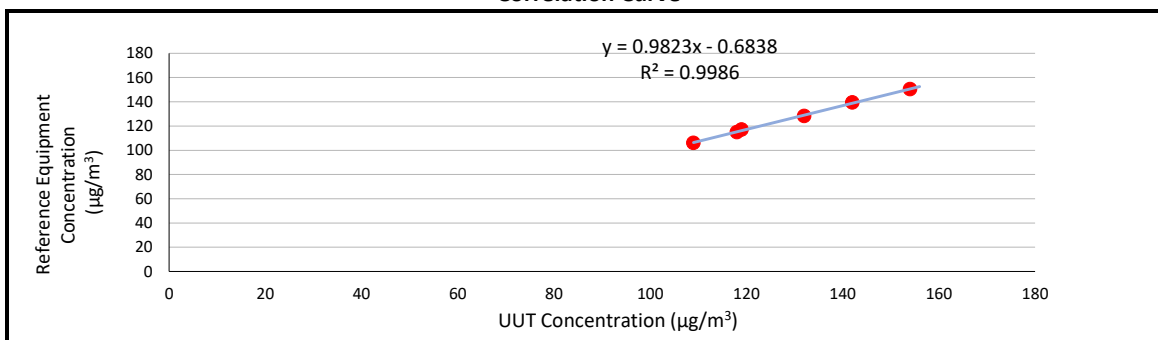
Slope, mv: 0.9823	Intercept: -0.6838	*Correlation Coefficient: 0.9993
Verification Test Result: Strong Correlation, Results were accepted.		

* If the Correlation Coefficient < 0.90, check and recalibrate.

Set Calibration Factor

Particulate Concentration by Reference Equipment ($\mu\text{g}/\text{m}^3$):	126
Particulate Concentration by UUT ($\mu\text{g}/\text{m}^3$):	129
Measuring Time, (min):	60
K Factor = High Volume Sampler / UUT, ($\mu\text{g}/\text{m}^3$):	0.98

Correlation Curve



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