

Appendix C

Calibration Certificate for
Construction Dust Monitoring
Equipment



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TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location : M-A3		Date of Calibration: 4-Oct-21
Location : S.K.H Tsoi Kung Po Secondary School		Next Calibration Date: 3-Jan-22
Make:	<input type="text" value="Tisch"/>	Technician: Felix Fong
Model:	<input type="text" value="TE-5170"/>	S/N: <input type="text" value="4388"/>

CONDITIONS

Sea Level Pressure (hPa):	1012.5	Corrected Pressure (mm Hg):	765
Temperature (°C):	29.8	Temperature (K):	303

CALIBRATION ORIFICE

Make:	<input type="text" value="Tisch"/>	Qstd Slope:	<input type="text" value="2.04731"/>
Model:	<input type="text" value="TE-5025A"/>	Qstd Intercept:	<input type="text" value="0.00573"/>
Calibration Date:	<input type="text" value="4-Jun-21"/>	Expiry Date:	<input type="text" value="4-Jun-22"/>
S/N:	<input type="text" value="2456"/>		

CALIBRATIONS

Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	8.90	-7.30	16.200	1.954	62.00	61.71	Slope = 29.9907
13	7.60	-6.80	14.400	1.842	57.00	56.74	Intercept = 2.3439
10	5.30	-4.80	10.100	1.542	49.00	48.77	Corr. coeff.= 0.9983
7	4.20	-3.30	7.500	1.329	42.00	41.81	
5	2.90	-2.00	4.900	1.073	35.00	34.84	

Calculations:

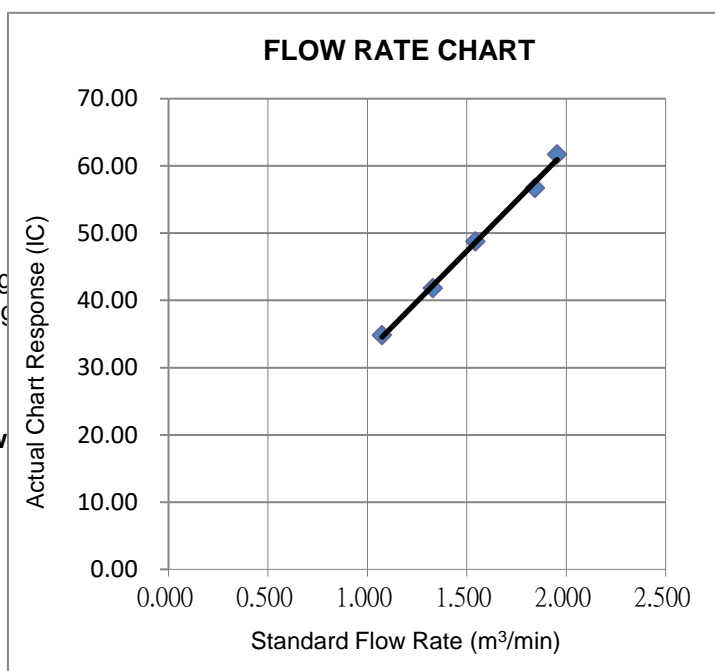
$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

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

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 C)
 Pa = actual pressure during calibration (mm Hg)
 Tstd = 298 deg K
 Pstd = 760 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: June 4, 2021	Rootsometer S/N: 438320	Ta: 294	°K
Operator: Jim Tisch		Pa: 750.3	mm Hg
Calibration Model #: TE-5025A	Calibrator S/N: 2456		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4450	3.2	2.00
2	3	4	1	1.0220	6.4	4.00
3	5	6	1	0.9070	8.0	5.00
4	7	8	1	0.8650	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)
0.9964	0.6896	1.4147	0.9957	0.6891	0.8853
0.9922	0.9708	2.0007	0.9915	0.9701	1.2519
0.9900	1.0915	2.2368	0.9893	1.0908	1.3997
0.9890	1.1433	2.3460	0.9883	1.1425	1.4680
0.9836	1.3795	2.8294	0.9829	1.3786	1.7705
QSTD	m=	2.04731	QA	m=	1.28199
	b=	0.00573		b=	0.00358
	r=	0.99996		r=	0.99996

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:	rootsometer 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

Report no. : 940891CA212394

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CALIBRATION CERTIFICATE OF DUST METER

Client : Fugro Technical Services Limited

Project : Calibration Services

Client Supplied Information

Details of Unit Under Test, UUT

Description : Laser dust monitor
 Manufacturer : SIBATA
 Model No. : LD-5R
 Serial No. : 155717
 Specification Limit : NA
 Next Calibration Date : 02-Sep-2022

Laboratory Information

Description : 1. Balance 2. TSP high volume air sampler
 Equipment ID. / Serial no. : 1. C-065-9 2. 4350
 Date of Calibration : 03-Sep-2021 Ambient Temperature : 25 ± 10 °C
 Calibration Location : General Chemical Laboratory of FTS and Ma Wan A1 Site Boundary
 Method Used : By direct comparison the weight of dust particle trapped in a filter paper using high volume sampler (TSP method) for a certain period, with the reading of the UUT. They should be placed at the same location and powered on and off at the same time.

Calibration Results :

Reference concentration (mg/m ³)	Total count for 1 hour	CPM (Count per minute)
0.0416	672	11.20
0.0388	650	10.83
0.0266	597	9.95

Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.
2. The interpolation equation : Concentration (mg/m³) = K x [UUT reading (CPM)], where K = 0.003345
3. Correlation coefficient (r) : 0.9940

Checked by : Cunmy Date : 28-9-2021 Certified by : Wai Date : 28-9-2021
 CA-R-297 (22/07/2009) Chan Chun Wai (Manager)

** End of Report **