

ประจำเดือนพฤษภาคม พ.ศ. 2566



บริษัท เอ็นไวโรแล็บ จำกัด 540/519/1 ถนนพหลโยธิน แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10110
EnviLab Co., Ltd. 540/519/1 Soi Bangkhae 7 Bangkhae Bangkok Bangkok 10110
Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



TSP High Volume Sampler Calibration

Verification Report No.

D6605 -TSP 01

| | | |
|--|---------------------------------|----------------------|
| <input checked="" type="checkbox"/> PM <input type="checkbox"/> Onsite | Site: บริษัท เอ็นไวโรแล็บ จำกัด | Date: 1 May 23 |
| | UTM : 47P N1514475 E654269 | Technical: Sanayu J. |
| | Sampler: NTSP#04 | Approval: Wisan R. |
| | Recorder: ECRANG15315224 | |

CONDITIONS

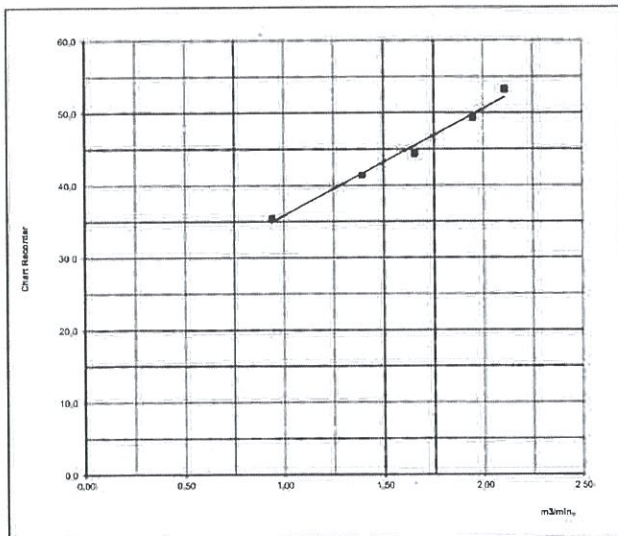
| | |
|---------------------------------|--------------------------------------|
| Barometric Press. (hPa): 1008.4 | Corrected Pressure (mm Hg): 756.4 |
| Temperature (deg C): 32.0 | Temperature (deg K): 305.0 |
| Average Press. (hPa): 1013.0 | Corrected Avg. Press. (mm Hg): 759.8 |
| Average Temp. (deg C): 30.0 | Average Temp. (deg K): 303.0 |

CALIBRATION ORIFICE

| | |
|---------------------------------|-----------------------------|
| Brand: Tisch Environmental, Inc | Qstd Slope: 1.63957 |
| Model: TE-5028A | Qstd Intercept: -0.01202 |
| Serial#: 1328 | Date Certified: 19 Jan 2023 |

CALIBRATIONS

| Plate or Test # | H2O (in) | Qstd (m3/min) | I (chart) | IC (corrected) | LINEAR REGRESSION |
|-----------------|----------|---------------|-----------|----------------|---|
| 1 | 12.21 | 2.109 | 54.0 | 53.25 | Slope = 14.7492 |
| 2 | 10.41 | 1.948 | 50.0 | 49.30 | Intercept = 21.0321 |
| 3 | 7.50 | 1.654 | 45.0 | 44.37 | Corr. coeff. = 0.9922 |
| 4 | 5.32 | 1.395 | 42.0 | 41.42 | # of Observations: 5 |
| 5 | 2.41 | 0.941 | 36.0 | 35.50 | Range of Chart at 1.1 - 1.7 m3/min. 38 46 |



Calibrated by :

(Sanayu Jantason)
1 May 2023

Approved by :

(Wisan Ritthikamon)
1 May 2023

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Environmental responsibility with accuracy measurements

FE-MNT-29 Rev.00/01/08/63



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ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

บริษัท นีดิส ซัพพลาย อินสตรูमेंท์ จำกัด
Neediss Supply Instrument Co., Ltd.

520 หมู่บ้าน 7 แขวงบางพลี เขตภาษีเจริญ กรุงเทพฯ 10160 530 Soi Bangkhoe 7 Bangkhoe Bangkok
Tel 02-802-3780-2 Fax 02-802-3988 Email: info@neediss.co.th



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6605006

Page:1/1

Calibrated Date: 2-May-23

☒ PM ☐ Onsite

Instruments Information

| | |
|---|--|
| Analyzer Type: SO2 Analyzer Model: THERMO.,43C | Manufacturer THERMO S/N: ESOTE43C069871 |
|---|--|

Calibration System

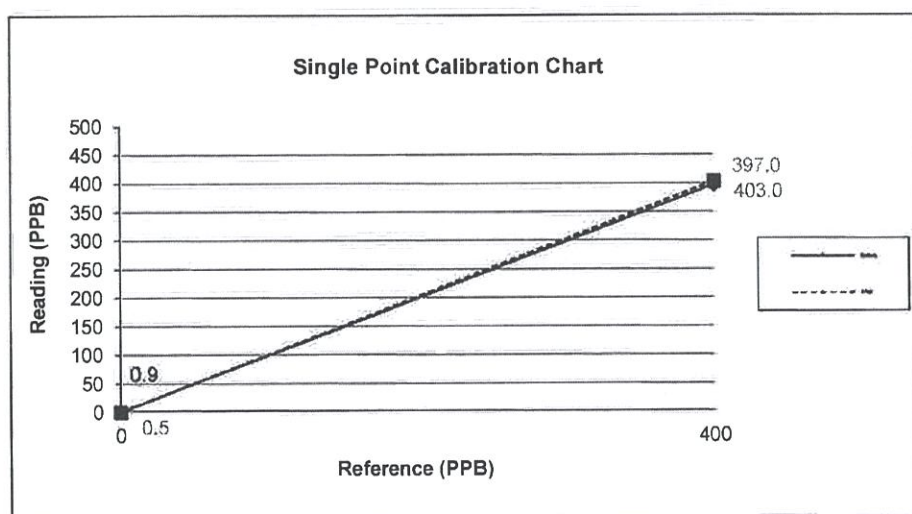
| Calibrator Unit | Standard Gas |
|--|---|
| Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644 | NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762 |

Environment: Temperature 28.9 °C

Humidity: 57 %RH

Calibration Report

| Status | Zero | | | Span | | |
|--------|-----------------|---------------|-------------|-----------------|---------------|--------|
| | Reference (PPB) | Reading (PPB) | Drift (PPB) | Reference (PPB) | Reading (PPB) | Drift% |
| Before | 0.0 | 0.9 | 0.9 | 400.0 | 397 | -0.8 |
| After | 0.0 | 0.5 | 0.5 | 400.0 | 403 | 0.8 |



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Envilab Co., Ltd.

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ผู้จัดการฝ่ายควบคุมคุณภาพ



NOx Analyzer Verification Test Report

Calibration Report No.: 6605011
Calibrated Date: 2-May-23

Page:1/2

☒ PM ☐ Onsite

Instruments Information

| | |
|--|--|
| Analyzer Type: NO/NO2/NOx Analyzer Model: 42C | Manufacturer THERMO S/N: ENOTE42C304780 |
|--|--|

Calibration System

| Calibrator Unit | Standard Gas |
|--|---|
| Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644 | NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762 |

Environment: Temperature 27.5 °C

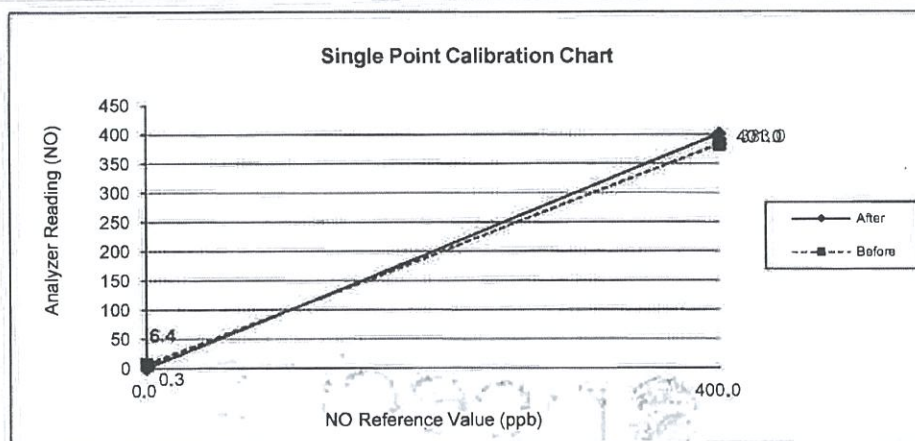
Humidity: 50 %RH

Calibration Check (Before adjust)

| GAS | Zero | | | Span | | |
|-----------------|---------------------|----------------------|-------------|---------------------|----------------------|--------|
| | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) | Drift% |
| NO | 6.4 | 0.0 | 6.4 | 383 | 400.0 | -2.2 |
| NO ₂ | -2.1 | 0.0 | -2.1 | 30.0 | 0.0 | 3.8 |
| NOx | 4.3 | 0.0 | 4.3 | 413 | 400.0 | 1.6 |

Calibration Check (After adjust)

| GAS | Zero | | | Span | | |
|-----------------|---------------------|----------------------|-------------|---------------------|----------------------|--------|
| | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) | Drift% |
| NO | 0.3 | 0.0 | 0.3 | 401 | 400.0 | 0.1 |
| NO ₂ | 0.5 | 0.0 | 0.5 | 2.0 | 0.0 | 0.2 |
| NOx | 0.8 | 0.0 | 0.8 | 403 | 400.0 | 0.4 |

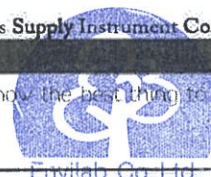


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Envilab Co., Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ



บริษัท เอ็นไวแล็บ จำกัด 540,540/1 ถนนพหลโยธิน 7 แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10150
Envilab Co., Ltd. 540,540/1 Soi Bangkhae 7 Bangkhae Bangkok Bangkok 10150
Tel : 02-802-3577-8 Fax : 02-802-3773 E-mail : info@evltesting.com



www.A.Sanayut.com

Verification Test Report

Report No.:

CONDO -SLM 08

☒ PM ☐ Onsite UTM : 47P N 1514455 E 654248

Calibrated Date: 1 May 2023

Site : บริษัทเอ็นไวแล็บ จำกัด

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0027

Environment: Temperature 25 °C Humidity 70 %RH

Reference Standard: Acoustic Calibrator Class 1 Model CB011,CESVA

Serial No.T252953

Date of Calibration : 02 December 2022

Result of Test

| Reference Standard (dB) | Instrument reading (dB) | Error (dB) | Adjust (dB) |
|----------------------------|----------------------------|---------------|----------------|
| 93.92 | 93.94 | 0.02 | 93.92 |

Calibrated By:

(Sanayu Jantason)

Date:

1 May 2023

Approve By:

(Wisan Ritthikamon)

Date:

1 May 2023

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RECALIBRATION

DUE DATE:

January 18, 2024

Certificate of Calibration

Calibration Certification Information

Cal. Date: January 18, 2023

Rootsmeter S/N: 438320

Ta: 294 °K

Operator: Jim Tisch

Pa: 750.1 mm Hg

Calibration Model #: TE-5025A

Calibrator S/N: 0759

| Run | Vol. Init (m3) | Vol. Final (m3) | ΔVol. (m3) | ΔTime (min) | ΔP (mm Hg) | ΔH (in H2O) |
|-----|----------------|-----------------|------------|-------------|------------|-------------|
| 1 | 1 | 2 | 1 | 1.3960 | 3.2 | 2.00 |
| 2 | 3 | 4 | 1 | 0.9950 | 6.4 | 4.00 |
| 3 | 5 | 6 | 1 | 0.8850 | 8.0 | 5.00 |
| 4 | 7 | 8 | 1 | 0.8450 | 8.8 | 5.50 |
| 5 | 9 | 10 | 1 | 0.6990 | 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) |
|-----------|---------------|--|--------|-------------|---|
| 0.9961 | 0.7135 | 1.4145 | 0.9957 | 0.7133 | 0.8854 |
| 0.9918 | 0.9968 | 2.0004 | 0.9915 | 0.9964 | 1.2521 |
| 0.9897 | 1.1183 | 2.2365 | 0.9893 | 1.1179 | 1.3999 |
| 0.9886 | 1.1700 | 2.3456 | 0.9883 | 1.1695 | 1.4683 |
| 0.9833 | 1.4067 | 2.8289 | 0.9829 | 1.4062 | 1.7708 |
| QSTD | m= | 2.03736 | QA | m= | 1.27576 |
| | b= | -0.03733 | | b= | -0.02337 |
| | r= | 0.99997 | | r= | 0.99997 |

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



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 66-200035-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

| Nominal Value (g) | Correction (g) | Uncertainty \pm (g) |
|----------------------|-------------------|--------------------------|
| 0.01 | 0.0001 | 0.00011 |
| 0.1 | 0.0001 | 0.00011 |
| 1 | 0.0000 | 0.00011 |
| 2 | 0.0001 | 0.00011 |
| 5 | 0.0000 | 0.00012 |
| 10 | 0.0000 | 0.00011 |
| 20 | 0.0000 | 0.00013 |
| 50 | 0.0001 | 0.00014 |
| 100 | 0.0000 | 0.00020 |
| 200 | -0.0001 | 0.00038 |

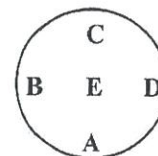
This result of calibration was found accurate as shown on date and place of calibration only.

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.11$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

| | | | | | |
|---------|--------|--------|---------|--------|---|
| A | B | C | D | E | |
| -0.0001 | 0.0001 | 0.0000 | -0.0001 | 0.0000 | g |



Repeatability

Load test : 200 g

Stdev. : 0.00000 g

- o o o -

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaphrachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 66-200035-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

| Nominal Value (g) | Correction (g) | Uncertainty \pm (g) |
|----------------------|-------------------|--------------------------|
| 10 | 0.00 | 0.0082 |
| 20 | 0.00 | 0.0082 |
| 50 | 0.00 | 0.0082 |
| 100 | 0.00 | 0.0082 |
| 200 | 0.00 | 0.0083 |
| 500 | 0.00 | 0.0085 |
| 1000 | 0.00 | 0.0110 |
| 1500 | 0.00 | 0.012 |
| 2000 | 0.00 | 0.012 |
| 3000 | 0.00 | 0.023 |

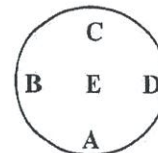
This result of calibration was found accurate as shown on date and place of calibration only.

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 1000 g

| | | | | | |
|------|-------|------|------|------|---|
| A | B | C | D | E | |
| 0.00 | -0.01 | 0.01 | 0.00 | 0.00 | g |



Repeatability

Load test : 2000 g

Stdev. : 0.000 g

- o0o -

12/1





THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0123

MTC No. EEL. BP. 76/1165

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 94 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa, Corrected to Reference Conditions : 101.325 kPa, 23.0°C and 50 %RH

1. Sound Pressure Level

| Standard Microphone Type | Measured Sound Pressure Level (dB) | Deviated value (dB) | Uncertainty (dB) | Tolerance limit IEC60942:2003 Class 1 |
|-----------------------------|---------------------------------------|------------------------|---------------------|--|
| 1/2 inch Bruel&Kjaer 4180 | 93.92 | -0.08 | ± 0.10 | ± 0.40 dB |

2. Frequency

| Standard Microphone Type | Measured Frequency (Hz) | Deviated value (Hz) | Uncertainty (Hz) | Tolerance limit IEC60942:2003 Class 1 |
|-----------------------------|----------------------------|------------------------|---------------------|--|
| 1/2 inch Bruel&Kjaer 4180 | 1000.0 | 0.0 | ± 1.5 | $\pm 1.0\%$ |

3. Total distortion

| Standard Microphone Type | Measured Total distortion (%) | Uncertainty (%) | Tolerance limit IEC60942:2003 Class 1 |
|-----------------------------|----------------------------------|--------------------|--|
| 1/2 inch Bruel&Kjaer 4180 | 1.30 | ± 0.50 | $\pm 3.0\%$ |

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

(Mr. Weerachai Deechaiyae)

Approved by :



Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 2 Dec. 2022

Date of Issue : 2 Dec. 2022

Ref : 2011265112805100001

End of Certificate

2 / 2

The results relate only to the items tested/calibrated or value assigned.

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FM.BL.MTC.002 Rev.4

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
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Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th



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ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Certificate No. : 66-200066-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
540, 540/1 Soi Bangkhae7, Bangkhae, Bangkok 10160

Equipment : Electronic Balance
Manufacturer : Sartorius **Model :** SECURA125-1S
Serial No. : 0034606552 **ID No. :** ELABBALANCEN05
Capacity : 120 g **Resolution :** 0.0001 g

Environment : On site calibration was carried out at the B304 Balance Room, Envilab Co., Ltd.
Ambient Temperature : (21.7 to 22.0) °C
Relative Humidity : (47.0 to 47.1) %
Air Pressure : (1015.0 to 1016.0) mbar

Date of Received : 01 March 2023

Date of Calibration : 01 March 2023

Date of Issue : 04 March 2023

Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 7 - November 2022

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Weights

| ID No. | Cert. No. | Due Date | Traceability |
|------------|-----------|-------------|--|
| E261-E2624 | C02222345 | 10 Nov 2023 | National Institute of Metrology (Thailand), (NIMT) |

Approved by :



(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-200066-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
540, 540/1 Soi Bangkhae7, Bangkhae, Bangkok 10160

Equipment : Electronic Balance
Manufacturer : METTLER TOLEDO Model : XSR205DU
Serial No. : B911363567 ID No. : ELABBALANCEN06
Capacity : 220 g Resolution : 0.00001g/81g, 0.0001g/220g

Environment : On site calibration was carried out at the B304 Balance Room, Envilab Co., Ltd.

Ambient Temperature : (24.6 to 24.9) °C

Relative Humidity : (57.0 to 67.8) %

Air Pressure : 1015.0 mbar

Date of Received : 01 March 2023

Date of Calibration : 01 March 2023

Date of Issue : 04 March 2023

Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 7 - November 2022

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Weights

| ID No. | Cert. No. | Due Date | Traceability |
|------------|-----------|-------------|--|
| E261-E2624 | C02222345 | 10 Nov 2023 | National Institute of Metrology (Thailand), (NIMT) |

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



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ผู้จัดการฝ่ายควบคุมคุณภาพ



บริษัท เอ็นวิลแล็บ จำกัด 540,540/1 ซอยบางนาซอย 7 แขวงบางนา เขต บางนา กรุงเทพมหานคร 10160
Envilab Co., Ltd. 540,540/1 Soi Bangna 7 Bangnae Bangnae Bangkok 10160
Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@envilab.com



Document No. EVL-001-01-01-01

TSP High Volume Sampler Calibration

Verification Report No.

A6605 -TSP 01

| | |
|--|---------------------------------|
| <input checked="" type="checkbox"/> PM | <input type="checkbox"/> Onsite |
| Site: บริษัท เอ็นวิลแล็บ จำกัด | |
| UTM : 47P N1514475 E654269 | |
| Sampler: NTSP#11 | |
| Recorder: TEST Report | |
| Date: 1 May 23 | |
| Technical: Sanayu J. | |
| Approval: Wisan R. | |

CONDITIONS

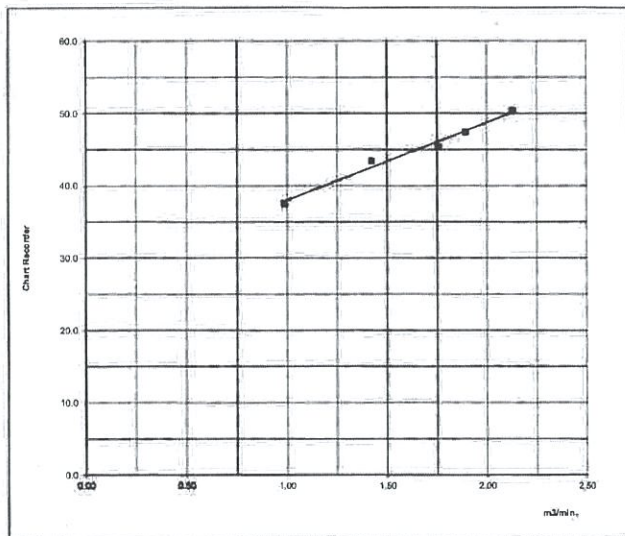
| | |
|---------------------------------|--------------------------------------|
| Barometric Press. (hPa): 1010.0 | Corrected Pressure (mm Hg): 757.6 |
| Temperature (deg C): 32.0 | Temperature (deg K): 305.0 |
| Average Press. (hPa): 1013.0 | Corrected Avg. Press. (mm Hg): 759.8 |
| Average Temp. (deg C): 30.0 | Average Temp. (deg K): 303.0 |

CALIBRATION ORIFICE

| | |
|---------------------------------|-----------------------------|
| Brand: Tisch Environmental, Inc | Qstd Slope: 1.63957 |
| Model: TE-5028A | Qstd Intercept: -0.01202 |
| Serial#: 1328 | Date Certified: 19 Jan 2023 |

CALIBRATIONS

| Plate or Test # | H2O (in) | Qstd (m3/min) | I (chart) | IC (corrected) | LINEAR REGRESSION |
|-----------------|----------|---------------|-----------|----------------|---|
| 1 | 12.40 | 2.127 | 51.0 | 50.33 | Slope = 10.7595 |
| 2 | 9.82 | 1.894 | 48.0 | 47.37 | Intercept = 27.1829 |
| 3 | 8.45 | 1.757 | 46.0 | 45.40 | Corr. coeff. = 0.9918 |
| 4 | 5.54 | 1.424 | 44.0 | 43.42 | # of Observations: 5 |
| 5 | 2.65 | 0.987 | 38.0 | 37.50 | Range of Chart at 1.1 - 1.7 m3/min. 40 46 |



Calibrated by :

(Sanayu Jantason)
1 May 2023

Approved by :

(Wisan Ritthikamon)
1 May 2023

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Environmental responsibility with accuracy measurement.

FE-MNT-29 Rev.00/01/06/53



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6605009

Page:1/1

Calibrated Date: 2-May-23

☒ PM ☐ Onsite

Instruments Information

| | |
|-----------------------------|---------------------|
| Analyzer Type: SO2 Analyzer | Manufacturer THERMO |
| Model: THERMO_43C | S/N: ESOTE43C071944 |

Calibration System

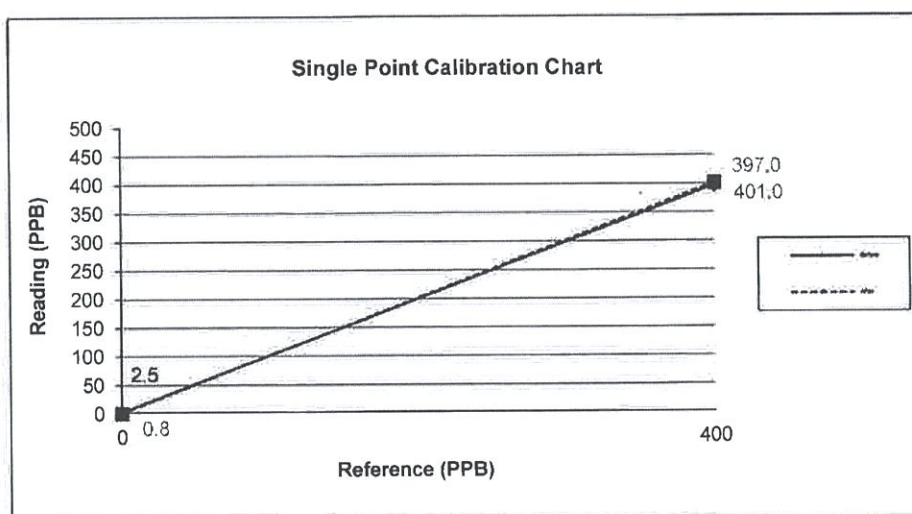
| Calibrator Unit | Standard Gas |
|----------------------------|------------------------------------|
| Dilutor Model ESA MGC101 | NO Conc 44.68 PPM |
| S/N: 792 | SO2 Conc 45.34 PPM |
| ZERO AIR Generator ZAG7001 | CO Conc 4500 PPM |
| S/N: 644 | Expire Date: Feb 19,2024 EB0140762 |

Environment: Temperature 28.5 °C

Humidity: 55 %RH

Calibration Report

| Status | Zero | | | Span | | |
|--------|-----------------|---------------|-------------|-----------------|---------------|--------|
| | Reference (PPB) | Reading (PPB) | Drift (PPB) | Reference (PPB) | Reading (PPB) | Drift% |
| Before | 0.0 | 2.5 | 2.5 | 400.0 | 397 | -0.8 |
| After | 0.0 | 0.8 | 0.8 | 400.0 | 401 | 0.3 |



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 ผู้จัดการฝ่ายควบคุมคุณภาพ



NOx Analyzer Verification Test Report

Calibration Report No.: 8805010
Calibrated Date: 2-May-23

Page:1/2

☒ PM ☐ Onsite

Instruments Information

| | |
|--|--|
| Analyzer Type: NO/NO2/NOx Analyzer Model: 42C | Manufacturer THERMO S/N: ENOTE42C515373 |
|--|--|

Calibration System

| Calibrator Unit | Standard Gas |
|--|---|
| Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644 | NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762 |

Environment: Temperature 27.5 °C

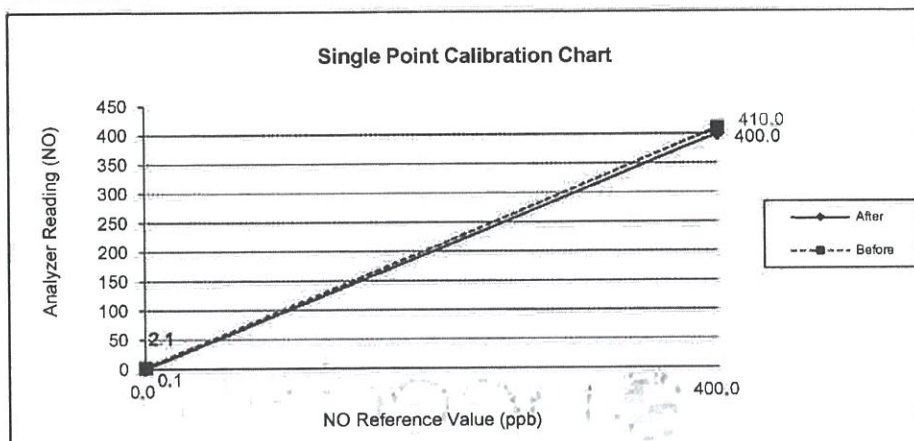
Humidity: 50 %RH

Calibration Check (Before adjust)

| GAS | Zero | | | Span | | |
|-----------------|---------------------|----------------------|-------------|---------------------|----------------------|--------|
| | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) | Drift% |
| NO | 2.1 | 0.0 | 2.1 | 410 | 400.0 | 1.2 |
| NO ₂ | 1.6 | 0.0 | 1.6 | 1.0 | 0.0 | 0.1 |
| NOx | 3.7 | 0.0 | 3.7 | 411 | 400.0 | 1.4 |

Calibration Check (After adjust)

| GAS | Zero | | | Span | | |
|-----------------|---------------------|----------------------|-------------|---------------------|----------------------|--------|
| | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) | Drift% |
| NO | 0.1 | 0.0 | 0.1 | 400 | 400.0 | 0.0 |
| NO ₂ | 0.2 | 0.0 | 0.2 | 0.5 | 0.0 | 0.1 |
| NOx | 0.3 | 0.0 | 0.3 | 401 | 400.0 | 0.1 |



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บริษัท เอ็นไวเลบ จำกัด 540,540/1 ซอยบางกะปิ 7 แขวงบางกะปิ เขตบางกะปิ กรุงเทพฯ 10160
Envilab Co., Ltd. 540,540/1 Soi Bangkapi 7 Bangkapi Bangkok Bangkok 10160
Tel : 02-202-3577-8 Fax. 02-202-3773 E-mail : info@evltesting.com



Verification Test Report

Report No.:

CONDO -SLM 04

☒ PM ☐ Onsite UTM: 47P N 1514455 E 654248

Calibrated Date: 1 May 2023

Site : บริษัทเอ็นไวเลบ จำกัด

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0016

Environment: Temperature 25 °C Humidity 70 %RH

Reference Standard: Acoustic Calibrator Class 1 Model CB011,CESVA

Serial No.T252953

Date of Calibration : 02 December 2022

Result of Test

| Reference Standard (dB) | Instrument reading (dB) | Error (dB) | Adjust (dB) |
|----------------------------|----------------------------|---------------|----------------|
| 93.92 | 93.93 | 0.01 | 93.92 |

Calibrated By:

(Sanayu Jantason)

Date:

1 May 2023

Approve By:

(Wisan Ritthikamon)

Date:

1 May 2023

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บริษัท เอ็นวีแล็บ จำกัด (มหาชน) 101 หมู่ 10 ตำบลบ้านใหม่ อำเภอเมือง จังหวัดนนทบุรี 11000
โทรศัพท์ : 02-011-1111, 081-0007112, 081-0007113, 081-0007114, 081-0007115, 081-0007116, 081-0007117, 081-0007118, 081-0007119, 081-0007120
โทรสาร : 02-011-1111, 02-011-1112, 02-011-1113, 02-011-1114, 02-011-1115, 02-011-1116, 02-011-1117, 02-011-1118, 02-011-1119, 02-011-1120
เว็บไซต์ : www.evlab.com



TSP High Volume Sampler Calibration

Verification Report No.

A6605 -TSP 02

☐ PM ☐ Onsite

Site: บริษัท เอ็นวีแล็บ จำกัด

UTM: 47P N1514475 E654269

Sampler: ETSP#15

Recorder: TEST Report

Date: 1 May 23

Technical: Sanayu J.

Approval: Wisan R.

CONDITIONS

Barometric Press. (hPa): 1010.0

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.6

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5028A

Serial#: 1328

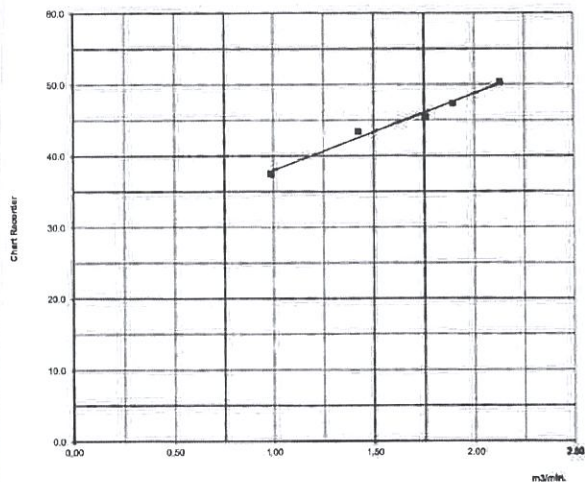
Qstd Slope: 1.63957

Qstd Intercept: -0.01202

Date Certified: 19 Jan 2023

CALIBRATIONS

| Plate or Test # | H ₂ O (in) | Qstd (m ³ /min) | I (chart) | IC (corrected) | LINEAR REGRESSION |
|-----------------|-----------------------|----------------------------|-----------|----------------|---|
| 1 | 12.93 | 2.172 | 51.0 | 50.33 | Slope = 10.8022 |
| 2 | 9.36 | 1.849 | 47.0 | 46.38 | Intercept = 26.9473 |
| 3 | 6.70 | 1.565 | 45.0 | 44.41 | Corr. coeff. = 0.9930 |
| 4 | 4.45 | 1.277 | 42.0 | 41.45 | # of Observations: 5 |
| 5 | 2.43 | 0.946 | 37.0 | 36.51 | Range of Chart at 1.1 - 1.7 m ³ /min. 40 |
| | | | | | 45 |



Calibrated by :

(Sanayu Jantason)
1 May 2023

Approved by :

(Wisan Ritthikamon)
1 May 2023

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RE-MNT-29 Rev.00/01/08/63



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ผู้จัดการฝ่ายควบคุมดูแล

**neediss**

บริษัท นีดิส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.
535 ซอยบางนา 7 แขวงบางนา เขตบางนา กรุงเทพมหานคร 10150 535 Soi Bangnae 7 Bangkhoe Bangkok
Tel 02-602-3920-2 Fax 02-602-3928 Email: info@neediss.com



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6605008

Page:1/1

Calibrated Date: 2-May-23

☒ PM ☐ Onsite

Instruments Information

| | |
|------------------------------------|----------------------------|
| Analyzer Type: SO2 Analyzer | Manufacturer THERMO |
| Model: THERMO.,43C | S/N: ESOTE43C103362 |

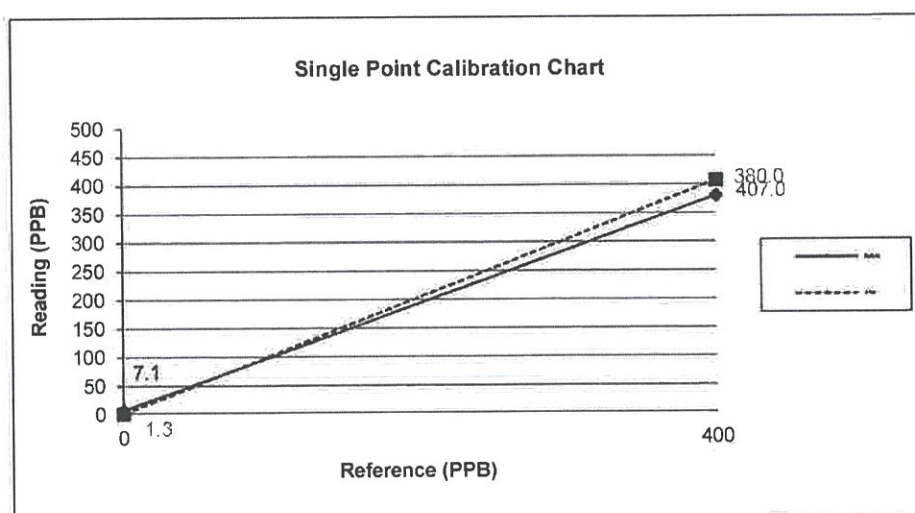
Calibration System

| Calibrator Unit | Standard Gas |
|----------------------------|------------------------------------|
| Dilutor Model ESA MGC101 | NO Conc 44.68 PPM |
| S/N: 792 | SO2 Conc 45.34 PPM |
| ZERO AIR Generator ZAG7001 | CO Conc 4500 PPM |
| S/N: 644 | Expire Date: Feb 19,2024 EB0140762 |

Environment: Temperature 28.5 °CHumidity: 55 %RH

Calibration Report

| Status | Zero | | | Span | | |
|--------|-----------------|---------------|-------------|-----------------|---------------|--------|
| | Reference (PPB) | Reading (PPB) | Drift (PPB) | Reference (PPB) | Reading (PPB) | Drift% |
| Before | 0.0 | 7.1 | 7.1 | 400.0 | 380 | -5.0 |
| After | 0.0 | 1.3 | 1.3 | 400.0 | 407 | 1.8 |



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NOx Analyzer Verification Test Report

Calibration Report No.: 6605002
Calibrated Date: 2-May-23

Page:1/2

☒ PM ☐ Onsite

Instruments Information

| | |
|--|--|
| Analyzer Type: NO/NO2/NOx Analyzer Model: 42C | Manufacturer THERMO S/N: ENOTE42C304779 |
|--|--|

Calibration System

| Calibrator Unit | Standard Gas |
|--|---|
| Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644 | NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762 |

Environment: Temperature 27.7 °C

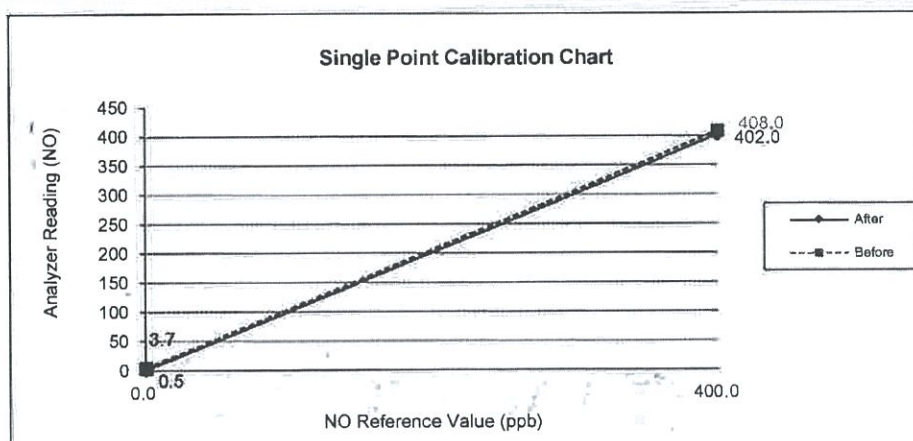
Humidity: 49 %RH

Calibration Check (Before adjust)

| GAS | Zero | | | Span | | |
|-----------------|---------------------|----------------------|-------------|---------------------|----------------------|--------|
| | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) | Drift% |
| NO | 3.7 | 0.0 | 3.7 | 408 | 400.0 | 1.0 |
| NO ₂ | 0.4 | 0.0 | 0.4 | 2.0 | 0.0 | 0.2 |
| NOx | 4.1 | 0.0 | 4.1 | 410 | 400.0 | 1.2 |

Calibration Check (After adjust)

| GAS | Zero | | | Span | | |
|-----------------|---------------------|----------------------|-------------|---------------------|----------------------|--------|
| | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) | Drift% |
| NO | 0.5 | 0.0 | 0.5 | 402 | 400.0 | 0.2 |
| NO ₂ | 0.2 | 0.0 | 0.2 | 3.0 | 0.0 | 0.4 |
| NOx | 0.7 | 0.0 | 0.7 | 405 | 400.0 | 0.6 |



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บริษัท เอ็นไวแล็บ จำกัด 540,540/1 ซอยบางกะปิ 7 บางกะปิ กรุงเทพฯ 10160
Envilab Co., Ltd. 540,540/1 Soi Bangkok 7 Bangkok Bangkok 10160
Tel : 02-802-3577-8 Fax : 02-802-3773 E-mail : info@evltesting.com



Verification Test Report

Report No.:

CONDO -SLM 05

☒ PM ☐ Onsite UTM : 47P N 1514455 E 654248

Calibrated Date: 1 May 2023

Site : บริษัทเอ็นไวแล็บ จำกัด

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0018

Environment: Temperature 25 °C Humidity 70 %RH

Reference Standard: Acoustic Calibrator Class 1 Model CB011,CESVA

Serial No.T252953

Date of Calibration : 02 December 2022

Result of Test

| Reference Standard (dB) | Instrument reading (dB) | Error (dB) | Adjust (dB) |
|----------------------------|----------------------------|---------------|----------------|
| 93.92 | 93.94 | 0.02 | 93.92 |

Calibrated By:

(Sanayu Jantason)

Date:

1 May 2023

Approve By:

(Wisan Ritthikamon)

Date:

1 May 2023

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Certificate of Calibration

| Calibration Certification Information | | | |
|---------------------------------------|------------------------|-----------------|--|
| Cal. Date: January 18, 2023 | Rootsmeter S/N: 438320 | Ta: 294 °K | |
| Operator: Jim Tisch | | Pa: 750.1 mm Hg | |
| Calibration Model #: TE-5025A | Calibrator S/N: 0759 | | |

| Run | Vol. Init (m3) | Vol. Final (m3) | ΔVol. (m3) | ΔTime (min) | ΔP (mm Hg) | ΔH (in H2O) |
|-----|----------------|-----------------|------------|-------------|------------|-------------|
| 1 | 1 | 2 | 1 | 1.3960 | 3.2 | 2.00 |
| 2 | 3 | 4 | 1 | 0.9950 | 6.4 | 4.00 |
| 3 | 5 | 6 | 1 | 0.8850 | 8.0 | 5.00 |
| 4 | 7 | 8 | 1 | 0.8450 | 8.8 | 5.50 |
| 5 | 9 | 10 | 1 | 0.6990 | 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) | $\sqrt{\Delta H (Ta/Pa)}$ (y-axis) |
| 0.9961 | 0.7135 | 1.4145 | 0.9957 | 0.7133 | 0.8854 |
| 0.9918 | 0.9968 | 2.0004 | 0.9915 | 0.9964 | 1.2521 |
| 0.9897 | 1.1183 | 2.2365 | 0.9893 | 1.1179 | 1.3999 |
| 0.9886 | 1.1700 | 2.3456 | 0.9883 | 1.1695 | 1.4683 |
| 0.9833 | 1.4067 | 2.8289 | 0.9829 | 1.4062 | 1.7708 |
| QSTD | m= | 2.03736 | QA | m= | 1.27576 |
| | b= | -0.03733 | | b= | -0.02337 |
| | r= | 0.99997 | | r= | 0.99997 |

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

| 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 |

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 66-200035-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

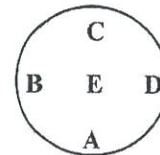
| Nominal Value (g) | Correction (g) | Uncertainty \pm (g) |
|----------------------|-------------------|--------------------------|
| 0.01 | 0.0001 | 0.00011 |
| 0.1 | 0.0001 | 0.00011 |
| 1 | 0.0000 | 0.00011 |
| 2 | 0.0001 | 0.00011 |
| 5 | 0.0000 | 0.00012 |
| 10 | 0.0000 | 0.00011 |
| 20 | 0.0000 | 0.00013 |
| 50 | 0.0001 | 0.00014 |
| 100 | 0.0000 | 0.00020 |
| 200 | -0.0001 | 0.00038 |

This result of calibration was found accurate as shown on date and place of calibration only.

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.11$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g
A B C D E
-0.0001 0.0001 0.0000 -0.0001 0.0000 g



Repeatability

Load test : 200 g
Stdev. : 0.00000 g

- o O o -



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 66-200035-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

| Nominal Value (g) | Correction (g) | Uncertainty \pm (g) |
|----------------------|-------------------|--------------------------|
| 10 | 0.00 | 0.0082 |
| 20 | 0.00 | 0.0082 |
| 50 | 0.00 | 0.0082 |
| 100 | 0.00 | 0.0082 |
| 200 | 0.00 | 0.0083 |
| 500 | 0.00 | 0.0085 |
| 1000 | 0.00 | 0.0110 |
| 1500 | 0.00 | 0.012 |
| 2000 | 0.00 | 0.012 |
| 3000 | 0.00 | 0.023 |

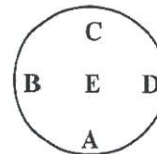
This result of calibration was found accurate as shown on date and place of calibration only.

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 1000 g

| | | | | | |
|------|-------|------|------|------|---|
| A | B | C | D | E | |
| 0.00 | -0.01 | 0.01 | 0.00 | 0.00 | g |



Repeatability

Load test : 2000 g

Stdev. : 0.000 g

- o0o -





THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0123

MTC No. EEL. BP. 76/1165

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 94 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa, Corrected to Reference Conditions : 101.325 kPa, 23.0°C and 50 %RH

1. Sound Pressure Level

| Standard Microphone Type | Measured Sound Pressure Level (dB) | Deviated value (dB) | Uncertainty (dB) | Tolerance limit IEC60942:2003 Class 1 |
|-----------------------------|---------------------------------------|------------------------|---------------------|--|
| 1/2 inch Bruel&Kjaer 4180 | 93.92 | -0.08 | ± 0.10 | ± 0.40 dB |

2. Frequency

| Standard Microphone Type | Measured Frequency (Hz) | Deviated value (Hz) | Uncertainty (Hz) | Tolerance limit IEC60942:2003 Class 1 |
|-----------------------------|----------------------------|------------------------|---------------------|--|
| 1/2 inch Bruel&Kjaer 4180 | 1000.0 | 0.0 | ± 1.5 | $\pm 1.0\%$ |

3. Total distortion

| Standard Microphone Type | Measured Total distortion (%) | Uncertainty (%) | Tolerance limit IEC60942:2003 Class 1 |
|-----------------------------|----------------------------------|--------------------|--|
| 1/2 inch Bruel&Kjaer 4180 | 1.30 | ± 0.50 | $\pm 3.0\%$ |

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

(Mr. Weerachai Deechaiyae)

Approved by :



Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 2 Dec. 2022

Date of Issue : 2 Dec. 2022

Ref : 2011265112805100001

End of Certificate

2 / 2

The results relate only to the items tested/calibrated or value assigned.

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FM.BL.MTC.002 Rev.4

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

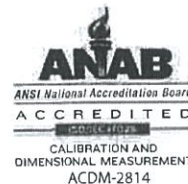


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ผู้จัดการฝ่ายควบคุมคุณภาพ



CALIBRATION LABORATORY CO., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



Supplement to Calibration Certificate No. Q22080016

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VIBRATION METER
MANUFACTURER : INSTANTEL
MODEL / TYPE : 721A2601/721A3301
SERIAL NO. : UM14628/UM14628[EVMINMMATE4628]
CLID. NO. : 252101368
JOB CONTROL NO. : 220809080016

CUSTOMER : ENVILAB CO., LTD.
540, 540/1 SOI BANGKHAE 7, BANGKHAE,
BANGKHAE, BANGKOK 10160 THAILAND

DATE OF RECEIVED : 09 August 2022

DATE OF ISSUED : 23 August 2022

Report of calibration screening must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Suwit Phuanbusabong
Calibration Engineer



Approved By :

Mongkol Yotsoontorn
Authorized Signatory
23 August 2022

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q22080016A1
F3-012-04/01-12



page 1 of 3
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ผู้จัดการฝ่ายควบคุมคุณภาพ
@clccalibration

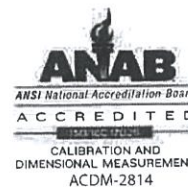




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Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

VELOCITY RESULT

| Test point | | Mode | STD Reading | DUC Reading | Correction | Uncertainty |
|------------|---------------|------|-------------|-------------|------------|---------------------|
| (mm/s) | (frequency) | | (mm/s) | (mm/s) | (mm/s) | \pm (% of rdg.) |
| 10 | 50 Hz | peak | 10.000 | 10.107 | -0.107 | 2.3 |
| 20 | 50 Hz | | 20.000 | 20.343 | -0.343 | 1.8 |
| 30 | 50 Hz | | 30.000 | 30.581 | -0.581 | 1.8 |

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 008 Page 1 of 54

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q22080016

F3-011-04/01-12

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รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



@clccalibration



Result of Calibration

Certificate No. : SPR22050142-2

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Frequency Response Performance Test @ 5 mm/s

Unit : mm/s

| Frequency (Hz) | STD Reading | UUC. Reading | Error | Uncertainty (±) |
|-------------------|-------------|--------------|-------|--------------------|
| 20.0 | 5.12 | 5.00 | -0.12 | 0.042 |
| 40.0 | 5.10 | 5.00 | -0.10 | 0.042 |
| 50.0 | 5.09 | 5.00 | -0.09 | 0.042 |
| 80.0 | 5.10 | 5.00 | -0.10 | 0.042 |
| 100.0 | 5.08 | 5.00 | -0.08 | 0.042 |
| 160.0 | 5.09 | 5.00 | -0.09 | 0.042 |
| 200.0 | 5.11 | 5.00 | -0.11 | 0.042 |

Linearity Performance Test

Unit : mm/s

| Frequency (Hz) | STD Reading | UUC. Reading | Error | Uncertainty (±) |
|-------------------|-------------|--------------|-------|--------------------|
| 80 | 0.95 | 1.00 | 0.05 | 0.042 |
| | 1.54 | 1.50 | -0.04 | 0.044 |
| | 2.07 | 2.00 | -0.07 | 0.047 |
| | 3.09 | 3.00 | -0.09 | 0.053 |
| | 5.12 | 5.00 | -0.12 | 0.070 |

Note:

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2$, providing a level of confidence approximately 95%

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR22050142-2

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Customer : Envilab Co., Ltd.

540, 540/1 Soi Bangkhae 7, Bangkhae, Bangkhae Bangkok 10160

Equipment Name : Vibration Meter

Manufacturer : GeoSonics

Model : SSU3000LC

Serial Number : 3852/4824

ID. Number : EVMGS30LC03852

Environmental Conditions

Ambient Temperature : 23 °C \pm 3 °C

Received Date : 12 May 2022

Relative Humidity : 50 % \pm 15 %

Calibration Date : 17 May 2022

Location of Calibration : In-Lab

Recommend Due Date : 17 May 2023

Calibration Procedure : In-House Method

Date of Issue : 18 May 2022

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

All calibrations are performed within manufacture's specifications. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr. Munin Khumpum

Approved by :

Calibration Officer

(Mr. Worapong Sinthusopa)

Authorized Signatory



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ
SPM-04-15 rev.0