

# Appendix C

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Calibration Certificate for  
Construction Dust Monitoring  
Equipment



**TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET**

Location : M-A3	Date of Calibration: 28-Oct-20
Location : S.K.H Tsoi Kung Po Secondary School	Next Calibration Date: 27-Jan-21
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):	1014.9	Corrected Pressure (mm Hg):	761
Temperature (°C):	24.4	Temperature (K):	297

CALIBRATION ORIFICE			
Make:	<input type="text" value="Tisch"/>	Qstd Slope:	<input type="text" value="2.11508"/>
Model:	<input type="text" value="TE-5025A"/>	Qstd Intercept:	<input type="text" value="-0.02962"/>
Calibration Date:	<input type="text" value="11-Sep-20"/>	Expiry Date:	<input type="text" value="11-Sep-21"/>
S/N:	<input type="text" value="2154"/>		

CALIBRATIONS							
Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m <sup>3</sup> /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
18	6.50	-8.00	14.500	1.817	58.00	58.10	Slope = 69.5119 Intercept = -69.1022 Corr. coeff.= 0.9967
13	5.20	-7.60	12.800	1.708	49.00	49.08	
10	4.40	-6.80	11.200	1.599	42.00	42.07	
7	3.50	-6.40	9.900	1.504	34.00	34.06	
5	2.20	-5.80	8.000	1.354	26.00	26.04	

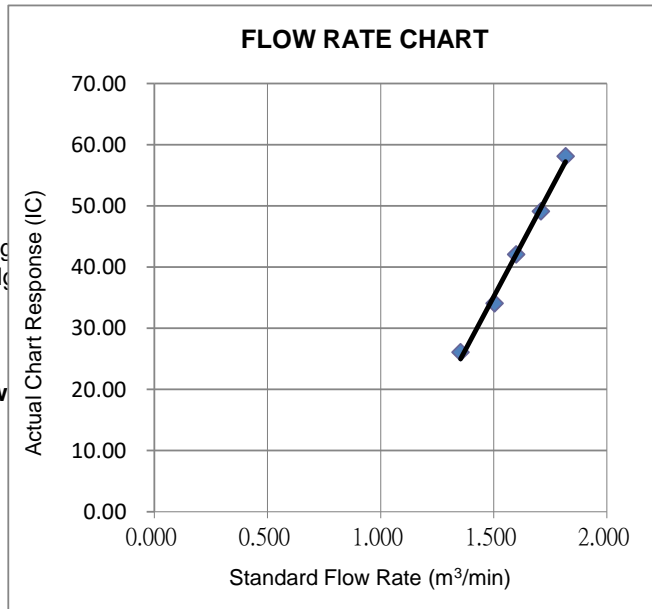
**Calculations:**

Qstd = 1/m[√(H2O(Pa/Pstd)(Tstd/Ta))-b]  
IC = I[√(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)
- Tstd = 298 deg K
- Pstd = 760 mm Hg

**For subsequent calculation of sampler flow**  
1/m((I[√(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: September 11, 2020	Rootsmer S/N: 438320	Ta: 297	°K
Operator: Jim Tisch		Pa: 755.4	mm Hg
Calibration Model #: TE-5025A	Calibrator S/N: <b>2154</b>		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4510	3.3	2.00
2	3	4	1	1.0340	6.4	4.00
3	5	6	1	0.9260	8.0	5.00
4	7	8	1	0.8780	8.9	5.50
5	9	10	1	0.7250	13.0	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)
0.9929	0.6843	1.4123	0.9956	0.6862	0.8868
0.9888	0.9563	1.9973	0.9915	0.9589	1.2541
0.9867	1.0656	2.2330	0.9894	1.0685	1.4021
0.9855	1.1225	2.3420	0.9882	1.1255	1.4705
0.9801	1.3519	2.8246	0.9828	1.3556	1.7735
<b>QSTD</b>	<b>m=</b>	<b>2.11508</b>	<b>QA</b>	<b>m=</b>	<b>1.32442</b>
	<b>b=</b>	<b>-0.02962</b>		<b>b=</b>	<b>-0.01860</b>
	<b>r=</b>	<b>0.99993</b>		<b>r=</b>	<b>0.99993</b>

Calculations	
<b>Vstd=</b> $\Delta Vol \left( \frac{Pa - \Delta P}{Pstd} \right) \left( \frac{Tstd}{Ta} \right)$	<b>Va=</b> $\Delta Vol \left( \frac{Pa - \Delta P}{Pa} \right)$
<b>Qstd=</b> $Vstd / \Delta Time$	<b>Qa=</b> $Va / \Delta Time$
<b>For subsequent flow rate calculations:</b>	
<b>Qstd=</b> $1/m \left( \left( \sqrt{\Delta H \left( \frac{Pa}{Pstd} \right) \left( \frac{Tstd}{Ta} \right)} \right) - b \right)$	<b>Qa=</b> $1/m \left( \left( \sqrt{\Delta H \left( \frac{Ta}{Pa} \right)} \right) - b \right)$

Standard Conditions	
Tstd:	298.15 °K
Pstd:	760 mm Hg
<b>Key</b>	
ΔH:	calibrator manometer reading (in H2O)
ΔP:	rootsmer 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. : 940891CA196546(2)

Page 1 of 1

## 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. : 882149  
 Specification Limit : NA  
 Next Calibration Date : 05-Dec-2020

### Laboratory Information

Description : Reference balance  
 Equipment ID. : R-039-12  
 Date of Calibration : 06-Dec-2019 Ambient Temperature : 22 °C  
 Calibration Location : Calibration Laboratory of FTS  
 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 <sup>3</sup> )	Total count for 1 hour	CPM (Count per minute)
0.0393	1511	25.18
0.0681	1799	29.98
0.0504	1590	26.50

### Remarks:

1. The equipment being used in this calibration is traceable to recognized National Standards.
2. The interpolation equation : Concentration (mg/m<sup>3</sup>) = K x [ UUT reading (CPM) ], where K = 0.001932
3. Correlation coefficient (r) : 0.9927

 Checked by :                      Date : 17-12-2019 Certified by : K.T. Young Date : 18-12-2019

CA-R-297 (22/07/2009)

Leung Kwok Tai (Assistant Manager)

**\*\* End of Report \*\***