High-Volume TSP Sampler

5-POINT CALIBRATION DATA SHEET



						File No.	MA20003/18/021
	CKL 1 - Flat 121					-	
Date:	4-Jul	<u>-23</u>	Next Due Date:	4-S	Sep-23	Operator:	SK
Equipment No.:	A-01	-18	Model No.:	TE	5170	Serial No.	0723
			Ambient	Condition			
Temperatur	re, Ta (K)	302.3	Pressure, Pa	(mmHg)		756.6	
		Or	ifice Transfer Sta	andard Inform	ation		
Serial	No	3864	Slope, mc	0.05928	Intercept	t be	-0.03491
Last Calibra		16-Jan-23			$\mathbf{c} = [\Delta \mathbf{H} \times (\mathbf{Pa}/76)]$		
					$x (Pa/760) \times (298)$		
Next Calibra	ation Date:	16-Jan-24		Qsta = \[ΔΠ λ	X (1 a/700) X (290)	/1a)] -bc _}	/ IIIC
ı			Calibration of	TSP Sampler			
Calibration		Or	fice	1		HVS	
Point	ΔH (orifice), in. of water	[ΔH x (Pa/76	0) x (298/Ta)] ^{1/2}	Qstd (CFM) X - axis	ΔW (HVS), in. of water	[ΔW x (Pa/7	(60) x (298/Ta)] ^{1/2} Y axis
1	12.6	3	3.52	59.91	9.6		3.07
2	9.8	3	3.10	52.90	7.6		2.73
3	8.1	2	2.82	48.15	5.4		2.30
4	5.8	2	2.39	40.83	3.3		1.80
5	3.0	J	1.72	29.53	1.7		1.29
Slope , mw = Correlation o		0.	9932	Intercept, bw :	-0.567	79	
			Set Point (`alculation			
From the TSP Fig	eld Calibration C	urve take Octd		alculation			
	sion Equation, the	_					
		mw x ($\mathbf{Qstd} + \mathbf{bw} = [\Delta \mathbf{W}]$	x (Pa/760) x (2	298/Ta)] ^{1/2}		
Therefore, Se	et Point; W = (my	$w \times Qstd + bw$) ²	² x (760 / Pa) x (³	Γa / 298) =	4.24		
Remarks:							
Conducted by:	Wong Shi	ng Kwai	Signature:	<u> </u>	<u></u>	Date:	4-Jul-23
Charled by	Hanry	Loung	Signatura	10	Non o	Data	4 Iul 22

High-Volume TSP Sampler

5-POINT CALIBRATION DATA SHEET



File No. MA20003/55/020

Project No.	CKL 2 - Flat 10	3 Cha Kwo Ling	Village				
Date:	4-Jւ	11-23	Next Due Date:	4-5	Sep-23	Operator:	SK
Equipment No.:	A-0	1-55	Model No.:	TE	E 5170	Serial No.	1956
			Ambient C				
Temperatur	re, Ta (K)	302.3	Pressure, Pa	(mmHg)		756.6	
		Or	ifice Transfer Star	ndard Informa	ation		
Serial	No.	3864	Slope, mc	0.05928	Intercept	. bc	-0.03491
Last Calibra		16-Jan-23			$c = [\Delta H \times (Pa/760)]$		
Next Calibra		16-Jan-24			(Pa/760) x (298/		
			Calibration of	TSP Sampler			
Calibration		Oı	fice			HVS	
Point	ΔH (orifice), in. of water	[ΔH x (Pa/76	50) x (298/Ta)] ^{1/2}	Qstd (CFM) X - axis	ΔW (HVS), in. of water		60) x (298/Ta)] ^{1/2} Y-axis
1	12.9		3.56	60.61	9.8		3.10
2	10.9		3.27	55.76	7.8		2.77
3	8.8		2.94	50.16	6.0		2.43
4	5.0		2.22	37.96	2.8		1.66
5	3.0		1.72	29.53	1.7		1.29
By Linear Regressions, mw = Correlation Correlation C	0.0589 coefficient* =	0	.9977	Intercept, bw	-0.505	9	
			Set Point Ca	alculation			
From the TSP Fi	eld Calibration (Curve, take Ostd		ilculation			
From the Regress							
Ü	1 /		_		1/2		
		mw x Q	$\mathbf{pstd} + \mathbf{bw} = [\Delta \mathbf{W} \ \mathbf{x}]$	(Pa/760) x (29	98/Ta)] ^{1/2}		
Therefore, Se	et Point; W = (m	w x Qstd + bw)	² x (760 / Pa) x (7	Γa / 298) =	4.18		
Remarks:							
Conducted by:	Wong Sh	ing Kwai	Signature:	K	<u></u>	Date:	4-Jul-23
Checked by:	Henry	Leung	Signature:	- lem	g Mong	Date:	4-Jul-23

High-Volume TSP Sampler 5-POINT CALIBRATION DATA SHEET



File No. MA20003/04/0019

Project No.	KER 1 - Future	Residential Deve	elopment at Kerry (Godown			
Date:	10-J	ul-23	Next Due Date:	nte: 10-Sep-23		Operator:	SK
Equipment No.:	A-0	1-04	Model No.:	TE	TE 5170		10595
			Ambient C	ondition			
Temperatu	re, Ta (K)	303.7	Pressure, Pa			756.4	
1	, , ,		,	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			
		Or	ifice Transfer Star	ndard Informa	ation		
Serial	No.	3864	Slope, mc	0.05928	Intercept	t, bc	-0.03491
Last Calibra	ation Date:	16-Jan-23	r	nc x Qstd + bo	$c = [\Delta H \times (Pa/760)]$) x (298/Ta)] ¹	72
Next Calibr	ation Date:	16-Jan-24		$Qstd = \{ [\Delta H x] \}$	(Pa/760) x (298/7	Γa)] ^{1/2} -bc} / m	ic
			Calibration of	ΓSP Sampler			
Calibration		Or	fice			HVS	
Point	ΔH (orifice), in. of water	[ΔH x (Pa/76	50) x (298/Ta)] ^{1/2}	Qstd (CFM) X - axis	ΔW (HVS), in. of water		60) x (298/Ta)] ^{1/2} Y -axis
1	12.7		3.52	60.00	9.2		3.00
2	10.2		3.16	53.83	7.0		2.61
3	8.2		2.83	48.33	5.5		2.32
4	5.3		2.28	38.97	3.3	1.80	
5	3.1		1.74	29.94	1.8		1.33
Correlation	0.0554 coefficient* =	0	.9996	Intercept, bw	-0.349	2	
*If Correlation C	Coefficient < 0.99	90, check and rec	calibrate.				
			Set Point Ca	alculation			
		Curve, take Qstd ne "Y" value acco mw x Q		(Pa/760) x (29	98/Ta)] ^{1/2}		
Therefore, Se	et Point; W = (m	nw x Qstd + bw)	² x (760 / Pa) x (7	Γa / 298) =	4.23		
Remarks:							
Conducted by:	Wong Sh	ning Kwai	Signature:	K	<u>J.</u>	Date:	10-Jul-23
EdChecked by:	«Equipment Henry	Leungshaulmaan	oog 202207Signature:	100\-lo-	J (X2)	Date:	10-Jul-23

High-Volume TSP Sampler 5-POINT CALIBRATION DATA SHEET



File No. MA20003/44/0018

Project No.	KTD1 - Centre	of Excellence in	Paediatrics (Childr	en's Hospital)			
Date:	10-J	ul-23	Next Due Date:	10-	Sep-23	Operator:	SK
Equipment No.:	A-0		•		L-5170		
			•				
			Ambient C	ondition			
Temperatu	re, Ta (K)	303.7	Pressure, Pa	(mmHg)		756.4	
		Or	ifice Transfer Star	ndard Informs	ntion		
Serial	l No	3864	Slope, mc	0.05928	Intercept	t be	-0.03491
Last Calibra		16-Jan-23			$c = [\Delta H \times (Pa/760)]$		
Next Calibr	ation Date:	16-Jan-24			(Pa/760) x (298/7		
	T		Calibration of	TSP Sampler			
Calibration		Or	fice	Γ		HVS	1/2
Point	ΔH (orifice), in. of water	[ΔH x (Pa/76	0) x (298/Ta)] ^{1/2}	Qstd (CFM) X - axis	Δ W (HVS), in. of water		(60) x (298/Ta)] ^{1/2} Y-axis
1	12.7		3.52	60.00	9.4		3.03
2	10.5		3.20	54.61	7.2		2.65
3	8.4		2.86	48.90	5.4		2.30
4	5.8		2.38	40.74	3.5		1.85
5	3.2		1.77	30.41	2.0		1.40
By Linear Regression of Y on X Slope , mw =							
			Set Point Ca	alculation			
From the Regres	sion Equation, th		= 43 CFM	t (Pa/760) x (29	98/Ta)] ^{1/2} 4.22		
Remarks: Conducted by:	Wong Sh	ning Kwai	Signature:	<i>\</i> ?	<u></u>	Date:	10-Jul-23
F:\Checked.by:	s\Equipment\Calburny	Leungs\new\MA200	003_202307 Signatura:	01-44) - Cem	, Oran	Date:	10-Jul-23

High-Volume TSP Sampler

5-POINT CALIBRATION DATA SHEET



File No. MA20003/41/0019

Date: 10-Jul-23 Next Due Date: 9-Sep-23 Operator: SK	Project No.	KTD 2D - Next	to the SOR Offi	ce of Trunk Road	Γ2 in Kai Tak A	Area		
Ambient Condition Temperature, Ta (K) 303.7 Pressure, Pa (mmHg) 756.4	Date:	10-J	[ul-23	Next Due Date:	9-5	Sep-23	Operator:	SK
Temperature, Ta (K) 303.7 Pressure, Pa (mmHg) 756.4	Equipment No.:	A-0)1-41	Model No.:	TE	E 5170	Serial No.	5280
Temperature, Ta (K) 303.7 Pressure, Pa (mmHg) 756.4				Ambient C	ondition			
Serial No. 3864 Slope, mc 0.05928 Intercept, bc -0.03491 Last Calibration Date: 16-Jan-23 me x Qstd + bc = [AH x (Pa/760) x (298/Ta)]^{1/2} - bc) / mc Next Calibration Date: 16-Jan-24 Qstd = {[AH x (Pa/760) x (298/Ta)]^{1/2} - bc} / mc	Temperatur	re, Ta (K)	303.7				756.4	
Serial No. 3864 Slope, mc 0.05928 Intercept, bc -0.03491 Last Calibration Date: 16-Jan-23 me x Qstd + bc = [AH x (Pa/760) x (298/Ta)]^{1/2} - bc) / mc Next Calibration Date: 16-Jan-24 Qstd = {[AH x (Pa/760) x (298/Ta)]^{1/2} - bc} / mc								
Last Calibration Date: 16-Jan-23 mc x Qstd + bc = [Δ H x (Pa/760) x (298/Ta)] ^{1/2} -bc}/ mc Calibration Date: 16-Jan-24 Qstd = {[Δ H x (Pa/760) x (298/Ta)] ^{1/2} -bc}/ mc Calibration of TSP Sampler Calibration Point Orfice HVS All (orifice), in. of water [Δ H x (Pa/760) x (298/Ta)] ^{1/2} Qstd (CFM) X - axis AW (HVS), in. of water Y-axis X-axis X-axi								
Next Calibration Date: 16-Jan-24 Qstd = {[ΔH x (Pa/760) x (298/Ta)]}^{1/2} -be} / mc								
Calibration of TSP Sampler								
Calibration Point Orfice HVS ΔH (orifice), in, of water [ΔH x (Pa/760) x (298/Ta)] ^{1/2}	Next Canbra	ation Date:	10-Jan-24		<u> χ 11Δ] </u>	(1 a/ / 00) x (290/ .	[a)] -DC//III	
Calibration Point Orfice HVS ΔH (orifice), in, of water [ΔH x (Pa/760) x (298/Ta)] ^{1/2}			•	Calibration of	TSP Sampler			
Point AH (orifice), in. of water [ΔH x (Pa/760) x (298/Ta)] Point AH (Pa/760) x (298/Ta)] Point	Calibration		Or				HVS	
2 10.8 3.25 55.37 8.2 2.83 3 8.8 2.93 50.04 6.2 2.46 4 6.4 2.50 42.76 4.0 1.98 5 3.5 1.85 31.78 2.0 1.40 By Linear Regression of Y on X Slope, mw =			[ΔH x (Pa/76	(0) x (298/Ta)] ^{1/2}		, , , , , ,		
3 8.8 2.93 50.04 6.2 2.46 4 6.4 2.50 42.76 4.0 1.98 5 3.5 1.85 31.78 2.0 1.40 By Linear Regression of Y on X Slope , mw = 0.0585 Intercept, bw : -0.4763 Correlation Coefficient* = 0.9976 *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 x Qstd + bw = [ΔW x (Pa/760) x (298/Ta)] ^{1/2} Therefore, Set Point; W = (mw x Qstd + bw) ² x (760 / Pa) x (Ta / 298) = 4.26	1	13.2		3.59	61.16	9.6		3.06
4 6.4 2.50 42.76 4.0 1.98 5 3.5 1.85 31.78 2.0 1.40 By Linear Regression of Y on X Slope , mw = 0.0585	2	10.8		3.25	55.37	8.2		2.83
Set Point Calculation From the TSP Field Calibration Curve, take Qstd = 43 CFM From the Regression Equation, the "Y" value according to mw x Qstd + bw = [ΔW x (Pa/760) x (298/Ta)] ^{1/2} Therefore, Set Point; W = (mw x Qstd + bw) ² x (760 / Pa) x (Ta / 298) = 4.26	3	8.8	1	2.93	50.04	6.2		2.46
By Linear Regression of Y on X Slope, mw =		6.4		2.50	42.76			
Slope , mw =	5	3.5		1.85	31.78	2.0		1.40
*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 $\mathbf{mw} \times \mathbf{Qstd} + \mathbf{bw} = [\Delta \mathbf{W} \times (\mathbf{Pa/760}) \times (\mathbf{298/Ta})]^{1/2}$ Therefore, Set Point; W = (mw x Qstd + bw) ² x (760 / Pa) x (Ta / 298) = 4.26	By Linear Regr	ession of Y on I	X					
*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 x Qstd + bw = [\Delta W x (Pa/760) x (298/Ta)]^{1/2} Therefore, Set Point; W = (mw x Qstd + bw)^2 x (760 / Pa) x (Ta / 298) = 4.26	Slope, mw =	0.0585	_	1	Intercept, bw =	-0.476	3	
From the TSP Field Calibration Curve, take Qstd = 43 CFM From the Regression Equation, the "Y" value according to $\mathbf{mw} \ \mathbf{x} \ \mathbf{Qstd} + \mathbf{bw} = \left[\Delta \mathbf{W} \ \mathbf{x} \ (\mathbf{Pa/760}) \ \mathbf{x} \ (\mathbf{298/Ta}) \right]^{1/2}$ Therefore, Set Point; W = (mw x Qstd + bw) ² x (760 / Pa) x (Ta / 298) = 4.26	Correlation of	coefficient* =	0	.9976				
From the TSP Field Calibration Curve, take Qstd = 43 CFM From the Regression Equation, the "Y" value according to $\mathbf{mw} \ \mathbf{x} \ \mathbf{Qstd} + \mathbf{bw} = \left[\Delta \mathbf{W} \ \mathbf{x} \ (\mathbf{Pa/760}) \ \mathbf{x} \ (\mathbf{298/Ta}) \right]^{1/2}$ Therefore, Set Point; W = $(\mathbf{mw} \ \mathbf{x} \ \mathbf{Qstd} + \mathbf{bw})^2 \ \mathbf{x} \ (760 \ / \mathbf{Pa}) \ \mathbf{x} \ (\mathbf{Ta} \ / 298) = \qquad \qquad$	*If Correlation C	Coefficient < 0.9	90, check and rec	calibrate.				
From the Regression Equation, the "Y" value according to $\mathbf{mw} \ \mathbf{x} \ \mathbf{Qstd} + \mathbf{bw} = \left[\Delta \mathbf{W} \ \mathbf{x} \ (\mathbf{Pa/760}) \ \mathbf{x} \ (\mathbf{298/Ta}) \right]^{1/2}$ Therefore, Set Point; W = (mw x Qstd + bw) ² x (760 / Pa) x (Ta / 298) =				Set Point Ca	alculation			
$\mathbf{mw} \times \mathbf{Qstd} + \mathbf{bw} = [\Delta \mathbf{W} \times (\mathbf{Pa}/760) \times (\mathbf{298/Ta})]^{1/2}$ Therefore, Set Point; W = (mw x Qstd + bw) ² x (760 / Pa) x (Ta / 298) = 4.26	From the TSP Fi	eld Calibration	Curve, take Qstd	= 43 CFM				
Therefore, Set Point; W = $(\text{mw x Qstd} + \text{bw})^2 \text{ x} (760 / \text{Pa}) \text{ x} (\text{Ta}/298) = 4.26$	From the Regres	sion Equation, t	he "Y" value acco	ording to				
Therefore, Set Point; W = $(\text{mw x Qstd} + \text{bw})^2 \text{ x} (760 / \text{Pa}) \text{ x} (\text{Ta}/298) = 4.26$			mw x O	std + bw = [AW x]	(Pa/760) x (29	98/Ta)] ^{1/2}		
			m,, a 4		(1 ti/ 100) A (2)	, , , , , , , , , , , , , , , , , , ,		
Remarks:	Therefore, Se	et Point; W = (n	nw x Qstd + bw)	2 x (760 / Pa) x (7	$\Gamma a / 298) =$	4.26		
Remarks:								
	Remarks:							
	•							
Conducted by: Wong Shing Kwai Signature: Date: 10-Jul-23	Conducted by:	Wong Sh	ning Kwai	Signature:	<u> </u>	<u></u>	Date:	10-Jul-23
Checked by: Henry Leung Signature: Leng May Date: 10-Jul-23	Checked by:	Henry	Leung	Signature:	\-len	y Dong	Date:	10-Jul-23





RECALIBRATION DUE DATE:

January 16, 2024

Certificate of Calibration

Calibration Certification Information

Cal. Date: January 16, 2023

TE-5025A

Rootsmeter S/N: 438320

Ta: 293

°K

Operator: Jim Tisch

Pa: 749.0

mm Hg

Calibration Model #:

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	1.4440	3.2	2.00
2	3	4	1	1.0220	6.4	4.00
3	5	6	1	0.9100	8.0	5.00
4	7	8	1	0.8710	8.8	5.50
5	9	10	1	0.7210	12.8	8.00

	Data Tabulation					
Vstd	Qstd	$\sqrt{\Delta H \left(\frac{Pa}{Pstd}\right) \left(\frac{Tstd}{Ta}\right)}$		Qa	√∆H(Ta/Pa)	
(m3)	(x-axis)	(y-axis)	Va	(x-axis)	(y-axis)	
0.9981	0.6912	1.4159	0.9957	0.6896	0.8845	
0.9938	0.9724	2.0024	0.9915	0.9701	1.2509	
0.9917	1.0898	2.2388	0.9893	1.0872	1.3985	
0.9906	1.1373	2.3480	0.9883	1.1346	1.4668	
0.9853	1.3665	2.8318	0.9829	1.3633	1.7690	
	m=	2.09452		m=	1.31155	
QSTD[b=	-0.03493	QA	b=	-0.02182	
	r=	0.99995		r=	0.99995	

Calculations					
Vstd=	ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta)	Va=	ΔVol((Pa-ΔP)/Pa)		
Qstd=	Vstd/∆Time	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:	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 - Wind Monitoring Station

Description: Yau Lai Estate, Bik Lai House

Manufacturer: <u>Davis Instruments</u>

Model No.: <u>Davis7440</u>

Serial No.: MC01010A44

Equipment No.: SA-03-04

Date of Calibration <u>18-Feb-2023</u>

Next Due Date <u>18-Aug-2023</u>

1. Performance check of Wind Speed

Wind Sp	peed, m/s	Difference D (m/s)
Wind Speed Reading (V1)	Anemometer Value (V2)	D = V1 - V2
0.0	0.0	0.0
1.2	1.3	-0.1
2.5	2.5	0.0
3.8	3.9	-0.1

2. Performance check of Wind Direction

Wind Di	rection (°)	Difference D (°)
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: Approved by: Henry Leung



Certificate of Calibration - Wind Monitoring Station

Description: Yau Lai Estate, Bik Lai House

Manufacturer: <u>Davis Instruments</u>

Model No.: <u>Davis7440</u>

Serial No.: MC01010A44

Equipment No.: <u>SA-03-04</u>

Date of Calibration <u>18-Aug-2023</u>

Next Due Date <u>18-Feb-2024</u>

1. Performance check of Wind Speed

Wind Sp	peed, m/s	Difference D (m/s)
Wind Speed Reading (V1)	Anemometer Value (V2)	D = V1 - V2
0.0	0.0	0.0
1.5	1.5	0.0
2.5	2.4	0.1
4.0	3.9	0.1

2. Performance check of Wind Direction

Wind Direction (°)		Difference D (°)
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