# 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

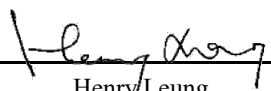| Wind Direction ($^o$) | | Difference D ($^o$) |
|---|---|---|
| Wind Direction Reading (W1) | Marine Compass Value (W2) | D = W1 - W2 |
| 0 | 0 | 0.0 |
| 90 | 90 | 0.0 |
| 180 | 180 | 0.0 |
| 270 | 270 | 0.0 |

**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: _____
Wong Shing Kwai

Approved by: _____
Henry Leung

# TISCH Environmental

## Certificate of Calibration

### Calibration Certification Information

| | | |
|---|---|---|
| **Cal. Date:** January 15, 2024 | **Rootsmeter S/N:** 438320 | **Ta:** 294 °K |
| **Operator:** Jim Tisch | | **Pa:** 755.4 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 | 1.4380 | 3.3 | 2.00 |
| 2 | 3 | 4 | 1 | 1.0270 | 6.4 | 4.00 |
| 3 | 5 | 6 | 1 | 0.9180 | 8.0 | 5.00 |
| 4 | 7 | 8 | 1 | 0.8750 | 8.9 | 5.50 |
| 5 | 9 | 10 | 1 | 0.7230 | 12.9 | 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) |
|---|---|---|---|---|---|
| 1.0031 | 0.6975 | 1.4195 | 0.9956 | 0.6924 | 0.8823 |
| 0.9989 | 0.9727 | 2.0075 | 0.9915 | 0.9655 | 1.2477 |
| 0.9968 | 1.0858 | 2.2444 | 0.9894 | 1.0778 | 1.3950 |
| 0.9956 | 1.1378 | 2.3539 | 0.9882 | 1.1294 | 1.4631 |
| 0.9903 | 1.3697 | 2.8390 | 0.9829 | 1.3595 | 1.7645 |
| **QSTD** | m= | 2.11196 | **QA** | m= | 1.32248 |
| | b= | -0.05043 | | b= | -0.03134 |
| | r= | 0.99998 | | r= | 0.99998 |

### Calculations

| | |
|---|---|
| **Vstd=** $\Delta Vol((Pa-\Delta P)/Pstd)(Tstd/Ta)$ | **Va=** $\Delta Vol((Pa-\Delta P)/Pa)$ |
| **Qstd=** $Vstd/\Delta Time$ | **Qa=** $Va/\Delta Time$ |

**For subsequent flow rate calculations:**

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

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

### 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

**CINOTECH**

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

| | | | | | |
|---|---|---|---|---|---|
| Date: | 4-Nov-24 | Next Due Date: | 4-Jan-25 | Operator: | SK |
| Equipment No.: | A-01-18 | Model No.: | TE 5170 | Serial No. | 0723 |

| Ambient Condition | | | |
|---|---|---|---|
| Temperature, Ta (K) | 302 | Pressure, Pa (mmHg) | 762.7 |

| 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 | |
| | $\Delta H$ (orifice), in. of water | $[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$ | Qstd (CFM) **X - axis** | $\Delta W$ (HVS), in. of water | $[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis** |
| 1 | 13.5 | 3.66 | 62.02 | 9.1 | 3.00 |
| 2 | 10.1 | 3.16 | 53.76 | 7.0 | 2.63 |
| 3 | 8.4 | 2.88 | 49.10 | 5.2 | 2.27 |
| 4 | 6.1 | 2.46 | 41.97 | 3.5 | 1.86 |
| 5 | 3.5 | 1.86 | 31.99 | 1.7 | 1.30 |

**By Linear Regression of Y on X**

Slope , mw =   **0.0579**          Intercept, bw :          **-0.5543**

Correlation coefficient* =          **0.9979**

*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 ) =          **3.79**

Remarks:

| | | | |
|---|---|---|---|
| Conducted by: | Wong Shing Kwai | Signature: | Date:   4-Nov-24 |
| Checked by: | Henry Leung | Signature: | Date:   4-Nov-24 |

# High-Volume TSP Sampler
## 5-POINT CALIBRATION DATA SHEET

Cinotech

Project No.      CKL 2 - Flat 103 Cha Kwo Ling Village

Date:            4-Nov-24          Next Due Date:        4-Jan-25        Operator:        SK

Equipment No.:   A-01-55           Model No.:            TE 5170         Serial No.       1956

| Ambient Condition | | | |
|---|---|---|---|
| Temperature, Ta (K) | 302 | Pressure, Pa (mmHg) | 762.7 |

| 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 | |
| | $\Delta H$ (orifice), in. of water | $[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$ | Qstd (CFM) **X - axis** | $\Delta W$ (HVS), in. of water | $[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis** |
| 1 | 13.5 | 3.66 | 62.02 | 9.3 | 3.03 |
| 2 | 11.3 | 3.35 | 56.82 | 7.3 | 2.69 |
| 3 | 9.2 | 3.02 | 51.35 | 5.9 | 2.42 |
| 4 | 5.5 | 2.33 | 39.89 | 2.8 | 1.67 |
| 5 | 3.5 | 1.86 | 31.99 | 1.9 | 1.37 |

**By Linear Regression of Y on X**

Slope , mw =      0.0566                    Intercept, bw :        -0.5013

Correlation coefficient* =        0.9966

*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-Nov-24

Checked by:        Henry Leung            Signature:                        Date:      4-Nov-24

# High-Volume TSP Sampler
## 5-POINT CALIBRATION DATA SHEET

**CINOTECH**

File No. MA20003/04/0027

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

Date: 11-Nov-24     Next Due Date: 11-Jan-25     Operator: SK

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

| Ambient Condition | | | |
|---|---|---|---|
| Temperature, Ta (K) | 297.9 | Pressure, Pa (mmHg) | 760.8 |

| 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 | |
| | $\Delta H$ (orifice), in. of water | $[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$ | Qstd (CFM) **X - axis** | $\Delta W$ (HVS), in. of water | $[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis** |
| 1 | 13.2 | 3.64 | 61.68 | 8.7 | 2.95 |
| 2 | 10.8 | 3.29 | 55.87 | 7.1 | 2.67 |
| 3 | 8.8 | 2.97 | 50.51 | 5.1 | 2.26 |
| 4 | 5.5 | 2.35 | 40.11 | 3.2 | 1.79 |
| 5 | 3.9 | 1.98 | 33.91 | 2.1 | 1.45 |

**By Linear Regression of Y on X**

Slope , mw = 0.0541       Intercept, bw = -0.3935

Correlation coefficient* = 0.9973

*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 ) =     3.72

Remarks:

Conducted by: Wong Shing Kwai     Signature:     Date: 11-Nov-24

Checked by: Henry Leung     Signature:     Date: 11-Nov-24

# High-Volume TSP Sampler
## 5-POINT CALIBRATION DATA SHEET



File No.  MA20003/44/0026

Project No.    KTD1 - Centre of Excellence in Paediatrics (Children's Hospital)

Date:    11-Nov-24      Next Due Date:    11-Jan-25      Operator:    SK

Equipment No.:    A-01-44      Model No.:    TE-5170      Serial No.    1316

| Ambient Condition | | | |
|---|---|---|---|
| Temperature, Ta (K) | 297.9 | Pressure, Pa (mmHg) | 760.8 |

| 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 | |
| | $\Delta H$ (orifice), in. of water | $[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$ | Qstd (CFM) **X - axis** | $\Delta W$ (HVS), in. of water | $[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis** |
| 1 | 13.8 | 3.72 | 63.05 | 9.5 | 3.08 |
| 2 | 11.2 | 3.35 | 56.88 | 7.5 | 2.74 |
| 3 | 9.1 | 3.02 | 51.35 | 5.6 | 2.37 |
| 4 | 6.4 | 2.53 | 43.20 | 3.7 | 1.92 |
| 5 | 3.7 | 1.92 | 33.05 | 2.0 | 1.42 |

**By Linear Regression of Y on X**

Slope , mw =    0.0560         Intercept, bw :    -0.4681

Correlation coefficient* =    0.9988

*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 ) =    3.77

Remarks:

Conducted by:    Wong Shing Kwai      Signature:      Date:    11-Nov-24

Checked by:    Henry Leung      Signature:      Date:    11-Nov-24

# 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-Nov-24 | Next Due Date: | 11-Jan-25 | Operator: | SK |
| Equipment No.: | A-01-41 | Model No.: | TE 5170 | Serial No. | 5280 |

| Ambient Condition | | | |
|---|---|---|---|
| Temperature, Ta (K) | 297.9 | Pressure, Pa (mmHg) | 760.8 |

| Orifice Transfer Standard Information | | | | | |
|---|---|---|---|---|---|
| Serial No. | 3864 | Slope, mc | 0.05976 | Intercept, bc | -0.05018 |
| Last Calibration Date: | 15-Jan-24 | | | | |
| Next Calibration Date: | 14-Jan-25 | | | | |

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

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

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| Calibration of TSP Sampler | | | | | |
|---|---|---|---|---|---|
| Calibration Point | Orifce | | | HVS | |
| | $\Delta H$ (orifice), in. of water | $[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$ | Qstd (CFM) **X - axis** | $\Delta W$ (HVS), in. of water | $[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ **Y-axis** |
| 1 | 14.3 | 3.78 | 64.16 | 9.6 | 3.10 |
| 2 | 11.5 | 3.39 | 57.63 | 8.1 | 2.85 |
| 3 | 9.7 | 3.12 | 52.99 | 6.1 | 2.47 |
| 4 | 7.1 | 2.67 | 45.46 | 4.3 | 2.08 |
| 5 | 4.0 | 2.00 | 34.33 | 2.0 | 1.42 |

**By Linear Regression of Y on X**

Slope , mw = **0.0577**          Intercept, bw : **-0.5536**

Correlation coefficient* = **0.9973**

*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 ) =          **3.70**

Remarks:

| | | | | |
|---|---|---|---|---|
| Conducted by: | Wong Shing Kwai | Signature: | Date: | 11-Nov-24 |
| Checked by: | Henry Leung | Signature: | Date: | 11-Nov-24 |