Certificate of Calibration - Wind Monitoring Station

Description:	Yau Lai Estate, Bik Lai House
Manufacturer:	Davis Instruments
Model No.:	Davis7440
Serial No.:	MC01010A44
Equipment No.:	SA-03-04
Date of Calibration	17-Aug-2024
Next Due Date	17-Feb-2025

1. Performance check of Wind Speed

Wind Speed, m/s		Difference D (m/s)
Wind Speed Reading (V1)	Anemometer Value (V2)	D = V1 – V2
0.0	0.0	0.0
1.5	1.6	-0.1
2.5	2.3	0.2
4.0	4.0	0.0

2. Performance check of Wind Direction

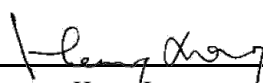| Wind Direction (^{o})		Difference D (^{o})
Wind Direction Reading (W1)	Marine Compass Value (W2)	D = W1 - W2
0	0	0.0
90	90	0.0
180	180	0.0
270	270	0.0

Test Specification:

1. Performance Wind Speed Test - The wind meter was on-site calibrated against the anemometer

2. Performance Wind Direction Test - The wind meter was on-site calibrated against the marine compass at four direction

Calibrated by: _____   Approved by: _____
Wong Shing Kwai   Henry Leung

Certificate of Calibration - Wind Monitoring Station

Description:	Yau Lai Estate, Bik Lai House
Manufacturer:	Davis Instruments
Model No.:	Davis7440
Serial No.:	MC01010A44
Equipment No.:	SA-03-04
Date of Calibration	17-Feb-2025
Next Due Date	17-Aug-2025

1. Performance check of Wind Speed

Wind Speed, m/s		Difference D (m/s)
Wind Speed Reading (V1)	Anemometer Value (V2)	$D = V1 - V2$
0.0	0.0	0.0
1.5	1.4	0.1
2.5	2.4	0.1
4.0	3.8	0.2
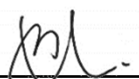
2. Performance check of Wind Direction

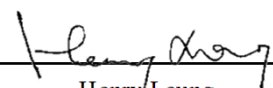| Wind Direction (^{o})		Difference D (^{o})
Wind Direction Reading (W1)	Marine Compass Value (W2)	$D = W1 - W2$
0	0	0.0
90	90	0.0
180	180	0.0
270	270	0.0

Test Specification:

1. Performance Wind Speed Test - The wind meter was on-site calibrated against the anemometer

2. Performance Wind Direction Test - The wind meter was on-site calibrated against the marine compass at four direction

Calibrated by: _____

Wong Shing Kwai

Approved by: _____

Henry Leung

TISCH Environmental

Certificate of Calibration

Calibration Certification Information

Cal. Date: January 7, 2025	**Rootsmeter S/N:** 438320	**Ta:** 293 °K
Operator: Jim Tisch		**Pa:** 759.0 mm Hg
Calibration Model #: TE-5025A	**Calibrator S/N: 3864**	

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4590	3.2	2.00
2	3	4	1	1.0360	6.4	4.00
3	5	6	1	0.9160	8.0	5.00
4	7	8	1	0.8800	8.8	5.50
5	9	10	1	0.7270	12.7	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)	$\sqrt{\Delta H\left(Ta/Pa\right)}$ (y-axis)
1.0114	0.6932	1.4252	0.9958	0.6825	0.8787
1.0071	0.9721	2.0156	0.9916	0.9571	1.2427
1.0050	1.0971	2.2535	0.9895	1.0802	1.3893
1.0039	1.1408	2.3635	0.9884	1.1232	1.4572
0.9987	1.3737	2.8505	0.9833	1.3525	1.7574

QSTD	m=	2.08969	**QA**	m=	1.30853
	b=	-0.02374		b=	-0.01464
	r=	0.99985		r=	0.99985

Calculations

Vstd= ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta)	**Va=** ΔVol((Pa-ΔP)/Pa)
Qstd= Vstd/ΔTime	**Qa=** Va/ΔTime

For subsequent flow rate calculations:

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

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

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

High-Volume TSP Sampler
5-POINT CALIBRATION DATA SHEET

File No.　MA20003/18/030

Project No.　CKL 1 - Flat 121 Cha Kwo Ling Village

Date:	4-Jan-25	Next Due Date:	6-Mar-25	Operator:	SK
Equipment No.:	A-01-18	Model No.:	TE 5170	Serial No.	0723

Ambient Condition			
Temperature, Ta (K)	292.7	Pressure, Pa (mmHg)	765.4

Orifice Transfer Standard Information					
Serial No.	3864	Slope, mc	0.05976	Intercept, bc	-0.05018
Last Calibration Date:	15-Jan-24	mc x Qstd + bc = [ΔH x (Pa/760) x (298/Ta)]$^{1/2}$			
Next Calibration Date:	14-Jan-25	Qstd = {[ΔH x (Pa/760) x (298/Ta)]$^{1/2}$ -bc} / mc			

$$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$$
$$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$$

Calibration of TSP Sampler						
Calibration Point	Orifice			HVS		
	ΔH (orifice), in. of water	[ΔH x (Pa/760) x (298/Ta)]$^{1/2}$	Qstd (CFM) X - axis	ΔW (HVS), in. of water	[ΔW x (Pa/760) x (298/Ta)]$^{1/2}$ Y-axis	
1	13.4	3.71	62.87	9.0	3.04	
2	10.3	3.25	55.22	7.2	2.72	
3	8.2	2.90	49.36	5.3	2.33	
4	6.2	2.52	43.03	3.6	1.92	
5	3.1	1.78	30.67	1.6	1.28	

By Linear Regression of Y on X

Slope , mw =　**0.0561**　　　　Intercept, bw :　**-0.4458**

Correlation coefficient* =　**0.9978**

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; W = (mw x Qstd + bw)^2 x (760 / Pa) x (Ta / 298) =　**3.76**

Remarks:

Conducted by:	Wong Shing Kwai	Signature:		Date:	4-Jan-25
Checked by:	Henry Leung	Signature:		Date:	4-Jan-25

High-Volume TSP Sampler
5-POINT CALIBRATION DATA SHEET

CINOTECH

File No.   MA20003/55/030

Project No.	CKL 2 - Flat 103 Cha Kwo Ling Village				
Date:	4-Jan-25	Next Due Date:	6-Mar-25	Operator:	SK
Equipment No.:	A-01-55	Model No.:	TE 5170	Serial No.	1956

Ambient Condition			
Temperature, Ta (K)	292.7	Pressure, Pa (mmHg)	765.4

Orifice Transfer Standard Information					
Serial No.	3864	Slope, mc	0.05976	Intercept, bc	-0.05018
Last Calibration Date:	15-Jan-24	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	14-Jan-25	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} -bc\} / mc$			

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Calibration of TSP Sampler					
Calibration Point	Orifice			HVS	
	ΔH (orifice), in. of water	$[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (CFM) **X - axis**	ΔW (HVS), in. of water	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis**
1	13.6	3.73	63.33	9.2	3.07
2	11.2	3.39	57.55	7.3	2.74
3	9.0	3.04	51.67	5.7	2.42
4	5.3	2.33	39.85	2.6	1.63
5	3.6	1.92	32.99	1.8	1.36

By Linear Regression of Y on X

Slope , mw =   0.0581   **Intercept, bw** :   -0.6068

   Correlation coefficient* =   0.9980

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; W = (mw x Qstd + bw)^2 x (760 / Pa) x (Ta / 298) =   **3.49**

Remarks:

Conducted by:	Wong Shing Kwai	Signature:		Date:	4-Jan-25
Checked by:	Henry Leung	Signature:		Date:	4-Jan-25

High-Volume TSP Sampler
5-POINT CALIBRATION DATA SHEET

Project No.　　KER 1 - Future Residential Development at Kerry Godown

Date:　　11-Jan-25　　　Next Due Date:　　13-Mar-25　　Operator:　　SK

Equipment No.:　　A-01-04　　　Model No.:　　TE 5170　　Serial No.　　10595

Ambient Condition			
Temperature, Ta (K)	289.6	Pressure, Pa (mmHg)	771.8

Orifice Transfer Standard Information					
Serial No.	3864	Slope, mc	0.05976	Intercept, bc	-0.05018
Last Calibration Date:	15-Jan-24	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	14-Jan-25	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$			

Calibration of TSP Sampler					
Calibration Point	Orfice			HVS	
	ΔH (orifice), in. of water	$[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (CFM) **X - axis**	ΔW (HVS), in. of water	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis**
1	13.1	3.70	62.75	8.6	3.00
2	10.9	3.37	57.31	7.0	2.70
3	8.6	3.00	51.00	5.3	2.35
4	5.3	2.35	40.22	3.1	1.80
5	3.8	1.99	34.19	2.4	1.58

By Linear Regression of Y on X

Slope , mw =　　0.0502　　　　　　　**Intercept, bw :**　　　-0.1790

Correlation coefficient* =　　　0.9981

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; W = (mw x Qstd + bw)^2 x (760 / Pa) x (Ta / 298) =　　　3.76

Remarks:

Conducted by:　　Wong Shing Kwai　　Signature:　　　　　　Date:　　11-Jan-25

Checked by:　　Henry Leung　　Signature:　　　　　　Date:　　11-Jan-25

High-Volume TSP Sampler
5-POINT CALIBRATION DATA SHEET

CINOTECH

Project No.	KTD1 - Centre of Excellence in Paediatrics (Children's Hospital)			
Date:	11-Jan-25	Next Due Date:	13-Mar-25	Operator: SK
Equipment No.:	A-01-44	Model No.:	TE-5170	Serial No. 1316

Ambient Condition			
Temperature, Ta (K)	289.6	Pressure, Pa (mmHg)	771.8

Orifice Transfer Standard Information				
Serial No.	3864	Slope, mc	0.05976	Intercept, bc	-0.05018
Last Calibration Date:	15-Jan-24	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$		
Next Calibration Date:	14-Jan-25	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$		

Calibration of TSP Sampler					
Calibration Point	Orifice			HVS	
	ΔH (orifice), in. of water	$[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (CFM) **X - axis**	ΔW (HVS), in. of water	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis**
1	13.7	3.78	64.15	9.6	3.17
2	11.3	3.44	58.34	7.4	2.78
3	9.0	3.07	52.16	5.6	2.42
4	6.2	2.55	43.43	3.5	1.91
5	3.5	1.91	32.84	2.0	1.45

By Linear Regression of Y on X

Slope , mw = **0.0551**   Intercept, bw : **-0.4192**

Correlation coefficient* = **0.9971**

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; W = (mw x Qstd + bw)^2 x (760 / Pa) x (Ta / 298) = **3.64**

Remarks:

Conducted by:	Wong Shing Kwai	Signature:	Date: 11-Jan-25
Checked by:	Henry Leung	Signature:	Date: 11-Jan-25

High-Volume TSP Sampler
5-POINT CALIBRATION DATA SHEET

CINOTECH

Project No. KTD 2D - Next to the SOR Office of Trunk Road T2 in Kai Tak Area

Date:	11-Jan-25	Next Due Date:	13-Mar-25	Operator:	SK
Equipment No.:	A-01-41	Model No.:	TE 5170	Serial No.	5280

Ambient Condition

Temperature, Ta (K)	289.6	Pressure, Pa (mmHg)	771.8

Orifice Transfer Standard Information

Serial No.	3864	Slope, mc	0.05976	Intercept, bc	-0.05018
Last Calibration Date:	15-Jan-24	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$
Next Calibration Date:	14-Jan-25	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$

$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$

$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$

Calibration of TSP Sampler

Calibration Point	Orifice			HVS	
	ΔH (orifice), in. of water	$[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$	Qstd (CFM) **X - axis**	ΔW (HVS), in. of water	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis**
1	13.9	3.81	64.61	9.5	3.15
2	11.7	3.50	59.35	8.2	2.93
3	9.8	3.20	54.39	6.2	2.55
4	7.2	2.74	46.74	4.3	2.12
5	4.3	2.12	36.31	2.1	1.48

By Linear Regression of Y on X

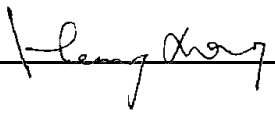Slope , mw = 0.0600   Intercept, bw : -0.6898

Correlation coefficient* = 0.9985

*If Correlation Coefficient < 0.990, check and recalibrate.

Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; W = (mw x Qstd + bw)^2 x (760 / Pa) x (Ta / 298) = **3.41**

Remarks:

Conducted by:	Wong Shing Kwai	Signature:		Date:	11-Jan-25
Checked by:	Henry Leung	Signature:		Date:	11-Jan-25