

Appendix C

Calibration Certificate for
Construction Dust Monitoring
Equipment



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TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location : M-A3
Location : S.K.H Tsoi Kung Po Secondary School
Make:
Model: S/N:
Date of Calibration: 23-Dec-22
Next Calibration Date: 22-Mar-23
Technician: Mike Kan

CONDITIONS

Sea Level Pressure (hPa): 1019 Corrected Pressure (mm Hg): 764
Temperature (°C): 17 Temperature (K): 290

CALIBRATION ORIFICE

Make: Qstd Slope:
Model: Qstd Intercept:
Calibration Date: Expiry Date:
S/N:

CALIBRATIONS

| Plate No. | H2O (L) (in) | H2O (R) (in) | H2O (in) | Qstd (m ³ /min) | I (chart) | IC (corrected) | LINEAR REGRESSION |
|-----------|--------------|--------------|----------|----------------------------|-----------|----------------|--|
| 18 | 5.70 | -5.90 | 11.600 | 1.649 | 59.00 | 59.97 | Slope = 41.6255 Intercept = -9.3892 Corr. coeff.= 0.9917 |
| 13 | 4.50 | -5.20 | 9.700 | 1.509 | 53.00 | 53.87 | |
| 10 | 3.90 | -4.60 | 8.500 | 1.413 | 48.00 | 48.79 | |
| 7 | 3.10 | -4.00 | 7.100 | 1.292 | 42.00 | 42.69 | |
| 5 | 2.40 | -2.50 | 4.900 | 1.075 | 36.00 | 36.59 | |

Calculations:

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

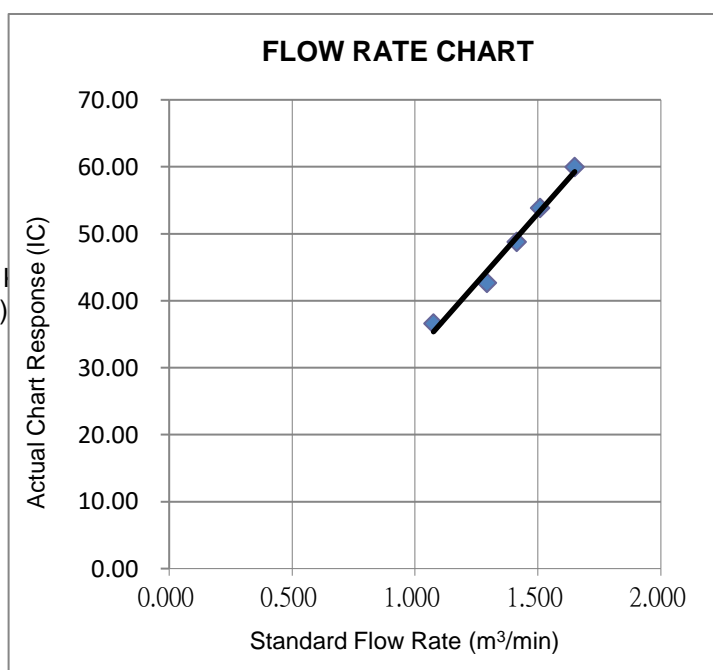
$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

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 K)
Pa = actual pressure during calibration (mm Hg)
Tstd = 298 deg K
Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m((I)[\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

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: April 24, 2022 | Rootsmeter S/N: 438320 | Ta: 295 | °K |
| Operator: Jim Tisch | | Pa: 751.1 | mm Hg |
| Calibration Model #: TE-5025A | Calibrator S/N: 2154 | | |

| Run | Vol. Init (m3) | Vol. Final (m3) | ΔVol. (m3) | ΔTime (min) | ΔP (mm Hg) | ΔH (in H2O) |
|-----|----------------|-----------------|------------|-------------|------------|-------------|
| 1 | 1 | 2 | 1 | 1.4680 | 3.2 | 2.00 |
| 2 | 3 | 4 | 1 | 1.0350 | 6.4 | 4.00 |
| 3 | 5 | 6 | 1 | 0.9240 | 8.0 | 5.00 |
| 4 | 7 | 8 | 1 | 0.8800 | 8.8 | 5.50 |
| 5 | 9 | 10 | 1 | 0.7290 | 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) |
| 0.9941 | 0.6772 | 1.4130 | 0.9957 | 0.6783 | 0.8863 |
| 0.9898 | 0.9563 | 1.9983 | 0.9915 | 0.9580 | 1.2534 |
| 0.9877 | 1.0689 | 2.2342 | 0.9893 | 1.0707 | 1.4014 |
| 0.9866 | 1.1212 | 2.3432 | 0.9883 | 1.1230 | 1.4698 |
| 0.9813 | 1.3461 | 2.8260 | 0.9830 | 1.3484 | 1.7726 |
| QSTD | m= | 2.11005 | QA | m= | 1.32128 |
| | b= | -0.01868 | | b= | -0.01172 |
| | r= | 0.99998 | | r= | 0.99998 |

| 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= $Vstd / \Delta Time$ | 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 |

Report no. : 940891CA222379(3)

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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. : 114892

Specification Limit : NA

Next Calibration Date : 25-Aug-2023

Laboratory Information

Details of Reference Equipment -

Description : 1.Reference balance 2. TSP high Volume air sampler

Equipment ID / Serial no. : 1.C-065-5 2. 4350

Date of Calibration : 26-Aug-2022 Ambient Temperature : 33 °C

Calibration Location : Calibration Lab. 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 ³) | Total count for 1 hour | CPM (Count per minute) |
|--|------------------------|------------------------|
| 0.0501 | 1531 | 25.52 |
| 0.0366 | 1075 | 17.92 |
| 0.0443 | 1290 | 21.50 |

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 = 0.002014
3. Correlation coefficient (r) : 0.9936

Checked by : Alloy Date : 18/10-2022 Certified by : P.T. Leung Date : 19-10-2022

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

Leung Kwok Tai (Assistant Manager)

** End of Report **