# APPENDIX C
# COPIES OF CALIBRATION CERTIFCATES

聲學測試服務有限公司
Acoustic Testing Services Limited
Unit E, 2/F., Century Industrial Centre, 33-35 Au Pui Wan Street, Fo Tan, Shatin, New Territories, Hong Kong
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# Certificate of Calibration

Certificate No. ATS25-008-CC001

| | | | |
|---|---|---|---|
| **Customer:** | **Ka Shing Facilities Management Limited**<br>Flat C, 14/F., Jing Ho Industrial Building,<br>78-84 Wing Lung Street, Tsuen Wan,<br>N.T., Hong Kong | | |
| **Unit-under-test (UUT):** | | | |
| **Description:** | Sound Analyzer | , Microphone | , Pre-amplifier |
| **Manufacturer:** | Rion | | |
| **Type No.:** | NL-53 | , UC-59 | , NH-25 |
| **Serial No.:** | 01130782 | , 24906 | , 33673 |
| **Conditions during calibration:** | | | |
| **Temperature:** | 23°C | | |
| **Relative Humidity:** | 65% | | |
| **Test Specifications:** | Calibration Check | | |
| **Date of Calibration:** | 23 January 2025 | | |
| **Test Results:** | All calibration points are within manufacturer's specification. | | |

***Certified by:***

***Mr. Ching Mau LAM / Quality Manager***
***MIOA, MHKIOA***

**Issue Date: 24 January 2025**

聲學測試服務有限公司
Acoustic Testing Services Limited
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1. The instrument under test was allowed to stabilize in the laboratory for over 24 hours.

2. Calibration equipment:

| | |
|---|---|
| **Description:** | Sound Calibrator |
| **Manufacturer & Type:** | Brüel & Kjær 4231 |
| **Serial No.:** | 2478237 |
| **Last Calibration Date:** | 27 February 2024 |
| **Certificate No.:** | AV240026 |

The calibration equipment used for calibration is traceable to National Standards via Standards and Calibration Laboratory, the Government of the HKSAR.

3. The Sound Analyzer has been calibrated in accordance with the requirements as specified in IEC 61672-1 Class 1, and vendor specific procedures.

4. The values given in this certification only related to the values measured at the time of the calibration and any uncertainties quoted, if any, will not allow for the equipment long-term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the calibration. Acoustic Testing Services Limited shall not be liable for any loss or damage resulting from the use of the equipment.

5. Calibration Results

| Setting of unit-under-test (UUT) | | | | Applied value | | UUT Reading, dB | IEC 61672-1 Class 1 Tolerance Limits, dB | Conclusion |
|---|---|---|---|---|---|---|---|---|
| Range, dB | Parameter | Frequency Weighting | Response | Level, dB | Frequency, Hz | | | |
| 30-130 | SPL | A | F | 94.00 | 1000 | 94.0 | ± 0.7 | PASS |
| | | | S | | | 94.0 | ± 0.7 | PASS |
| | | | I | | | 94.0 | ± 0.7 | PASS |
| | | C | F | | | 94.0 | ± 0.7 | PASS |
| | | | S | | | 94.0 | ± 0.7 | PASS |
| | | | I | | | 94.0 | ± 0.7 | PASS |
| | | L | F | | | 94.0 | ± 0.7 | PASS |
| | | | S | | | 94.0 | ± 0.7 | PASS |
| | | | I | | | 94.0 | ± 0.7 | PASS |
| | | A | F | 114.00 | 1000 | 114.0 | ± 0.7 | PASS |
| | | | S | | | 114.0 | ± 0.7 | PASS |
| | | | I | | | 114.0 | ± 0.7 | PASS |

All calibration points are within manufacturer's specification.

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# Certificate of Calibration

Certificate No. ATS24-112-CC001

**Customer:** **Ka Shing Facilities Management Limited**
Flat C, 14/F., Jing Ho Industrial Building,
78-84 Wing Lung Street, Tsuen Wan,
N.T., Hong Kong

**Unit-under-test (UUT):**

| | |
|---|---|
| **Description:** | Sound Calibrator |
| **Manufacturer:** | SoundTEK |
| **Type No.:** | ST-120 |
| **Serial No.:** | 210102628 |

**Conditions during calibration:**

| | |
|---|---|
| **Temperature:** | 25°C |
| **Relative Humidity:** | 50% |

| | |
|---|---|
| **Test Specifications:** | Calibration Check |
| **Date of Calibration:** | 11 November 2024 |
| **Test Results:** | All calibration points are within manufacturer's specification. |

***Certified by:***

***Mr. Ching Mau LAM / Quality Manager***
***MIOA, MHKIOA***

**Issue Date: 11 November 2024**

聲學測試服務有限公司
Acoustic Testing Services Limited
Unit E, 2/F., Century Industrial Centre, 33-35 Au Pui Wan Street, Fo Tan, Shatin, New Territories, Hong Kong
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1. The instrument under test was allowed to stabilize in the laboratory for over 24 hours.

2. Calibration equipment:

| | | |
|---|---|---|
| **Description:** | Sound Analyzer | Reference Microphone |
| **Manufacturer:** | Brüel & Kjær | Brüel & Kjær |
| **Type No.:** | 2270 | 4189 |
| **Serial No.:** | 3001883 | 2662797 |
| **Last Calibration Date:** | 14 March 2024 | 14 March 2024 |
| **Certificate No.:** | AV240037 | AV240037 |

The calibration equipment used for calibration is traceable to National Standards via Standards and Calibration Laboratory, the Government of the HKSAR.

3. The values given in this certification only related to the values measured at the time of the calibration and any uncertainties quoted, if any, will not allow for the equipment long-term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the calibration. Acoustic Testing Services Limited shall not be liable for any loss or damage resulting from the use of the equipment.

4. Calibration Results

| Nominal value dB | Measured value dB | IEC 60942 Class 1 Tolerance Limits dB | Conclusion | Expanded Measurement Uncertainty of Reference Microphone B&K 4189 at 1000 Hz dB |
|---|---|---|---|---|
| 94.00 | 93.82 | ± 0.25 | PASS | 0.20 |
| 114.0 | 113.76 | ± 0.25 | PASS | 0.20 |

All calibration points are within manufacturer's specification.

Acoustic Testing Services Limited atsl

**High Precision Chemical Testing Ltd.**
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Report No. : 00657 Issue Date : 24 Apr 2024
Application No. : HP00516

# Certificate of Calibration

Applicant : Ka Shing Facility Management Limited
Flat C, 14/ F, Jing Ho Industrial Building,
78-84 Wang Lung Street,
Tsuen Wan, N.T., Hong Kong

Sample Description : Submitted equipment stated to be Integrating Sound Level Meter.

Manufacturer: : BSWA Technology

Other information :

| | |
|---|---|
| Model No. | BSWA 308 |
| Serial No. | 610062 |
| Microphone No. | 610373 |

Date Received : 16 Apr 2024

Test Period : 23 Apr 2024 to 23 Apr 2024

Test Requested : Performance checking for Sound Level Meter

Test Method : According to manufacturer instruction manual and internal method.

Test conditions : Room Temperature: 22-25 degree Celsius
Relative Humidity: 35-70%

Test Result : Refer to the test result(s) on page 2.

**Remark : 1. Information of the sample description provided by the Applicant.**
**2. The result(s) relate only to the items tested or calibrated.**

***For and on behalf of***
***HIGH PRECISION CHEMICAL TESTING LIMITED***

Lee Wai Kit
Laboratory Manager

**High Precision Chemical Testing Ltd.**
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Report No. : 00657 Issue Date : 24 Apr 2024
Application No. : HP00516

# Certificate of Calibration

Measuring equipment :

| | |
|---|---|
| Description | Sound Calibrator |
| Manufacturer | Brüel & Kjær |
| Model No. | TYPE 4231 |
| Serial No. | 2326353 |
| Equipment No. | N-02-01 |

Date of Calibration : 23 Apr 2024
Date of Recommended Re-Calibration : 23 Apr 2025

Test Result :

| Reference value, dB | Indication value, dB | Deviation, dB | Allowed deviation, dB |
|---|---|---|---|
| 94.0 | 94.0 | ± 0.0 | ± 1.5 |
| 114.0 | 114.1 | + 0.1 | ± 1.5 |

**Note : 1. "Instrument Readings" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.**
**2. The indication value was obtained from the average of ten replicated measurement.**

- End of report -

# Equipment Verification Report (TSP)

**Equipment Calibrated:**

| | |
|---|---|
| Type: | Laser Dust monitor |
| Manufacturer: | Met One Aerocet 831 |
| Serial No. | E11304 |
| Equipment Ref: | NA |
| Work Order: | HK2505219 |

**Standard Equipment:**

| | |
|---|---|
| Standard Equipment: | Higher Volume Sampler (TSP) |
| Location & Location ID: | AUES office (calibration room) |
| Equipment Ref: | HVS 018 |
| Last Calibration Date: | 12 February 2025 |

Equipment Verification Results:

Verification Date: 17 February 2025

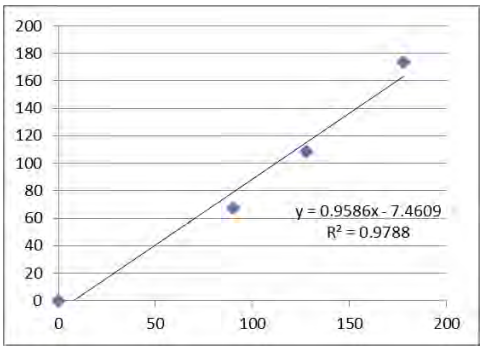
| Hour | Time | Mean Temp °C | Mean Pressure (hPa) | Concentration in ug/m$^3$ (Standard Equipment) | Concentration in ug/m$^3$ (Calibrated Equipment) | Tolerance (ug/m$^3$) |
|---|---|---|---|---|---|---|
| 1hr00min | 09:31 ~ 10:31 | 18.9 | 1020.6 | 173.7 | 178.0 | +4.3 |
| 1hr00min | 11:49 ~ 12:49 | 18.9 | 1020.6 | 108.1 | 127.6 | +19.5 |
| 1hr00min | 14:05 ~ 15:05 | 18.9 | 1020.6 | 67.5 | 89.9 | +22.4 |

**Linear Regression of Y or X**

Slope (factor): 0.9586 (µg/m3)/CPM

Correlation Coefficient (R) 0.9893

Date of Issue 20 February 2025




Remarks:

1. Strong Correlation (R>0.8)
2. Factor 0.9586 (µg/m$^3$) /CPM should be applied for TSP monitoring

*If R<0.5, repair or re-verification is required for the equipment

Operator : Martin Li Signature : Date : 20 February 2025

QC Reviewer : Ben Tam Signature : Date : 20 February 2025

# TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

| | | | |
|---|---|---|---|
| Location : | Gold King Industrial Building, Kwai Chung | Date of Calibration: | 12-Feb-25 |
| Location ID : | Calibration Room - TISCH Higher Volume Sampler (Model TE-5170) S/N:1260 | Next Calibration Date: | 12-May-25 |

## CONDITIONS

| | | | |
|---|---|---|---|
| Sea Level Pressure (hPa) | 1017.2 | Corrected Pressure (mm Hg) | 762.9 |
| Temperature (°C) | 18.8 | Temperature (K) | 292 |

## CALIBRATION ORIFICE

| | | | |
|---|---|---|---|
| Make-> | TISCH | Qstd Slope -> | 2.09671 |
| Model-> | 5025A | Qstd Intercept -> | -0.01852 |
| Calibration Date-> | 16-Dec-24 | Expiry Date-> | 16-Dec-25 |

## CALIBRATION

| Plate No. | H20 (L) (in) | H2O (R) (in) | H20 (in) | Qstd (m3/min) | I (chart) | IC corrected | LINEAR REGRESSION | |
|---|---|---|---|---|---|---|---|---|
| 18 | 5.6 | 5.6 | 11.2 | 1.625 | 55 | 55.69 | Slope = | 35.3445 |
| 13 | 4.5 | 4.5 | 9.0 | 1.458 | 48 | 48.60 | Intercept = | -2.1779 |
| 10 | 3.4 | 3.4 | 6.8 | 1.268 | 42 | 42.52 | Corr. coeff. = | 0.9989 |
| 8 | 2.3 | 2.3 | 4.6 | 1.045 | 35 | 35.44 | | |
| 5 | 1.2 | 1.2 | 2.4 | 0.757 | 24 | 24.30 | | |

***Calculations :***

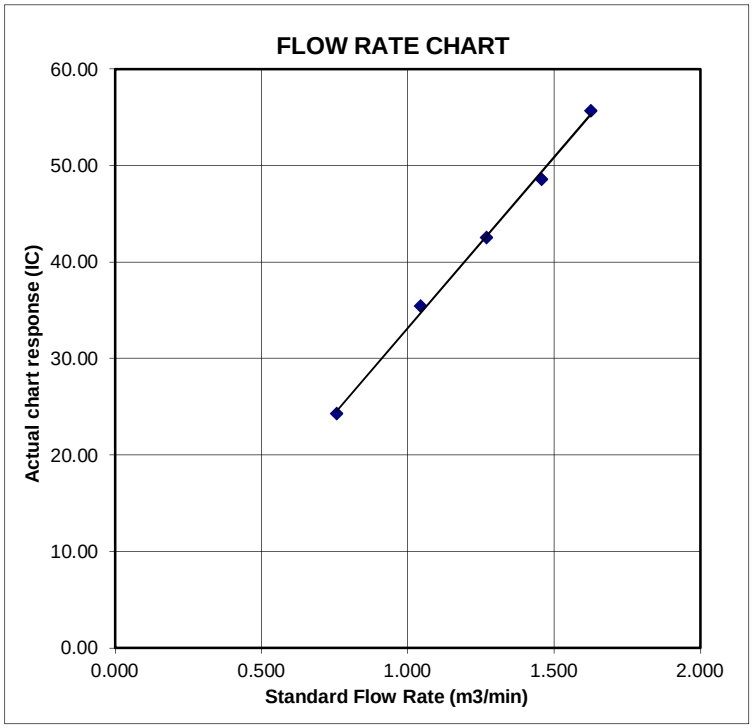
Qstd = 1/m[Sqrt(H20(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart respones
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration ( deg K )
Pstd = actual pressure during calibration ( mm Hg )

***For subsequent calculation of sampler flow:***

1/m(( I )[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure



TISCH Environmental

| RECALIBRATION DUE DATE: |
|---|
| December 16, 2025 |

# Certificate of Calibration

| Calibration Certification Information | | | | | |
|---|---|---|---|---|---|
| **Cal. Date:** | December 16, 2024 | **Rootsmeter S/N:** 438320 | **Ta:** 293 | °K | |
| **Operator:** | Jim Tisch | | **Pa:** 749.0 | mm Hg | |
| **Calibration Model #:** | TE-5025A | **Calibrator S/N:** **4064** | | | |

| Run | Vol. Init (m3) | Vol. Final (m3) | ΔVol. (m3) | ΔTime (min) | ΔP (mm Hg) | ΔH (in H2O) |
|---|---|---|---|---|---|---|
| 1 | 1 | 2 | 1 | 1.4600 | 3.2 | 2.00 |
| 2 | 3 | 4 | 1 | 1.0300 | 6.4 | 4.00 |
| 3 | 5 | 6 | 1 | 0.9220 | 8.0 | 5.00 |
| 4 | 7 | 8 | 1 | 0.8770 | 8.8 | 5.50 |
| 5 | 9 | 10 | 1 | 0.7250 | 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) | $\sqrt{\Delta H\left(Ta/Pa\right)}$ (y-axis) |
|---|---|---|---|---|---|
| 0.9981 | 0.6836 | 1.4159 | 0.9957 | 0.6820 | 0.8845 |
| 0.9938 | 0.9649 | 2.0024 | 0.9915 | 0.9626 | 1.2509 |
| 0.9917 | 1.0756 | 2.2388 | 0.9893 | 1.0730 | 1.3985 |
| 0.9906 | 1.1296 | 2.3480 | 0.9883 | 1.1269 | 1.4668 |
| 0.9853 | 1.3590 | 2.8318 | 0.9829 | 1.3557 | 1.7690 |
| **QSTD** | **m=** | **2.09671** | **QA** | **m=** | **1.31292** |
| | **b=** | **-0.01852** | | **b=** | **-0.01157** |
| | **r=** | **0.99999** | | **r=** | **0.99999** |

**Calculations**

| | | | |
|---|---|---|---|
| **Vstd=** | ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta) | **Va=** | ΔVol((Pa-ΔP)/Pa) |
| **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=** $1/m\left(\left(\sqrt{\Delta H\left(Ta/Pa\right)}\right)-b\right)$

| 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

Tisch Environmental, Inc.
145 South Miami Avenue
Village of Cleves, OH 45002

www.tisch-env.com
TOLL FREE: (877)263-7610
FAX: (513)467-9009

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Report No. : 00959 Issue Date : 23 Dec 2024
Application No. : HP00817

# Certificate of Calibration

Applicant : Ka Shing Facility Management Limited
Flat C, 14/ F, Jing Ho Industrial Building,
78-84 Wang Lung Street,
Tsuen Wan, N.T., Hong Kong

Sample Description : Submitted equipment stated to be Dust Meter.

Manufacturer: : Met One Instruments

Other information :

| | |
|---|---|
| Model No. | Aerocet 831 |
| Serial No. | D12641 |

Date Received : 12 Dec 2024

Test Period : 18 Dec 2024 to 22 Dec 2024

Test Requested : Performance checking for Dust Meter

Test Method : According to manufacturer instruction manual and internal method.

Test conditions : Environmental temperature: 20-35 degree Celsius
Relative Humidity: 35-85%

Test Result : Refer to the test result(s) on page 2.

**Remark : 1. Information of the sample description provided by the Applicant.**
**2. The result(s) relate only to the items tested or calibrated.**

***For and on behalf of***
***HIGH PRECISION CHEMICAL TESTING LIMITED***

Lee Wai Kit
Laboratory Manager

**High Precision Chemical Testing Ltd.**
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Report No. : 00959 Issue Date : 23 Dec 2024
Application No. : HP00817

# Certificate of Calibration

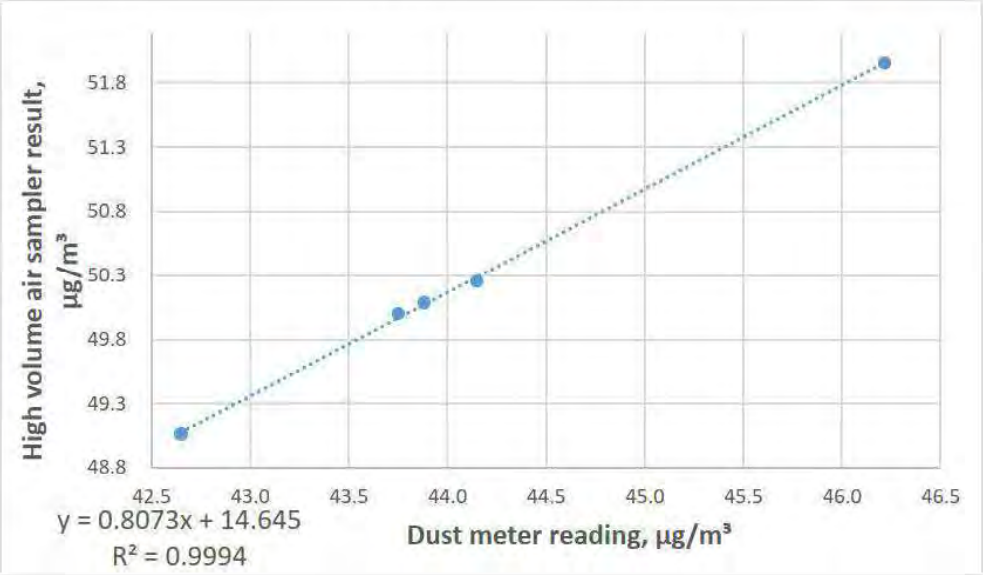
Measuring equipment :

| | |
|---|---|
| Description | High volume air sampler |
| Manufacturer | Tisch Environmental, Inc. |
| Model No. | TE-5170 |
| Serial No. | 10379 |

Date of Calibration : 18 Dec 2024 to 22 Dec 2024
Date of Recommended Re-Calibration : 22 Feb 2025

Test Result : 1 hour Total suspended particulate (TSP)

| Calibration Point | Average Dust Meter reading, µg/m³ | High volume air sampler results, µg/m³ |
|---|---|---|
| 1 | 44.2 | 50.3 |
| 2 | 46.2 | 52.0 |
| 3 | 43.9 | 50.1 |
| 4 | 42.7 | 49.1 |
| 5 | 43.8 | 50.0 |




**Note : 1. "Instrument Readings" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.**
**2. The coefficient of determination ($R^2$) of the calibration curve greater than 0.99 after a 5-point calibration, the dust meter complies with the specified requirements and deemed acceptable for use.**

- End of report -

**High Precision Chemical Testing Ltd.**
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Report No. : 00958 Issue Date : 19 Dec 2024

# Internal Report
# Certificate of Calibration

Description : Equipment stated to be High volume air sampler.

Manufacturer: : Tisch Environmental, Inc.

Other information :

| | |
|---|---|
| Model No. | TE-5170 |
| Serial No. | 10379 |

Test Period : 18 Dec 2024 to 18 Dec 2024

Test Requested : Performance checking for High volume air sampler

Test Method : According to manufacturer instruction manual and internal method.

Test conditions : Environmental temperature: 20-35 degree Celsius
Relative Humidity: 35-85%

Test Result : Refer to the test result(s) on page 2.

**Remark : The result(s) relate only to the items tested or calibrated.**

***For and on behalf of***
***HIGH PRECISION CHEMICAL TESTING LIMITED***

Lee Wai Kit
Laboratory Manager

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Report No. : 00958 Issue Date : 19 Dec 2024

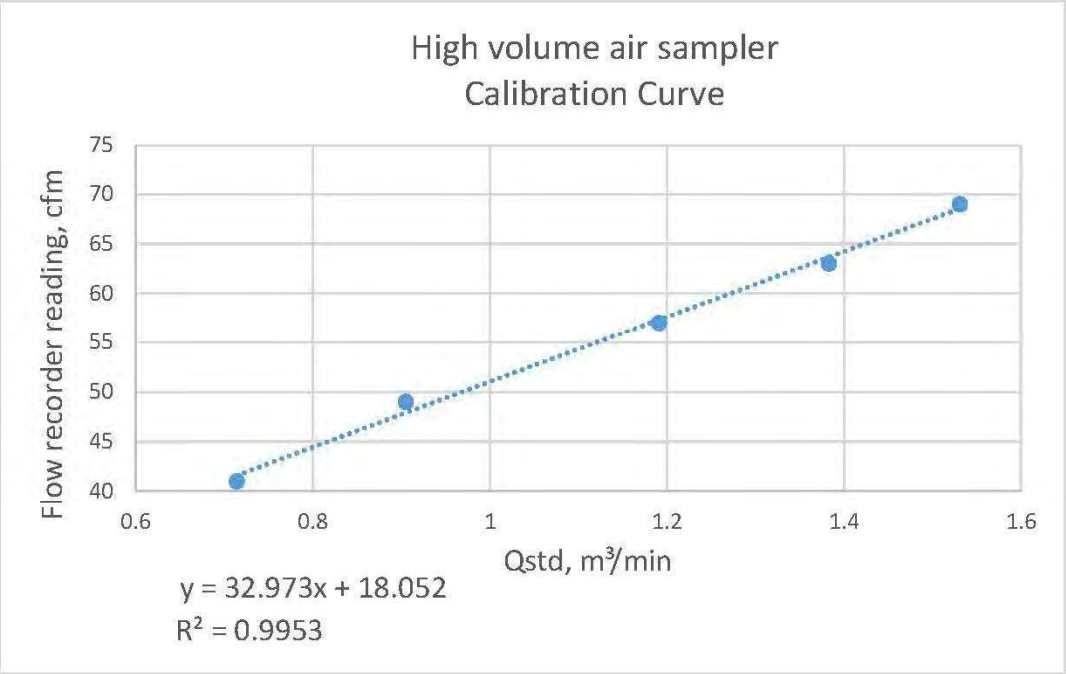
# Internal Report
# Certificate of Calibration

Measuring equipment :

| | |
|---|---|
| Description | Calibration Orifice |
| Manufacturer | Tisch Environmental, Inc. |
| Model No. | TE-5025A |
| Serial No. | 3864 |

Test Result :

| | | | | | |
|---|---|---|---|---|---|
| Qstd, Actual flow rate, $m^3$/min | 1.531 | 1.383 | 1.191 | 0.905 | 0.714 |
| Flow recorder reading, cfm | 69 | 63 | 57 | 49 | 41 |
| Pressure, mm Hg | 750 | | | | |
| Temperature, K | 302 | | | | |




**Note : The coefficient of determination ($R^2$) of the calibration curve greater than 0.99 after a 5-point calibration, the high volume air sampler complies with the specified requirements and deemed acceptable for use.**

- End of report -