

ภาคผนวกที่ 5

เอกสารผลการสอบเทียบเครื่องมือตรวจวัด

ภาคผนวกที่ 5-1
เอกสารผลการสอบเทียบเครื่องมือตรวจวัด
ครั้งที่ 1/2568
โรงเรียนแสงหิรัญ
และสถาบันการบินพลเรือน
วันที่ตรวจวัดวันที่ 3-8 ตุลาคม 2568

TSP High Volume Sampler Calibration

Verification Report No.
 SO2500251-E001 -TSP 01

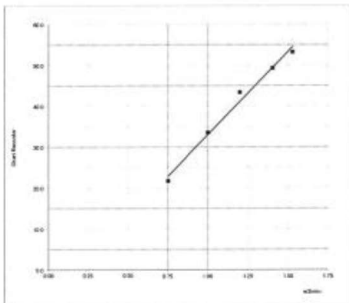
☐ PM ☒ Onsite
 Site: ร.ร.การนิเทศฯ
 UTM: N 1526246 E 667884
 Sampler: ETSP#36
 Recorder: ECRDS016339508
 Date: 3 Oct 25
 Technical: XXXXXXXXXX
 Approval: XXXXXXXXXX

CONDITIONS
 Barometric Press. (hPa): 1007.5 Corrected Pressure (mm Hg): 755.7
 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
 Model: TE-5025A
 Serial#: 2067
 Qstd Slope: 2.06933
 Qstd Intercept: -0.02815
 Date Certified: 4 Mar 25
 Due Date: 03-Mar-26

| CALIBRATIONS | | | | | LINEAR REGRESSION |
|-----------------|----------|---------------|-----------|----------------|-------------------|
| Plate or Test # | H2O (in) | Qstd (m3/min) | I (chart) | IC (corrected) | |
| 1 | 10.10 | 1.527 | 54.0 | 53.23 | |
| 2 | 8.50 | 1.402 | 50.0 | 49.28 | |
| 3 | 6.20 | 1.200 | 44.0 | 43.37 | |
| 4 | 4.30 | 1.001 | 34.0 | 33.51 | |
| 5 | 2.40 | 0.752 | 22.0 | 21.68 | |

Slope = 40.7713
 Intercept = -7.7493
 Corr. coeff = 0.9937
 # of Observations: 5
 Range of Chart at 1.1 - 1.7 m3/min: 38 / 62



Calibrated by: XXXXXXXXXX
 3 October 2025
 Approved by: XXXXXXXXXX
 3 October 2025

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 ประกาศใช้ 01/08/2568 PM-SVM-03-14 Rev 00

PM10 High Volume Sampler Calibration

Verification Report No.
 SO2500251-E001 -PM 01

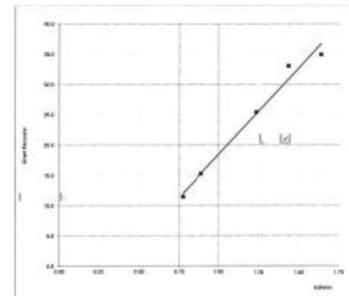
☒ PM ☐ Onsite
 Site: ร.ร.การนิเทศฯ
 UTM: N 1526246 E 667884
 Sampler: EPM10#25
 Recorder: ECRDS016075261
 Date: 3 Oct 25
 Technical: XXXXXXXXXX
 Approval: XXXXXXXXXX

CONDITIONS
 Barometric Press. (hPa): 1007.5 Corrected Pressure (mm Hg): 755.7
 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
 Model: TE-5025A
 Serial#: 2067
 Slope: 1.29578
 Intercept: -0.01772
 Date Certified: 4 Mar 25
 Due Date: 3 Mar 26

| CALIBRATIONS | | | | | LINEAR REGRESSION |
|-----------------|----------|-------------|-----------|----------------|-------------------|
| Plate or Test # | H2O (in) | Qs (m3/min) | I (chart) | IC (corrected) | |
| 1 | 11.00 | 1.640 | 55.0 | 34.94 | |
| 2 | 8.40 | 1.435 | 52.0 | 33.04 | |
| 3 | 6.20 | 1.234 | 40.0 | 25.41 | |
| 4 | 3.20 | 0.891 | 24.0 | 15.25 | |
| 5 | 2.40 | 0.773 | 18.0 | 11.44 | |

Slope = 28.5429
 Intercept = -10.0820
 Corr. coeff = 0.9905
 SFR = 1.000
 SSP = 29.06
 # of Observations: 5
 Range of Chart at SFR ±10%: 25 / 33



Calibrated by: XXXXXXXXXX
 3 October 2025
 Approved by: XXXXXXXXXX
 3 October 2025

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 ประกาศใช้ 01/08/2568 PM-SVM-03-14 Rev 00

TSP High Volume Sampler Calibration

Verification Report No.
 SO2500251-E001 -TSP 02

☒ PM ☒ Onsite
 Site: ร.ร.แสงศิษย์
 UTM: N 1516341 E 672867
 Sampler: ETSP#34
 Recorder: ECRDS016339508

Date: 3 Oct 25
 Technical: [REDACTED]
 Approval: [REDACTED]

CONDITIONS
 Barometric Press. (hPa): 1007.4 Corrected Pressure (mm Hg): 755.6
 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: 2.06933
 Model: TE-5025A Qstd Intercept: -0.02815
 Serial#: 2067 Date Certified: 4 Mar 25
 Due Date: 03-Mar-26

| Plate or Test # | H ₂ O (in) | Qstd (m3/min) | I (chart) | IC (corrected) |
|-----------------|-----------------------|---------------|-----------|----------------|
| 1 | 12.20 | 1.677 | 56.0 | 55.19 |
| 2 | 9.80 | 1.489 | 52.0 | 51.25 |
| 3 | 6.40 | 1.219 | 44.0 | 43.37 |
| 4 | 4.30 | 1.001 | 34.0 | 33.51 |
| 5 | 2.20 | 0.720 | 24.0 | 23.65 |

LINEAR REGRESSION
 Slope = 33.7515
 Intercept = 0.1752
 Corr. coeff = 0.9937
 # of Observations: 5
 Range of Chart at 1.1 - 1.7 m3/min: 38 / 58

Calibrated by: [REDACTED]
 3 October 2025
 Approved by: [REDACTED]
 3 October 2025

ประกอบหน้า 01/08/2568

PM10 High Volume Sampler Calibration

Verification Report No.
 SO2500251-E001 -PM 02

☒ PM ☒ Onsite
 Site: ร.ร.แสงศิษย์
 UTM: N 1516341 E 672867
 Sampler: EPM10#31
 Recorder: ECRDS016449812

Date: 3 Oct 25
 Technical: [REDACTED]
 Approval: [REDACTED]

CONDITIONS
 Barometric Press. (hPa): 1007.4 Corrected Pressure (mm Hg): 755.6
 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 Slope: 1.29578
 Model: TE-5025A Intercept: -0.01772
 Serial#: 2067 Date Certified: 4 Mar 25
 Due Date: 3 Mar 26

| Plate or Test # | H ₂ O (in) | Qa (m3/min) | I (chart) | IC (corrected) |
|-----------------|-----------------------|-------------|-----------|----------------|
| 1 | 12.80 | 1.768 | 56.0 | 35.58 |
| 2 | 10.40 | 1.595 | 54.0 | 34.31 |
| 3 | 7.30 | 1.338 | 43.0 | 27.32 |
| 4 | 4.40 | 1.042 | 32.0 | 20.33 |
| 5 | 2.70 | 0.819 | 20.0 | 12.71 |

LINEAR REGRESSION
 Slope = 24.5513
 Intercept = -6.1756
 Corr. coeff = 0.9902
 SFR = 1.000
 SSP = 28.92
 # of Observations: 5
 Range of Chart at SFR ±10%: 28 / 32

Calibrated by: [REDACTED]
 3 October 2025
 Approved by: [REDACTED]
 3 October 2025

ประกอบหน้า 01/08/2568

Verification Test Report

Report No.: SO2500251-E001 / 001

Verification Date : 03 October 2025

Operate Information ☐ PM ☒ Onsite

Site : 1.1.การบินพลเรือน

GPS coordinates : 47Q N 1516330 E 672887

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial No : 1915

Scale Rang : 20dB-140dB

Class : 2

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EELBP.65/0168

Date due : 17 January 2026

Traceability : TISTR

Ambient Condition : Temperature : 32.60 °C Relative humidity : 54.20 %

Atmospheric pressure : 1013.3 hpa

Measurement Data

| Reference Value (dB) | Correction Value (dB) | Adjustment (dB) | UUR Reading | | Error (dB) | Acceptant Criteria (dB) |
|-------------------------|--------------------------|--------------------|-------------|-------|---------------|----------------------------|
| | | | Initial | Final | | |
| 93.93 | -0.3 | 93.63 | 93.87 | 94.03 | 0.16 | ±1.0 |

* UUR = Unit Under Reference flow

Acceptant Criteria : Sound Level Meter Class 1 ±0.5 dB

Sound Level Meter Class 2 ±1.0 dB

Calibrated By: _____

Date : 03 October 2025

Approve By: _____

Date : 03 October 2025

The Results shown in this verification report refer only to the equipment tested.

This Calibration Certificate cannot be reproduced.

ประกาศใช้ 01/08/2568

4-SVM-05-06 Rev.00

Verification Test Report

Report No.: SO2500251-E001 / 001

Verification Date : 03 October 2025

Operate Information ☐ FM ☒ Onsite

Site : 1.1.แสดพิชญ

GPS coordinates : 47Q N 1516261 E 667893

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial No : 1974

Scale Rang : 20dB-140dB

Class : 2

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EELBP.65/0168

Date due : 17 January 2026

Traceability : TISTR

Ambient Condition : Temperature : 32.60 °C Relative humidity : 54.20 %

Atmospheric pressure : 1013.3 hpa

Measurement Data

| Reference Value (dB) | Correction Value (dB) | Adjustment (dB) | UUR Reading | | Error (dB) | Acceptant Criteria (dB) |
|-------------------------|--------------------------|--------------------|-------------|-------|---------------|----------------------------|
| | | | Initial | Final | | |
| 93.93 | 0 | 93.93 | 93.27 | 93.09 | -0.18 | ±1.0 |

* UUR = Unit Under Reference flow

Acceptant value : Sound Level Meter Class 1 ±0.5 dB

Sound Level Meter Class 2 ±1.0 dB

Calibrated By: _____

Date : 03 October 2025

Approve By: _____

Date : 03 October 2025

The Results shown in this verification report refer only to the equipment tested.

This Calibration Certificate cannot be reproduced.

ประกาศใช้ 01/08/2568

M-05-06 Rev.00

Certificate of Calibration

| Calibration Certification Information | | | |
|---------------------------------------|---------------|-----------------|-------------|
| Cal. Date: | March 4, 2025 | Rootsmer S/N: | 438320 |
| Operator: | Jim Tisch | Ta: | 294 °K |
| Calibration Model #: | TE-5025A | Pa: | 746.0 mm Hg |
| | | Calibrator S/N: | 2067 |

| Run | Vol. Init (m3) | Vol. Final (m3) | ΔVol. (m3) | ΔTime (min) | ΔP (mm Hg) | ΔH (in H2O) |
|-----|----------------|-----------------|------------|-------------|------------|-------------|
| 1 | 1 | 2 | 1 | 1.4220 | 3.2 | 2.00 |
| 2 | 3 | 4 | 1 | 1.0090 | 6.4 | 4.00 |
| 3 | 5 | 6 | 1 | 0.9030 | 8.0 | 5.00 |
| 4 | 7 | 8 | 1 | 0.8610 | 8.8 | 5.50 |
| 5 | 9 | 10 | 1 | 0.7090 | 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) |
| 0.9907 | 0.6967 | 1.4106 | 0.9957 | 0.7002 | 0.8878 |
| 0.9864 | 0.9776 | 1.9949 | 0.9914 | 0.9826 | 1.2556 |
| 0.9843 | 1.0900 | 2.2304 | 0.9893 | 1.0955 | 1.4038 |
| 0.9832 | 1.1419 | 2.3393 | 0.9882 | 1.1477 | 1.4723 |
| 0.9779 | 1.3792 | 2.8212 | 0.9826 | 1.3862 | 1.7756 |
| QSTD | | m= 2.06933 | QA | | m= 1.29578 |
| | | b= -0.02815 | | | b= -0.01772 |
| | | r= 0.99997 | | | r= 0.99997 |

| Calculations | | | |
|--|--|--|--|
| $V_{std} = \Delta Vol((P_a - \Delta P) / P_{std})(T_{std} / T_a)$ | | $V_a = \Delta Vol((P_a - \Delta P) / P_a)$ | |
| $Q_{std} = V_{std} / \Delta Time$ | | $Q_a = V_a / \Delta Time$ | |
| For subsequent flow rate calculations: | | | |
| $Q_{std} = 1/m \left(\sqrt{\Delta H \left(\frac{P_a}{P_{std}} \right) \left(\frac{T_{std}}{T_a} \right)} \right) - b$ | | $Q_a = 1/m \left(\sqrt{\Delta H (T_a / P_a)} \right) - b$ | |

| Standard Conditions | |
|---------------------|---------------------------------------|
| Tstd: | 298.15 °K |
| Pstd: | 760 mm Hg |
| Key | |
| 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 |
|---|
| USEPA 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)263-7611
67-900

Certificate of Calibration

Certificate No. : 68-200034-1

Page : 1 of 2

Submitted by :

Equipment :

Electronic Balance

Manufacturer : Sartorius

Model : SECURA224-1S

Serial No. : 0034803270

ID No. : ELABBALANCEN04

Capacity : 220 g

Resolution : 0.0001 g

Environment :

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

Ambient Temperature : (20.4 to 21.0) °C

Relative Humidity : (41.9 to 42.9) %

Air Pressure : 1014.0 mbar

Date of Received : 28 January 2025

Date of Calibration : 28 January 2025

Date of Issue : 30 January 2025

Calibrated by :

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

C02242009

07 Nov 2025

National Institute of Metrology (Thailand), (NIMT)

Approved by :

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the calibration provider.

CAL-P0031-03

Certificate of Calibration

Certificate No. : 68-200034-1 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 ± (g) |
|----------------------|-------------------|----------------------|
| 0.01 | 0.0000 | 0.00012 |
| 0.1 | 0.0001 | 0.00012 |
| 1 | 0.0000 | 0.00013 |
| 2 | 0.0001 | 0.00013 |
| 5 | 0.0000 | 0.00013 |
| 10 | 0.0000 | 0.00013 |
| 20 | -0.0001 | 0.00014 |
| 50 | -0.0001 | 0.00015 |
| 100 | -0.0001 | 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 $k = 2.06$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

| A | B | C | D | E |
|--------|--------|--------|--------|--------|
| 0.0004 | 0.0004 | 0.0005 | 0.0004 | 0.0000 |

Repeatability

Load test : 200 g

Stdev. : 0.00005 g

- o0o -

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: AIR LIQUIDE (THAILAND) LTD

Part Number: ED4NI99E15A00V3

Cylinder Number: EB0170003

Laboratory: 124 - Plumsteadville - PA

PGVP Number: A12024

Gas Code: CO,NO,NOX,SO2,BALN

Reference Number: 160-403162930-1

Cylinder Volume: 144.0 CF

Cylinder Pressure: 2015 PSIG

Valve Outlet: 660

Certification Date: Oct 23, 2024

Expiration Date: Oct 23, 2027

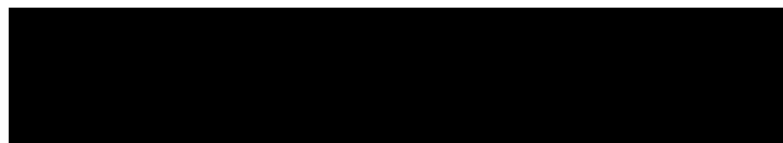
Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/031, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration medium. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty | Assay Dates |
|-----------------|-------------------------|----------------------|-----------------|----------------------------|------------------------|
| NOX | 45.00 PPM | 45.30 PPM | G1 | +/- 1.0% NIST Traceable | 10/16/2024, 10/23/2024 |
| NITRIC OXIDE | 45.00 PPM | 45.30 PPM | G1 | +/- 0.9% NIST Traceable | 10/16/2024, 10/23/2024 |
| SULFUR DIOXIDE | 45.00 PPM | 45.05 PPM | G1 | +/- 0.7% NIST Traceable | 10/16/2024, 10/23/2024 |
| CARBON MONOXIDE | 4500 PPM | 4528 PPM | G1 | +/- 0.6% NIST Traceable | 10/15/2024 |
| NITROGEN | Balance | | | | |

| Type | Lot ID | Cylinder No | Concentration | Uncertainty | Expiration Date |
|-----------------|--------------|--------------|-------------------------------------|-------------|-----------------|
| GMS | DC120120235 | CC750377 | 49.05 PPM NITRIC OXIDE/NITROGEN | +/- 0.5% | May 03, 2026 |
| PRM | 12404 | APEX 1324257 | 50.04 PPM NITRIC OXIDE/NITROGEN | +/- 0.4% | Dec 22, 2023 |
| GMS | 124206899128 | CC323207 | 4.239 PPM NITROGEN DIOXIDE/NITROGEN | +/- 2.0% | Jan 04, 2027 |
| PRM | C2392001.1 | D183445 | 9.87 PPM NITROGEN DIOXIDE/NITROGEN | +/- 2.0% | Nov 22, 2024 |
| GMS | 0712202310 | CC494279 | 49.82 PPM SULFUR DIOXIDE/NITROGEN | +/- 0.7% | Jun 18, 2027 |
| SRM | 1603a | FF25467 | 50.33 PPM SULFUR DIOXIDE/NITROGEN | +/- 0.7% | Jun 27, 2023 |
| CARBON MONOXIDE | 080123 | KAL004712 | 4857 PPM CARBON MONOXIDE/NITROGEN | +/- 0.6% | Feb 20, 2030 |

The SRM, NTRM, PRM, or RGM noted above is only in reference to the GMS used in the assay and not part of the analysis.

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|----------------------------------|----------------------|-----------------------------|
| SIEMENS ULTRAMAT 6 N1M9050 | NDIR | Oct 09, 2024 |
| Nicolet iS50 FTIR AUP2010245 NO | FTIR | Oct 17, 2024 |
| Nicolet iS50 FTIR AUP2010245 NO2 | FTIR | Oct 03, 2024 |
| Nicolet iS50 FTIR AUP2010245 SO2 | FTIR | Sep 26, 2024 |



SO2 Analyzer Verification Test Report

Calibration Report No.: ESA-6810004

Calibrated Date: 1-Oct-25

☒ PM ☐ Onsite

Instruments Information

Page:1/2

| | |
|---|---|
| Analyzer Type: SO2 Analyzer Model: AF22e | Manufacturer: Environnement SA, France S/N: 2503 |
|---|---|

Calibration System

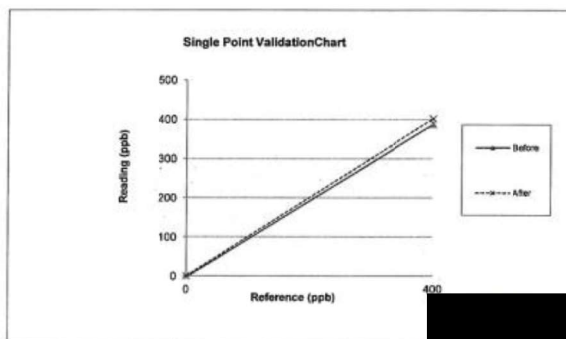
| Calibrator Unit | Standard Gas |
|--|------------------------------------|
| Dilutor Model ESA MGC101 S/N: 792 | NOx Conc 45.30 PPM |
| ZERO AIR Generator ZAG7001 S/N: 644 | NO Conc 45.30 PPM |
| | SO2 Conc 45.05 PPM |
| | CO Conc 4528 PPM |
| | Expire Date: OCT 23,2027 EB0170303 |

Environment: Temperature 25.9 °C

Humidity: 60 %RH

Validation Report

| Status | Zero | | | Span | | |
|--------|-----------------|---------------|-------------|-----------------|---------------|--------|
| | Reference (ppb) | Reading (ppb) | Drift (ppb) | Reference (ppb) | Reading (ppb) | Drift% |
| Before | 0.0 | -2.6 | -2.6 | 400.0 | 387.7 | -1.6 |
| After | 0.0 | 0.6 | 0.6 | 400.0 | 402.2 | 0.3 |



ประกาศใช้ 01/08/2568

FN-SVM-05-09 Rev.00



Page:2/2

Calibration Report No.: ESA-6810004

Calibrated Date: 1-Oct-25

☒ PM ☐ Onsite

| Analyzer Signal Values | | | | | |
|------------------------|----------|-------|--------------|---------|-------|
| Date | 1-Oct-25 | Time | 13:11:00 | | |
| Power Supplies | | | | | |
| Option | 0.00 | mV | +5 V Sensor | 5 | V |
| +4 V | 4068 | mV | +3.3 V | 3.3 | V |
| +24 V | 24.1 | V | +12 V | 11.9 | V |
| +5 V | 5 | V | I UV lamp | 44.3 | mA |
| +24 V | 1.2 | A | | | |
| Optical Bench | | | | | |
| Dark UV sig. | 0 | mV | Dark PM sig. | 88 | mV |
| UV ref. | 0 | mV | PM ref. | 0 | mV |
| UV sig. | 24.1 | mV | PM sig. | 138.6 | mV |
| Ref.ratio | 0 | | Meas.ratio | 0.34 | |
| Meas.sig. | 0.7 | | Raw trend | 11 | |
| Raw sig. | 24.4 | ppb | Inst.meas. | 22.8 | ppb |
| I UV Lamp | 44.7 | mA | HV PM | 2626.80 | mV |
| Sample | | | | | |
| Internal Temp. | 31.9 | deg.C | Chamber T. | 50 | deg.C |
| Gas Pr. | 970 | hPa | Pump Pr. | 355.5 | hPa |
| Flow | 18.7 | l/h | | | |

Validation By: [Redacted]

Date: 1-Oct-25

Approve By: [Redacted]

Date: [Redacted]

neediss
Neediss Supply Instrument Co.,Ltd

ประกาศใช้ 01/08/2568

FN-SVM-05-09 Rev.00



SO2 Analyzer Verification Test Report

Calibration Report No.: ESA-6810006

Calibrated Date: 1-Oct-25

☒ PM ☐ Onsite

Instruments Information

Page: 1/2

| | |
|---|--|
| Analyzer Type: SO2 Analyzer Model: AF22e | Manufacturer: Environnement SA., France S/N: 2505 |
|---|--|

Calibration System

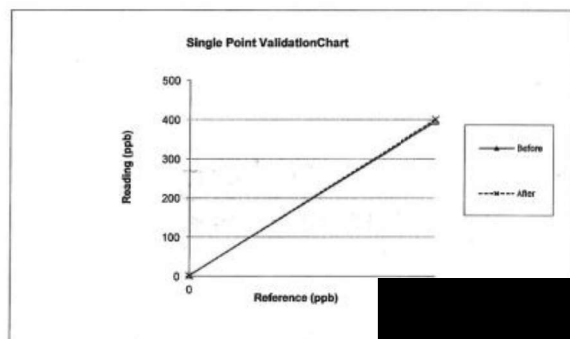
| Calibrator Unit | Standard Gas |
|---|--|
| Dilutor Model: ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644 | NOx Conc: 45.30 PPM NO Conc: 45.30 PPM SO2 Conc: 45.05 PPM CO Conc: 4528 PPM Expire Date: OCT 23, 2027 EB0170003 |

Environment: Temperature: 25.9 °C

Humidity: 60 %RH

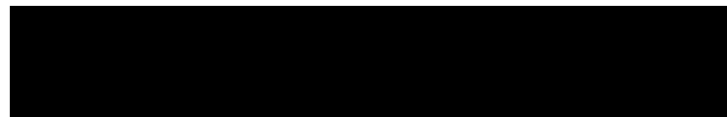
Validation Report

| Status | Zero | | | Span | | |
|--------|-----------------|---------------|-------------|-----------------|---------------|--------|
| | Reference (ppb) | Reading (ppb) | Drift (ppb) | Reference (ppb) | Reading (ppb) | Drift% |
| Before | 0.0 | 2.5 | 2.5 | 400.0 | 395.8 | -0.5 |
| After | 0.0 | 1.6 | 1.6 | 400.0 | 401.0 | 0.1 |



ประกาศใช้ 01/08/2568

FN-SVM-05-09 Rev.00



Calibration Report No.: ESA-6810006

Calibrated Date: 1-Oct-25

☒ PM ☐ Onsite

| Analyzer Signal Values | | | | | |
|------------------------|----------|-------|--------------|---------|-------|
| Date | 1-Oct-25 | Time | 13:11:00 | | |
| Power Supplies | | | | | |
| Option | 0.00 | mV | +5 V Sensor | 5 | V |
| +4 V | 4068 | mV | +3.3 V | 3.3 | V |
| +24 V | 24.1 | V | +12 V | 11.9 | V |
| +5 V | 5 | V | UV lamp | 44.3 | mA |
| +24 V | 1.2 | A | | | |
| Optical Bench | | | | | |
| Dark UV sig. | 0 | mV | Dark PM sig. | 88 | mV |
| UV ref. | 0 | mV | PM ref. | 0 | mV |
| UV sig. | 24.1 | mV | PM sig. | 138.6 | mV |
| Ref. ratio | 0 | | Meas ratio | 0.34 | |
| Mean sig. | 0.7 | | Raw trend | 11 | |
| Raw sig. | 24.4 | ppb | Inst. meas. | 22.8 | ppb |
| UV Lamp | 44.7 | mA | HV PM | 2626.80 | mV |
| Sample | | | | | |
| Internal Temp. | 31.9 | deg.C | Chamber T. | 50 | deg.C |
| Gas Pr. | 970 | hPa | Pump Pr. | 355.5 | hPa |
| Flow | 18.7 | l/h | | | |

Validation By: [Redacted]

Date: 1-Oct-25

Approve By: [Redacted]

Date: [Redacted]

neediss
Neediss Supply Instrument Co., Ltd.

ประกาศใช้ 01/08/2568

FN-SVM-05-09 Rev.00



CO Analyzer Verification Test Report

Page: 1/2

Validation Report No.: ESA-6810010

Validation Date: 1-Oct-25

☒ PM ☐ Onsite

Instruments Information

| | |
|--|--|
| Analyzer Type: CO Analyzer Model: CO12e | Manufacturer: Environnement SA, France S/N: 355 |
|--|--|

Calibration System

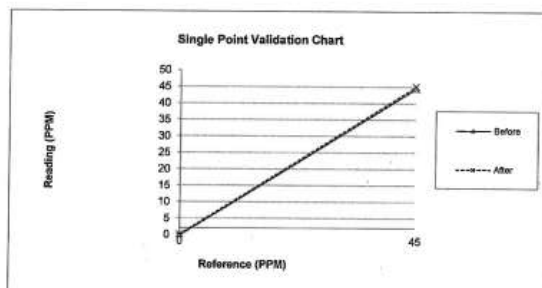
| Calibrator Unit | Standard Gas |
|--|---|
| Dilutor Model ESA MGA101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644 | NOx Conc 45.30 PPM NO Conc 45.30 PPM SO2 Conc 45.05 PPM CO Conc 45.28 PPM Expire Date: OCT 23, 2027 EB0170003 |

Environment: Temperature 25.9 °C

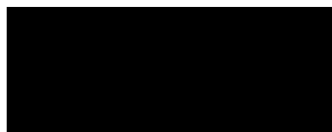
Humidity: 60 %RH

Validation Report

| Status | Zero | | | Span | | |
|--------|-----------------|---------------|-------------|-----------------|---------------|--------|
| | Reference (PPM) | Reading (PPM) | Drift (PPM) | Reference (PPM) | Reading (PPM) | Drift% |
| Before | 0.0 | -0.3 | -0.3 | 45.0 | 44.5 | -0.6 |
| After | 0.0 | 0.1 | 0.1 | 45.0 | 45.1 | 0.1 |



ประกาศใช้ 01/08/2568



Page: 2/2

Validation Report No.: ESA-6810010

Validation Date: 1-Oct-25

☒ PM ☐ Onsite

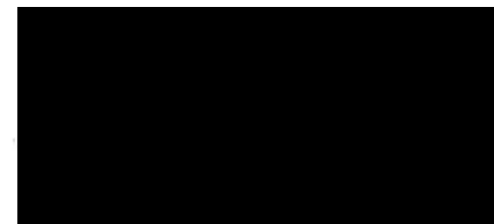
| Detail | Range | Unit | Before | After | Note |
|--------------------|------------------|---------|--------|--------|---------------|
| Date | 1-Oct-25 | | | | |
| Time | 10:51 | | | | |
| Range | 0.1-1000 PPM | PPM | 50 | 50 | |
| Stability | (0.1-2PPB) | ppb | 0.04 | 0.2 | |
| CO Measure | 2500 - 4800 MV. | mV | 4465.6 | 4431.3 | |
| CO Reference | 2500 - 4800 MV. | mV | 3788.5 | 3730.2 | |
| MR Ratio | 1.2 +/- 0.5 | | 1.19 | 1.20 | |
| Sample Pressure | 26 - 30 in-Hg-A | in-Hg-A | 28.7 | 28.6 | |
| Sample Flow | 720 - 880 cc/min | cc/min | 904 | 898 | |
| Sample Temp | 44 - 52 deg.C | deg.C | 48.5 | 43.3 | |
| Bench Temp | 47 - 49 deg.C | deg.C | 48 | 48 | |
| Wheel Temp | 66 - 70 deg.C | deg.C | 68 | 68 | |
| Box Temp | 27 - 50 deg.C | deg.C | 33.3 | 34.8 | |
| PHT drive | 250 - 4750 mv. | mV | 2912.3 | 2913.5 | |
| Slope | 0.800 - 1.200 | | 1.197 | 1.138 | |
| Offset | 0.05 +/- 0.2 | | -0.015 | -0.016 | |
| Gas Test Responses | | | | | |
| Zero Gas | 0 | PPM | -0.3 | 0.1 | |
| Span Gas | 45 | PPM | 44.5 | 45.1 | ± 5% of Range |

Validation By : _____

Approve By : _____

Date: _____

Date: _____



ประกาศใช้ 01/08/2568



CO Analyzer Verification Test Report

Page:1/2

Validation Report No.: ESA-6810007

Validation Date: 1-Oct-25

☒ PM ☐ Onsite

Instruments Information

| | |
|--|--|
| Analyzer Type: CO Analyzer Model: CO12e | Manufacturer: Environnement SA, France S/N: 356 |
|--|--|

Calibration System

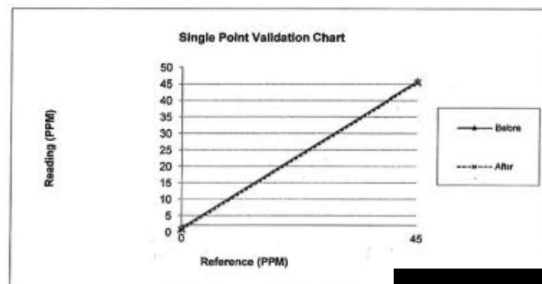
| Calibrator Unit | Standard Gas |
|---|---|
| Dilutor Model: ESA MGA101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644 | NOx Conc 45.30 PPM NO Conc 45.30 PPM SO2 Conc 45.05 PPM CO Conc 45.28 PPM Expire Date: OCT 23, 2027 EB0170003 |

Environment: Temperature 25.9 °C

Humidity: 60 %RH

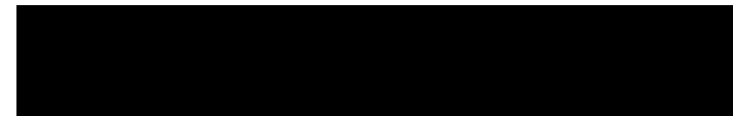
Validation Report

| Status | Zero | | | Span | | |
|--------|-----------------|---------------|-------------|-----------------|---------------|--------|
| | Reference (PPM) | Reading (PPM) | Drift (PPM) | Reference (PPM) | Reading (PPM) | Drift% |
| Before | 0.0 | 1.3 | 1.3 | 45.0 | 45.9 | 1.0 |
| After | 0.0 | 0.7 | 0.7 | 45.0 | 45.4 | 0.4 |



ประกาศใช้ 01/08/2568

FN-SVM-05-10 Rev.00



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Validation Report No.: ESA-6810007

Validation Date: 1-Oct-25

☒ PM ☐ Onsite

| Detail | Range | Unit | Before | After | Note |
|-------------------|------------------|---------|--------|--------|---------------|
| Date | 1-Oct-25 | | | | |
| Time | 10:51 | | | | |
| Range | 0.1-1000 PPM | PPM | 50 | 50 | |
| Stability | (0.1-2PPB) | ppb | 0.04 | 0.2 | |
| CO Measure | 2500 - 4800 MV. | mV | 4465.6 | 4431.3 | |
| CO Reference | 2500 - 4800 MV. | mV | 3768.5 | 3730.2 | |
| MR Ratio | 1.2 +/- 0.5 | | 1.19 | 1.20 | |
| Sample Pressure | 26 - 30 in-Hg-A | in-Hg-A | 28.7 | 28.6 | |
| Sample Flow | 720 - 880 cc/min | cc/min | 904 | 888 | |
| Sample Temp | 44 - 52 deg.C | deg.C | 48.5 | 43.3 | |
| Bench Temp | 47 - 49 deg.C | deg.C | 48 | 48 | |
| Wheel Temp | 66 - 70 deg.C | deg.C | 68 | 68 | |
| Box Temp | 27 - 50 deg.C | deg.C | 33.3 | 34.8 | |
| PHT drive | 250 - 4750 mv. | mV | 2912.3 | 2913.5 | |
| Slope | 0.800 - 1.200 | | 1.197 | 1.138 | |
| Offset | 0.05 +/- 0.2 | | -0.015 | -0.016 | |
| Gas Test Response | | | | | |
| Zero Gas | 0 | PPM | 1.3 | 0.7 | |
| Span Gas | 45 | PPM | 45.9 | 45.4 | ± 5% of Range |

Validation By :

Date: 1-Oct-25

Approve By :

Date: 1-Oct-25

ประกาศใช้ 01/08/2568

FN-SVM-05-10 Rev.00



NOx Analyzer Verification Test Report

Page:1/2

Validation Report No.: API-6810004

Validation Date: 1-Oct-25

☒ PM ☐ Onsite

Instruments Information

| | |
|---|-------------------------------|
| Analyzer Type: NO/NO2/NOx Analyzer Model: T200 | Manufacturer API S/N: 2572 |
|---|-------------------------------|

Calibration System

| Calibrator Unit | Standard Gas |
|--|---|
| Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644 | NOx Conc 45.30 PPM NO Conc 45.30 PPM SO2 Conc 45.05 PPM CO Conc 4528 PPM Expire Date: OCT 23,2027 EB0170003 |

Environment: Temperature 24.9 °C

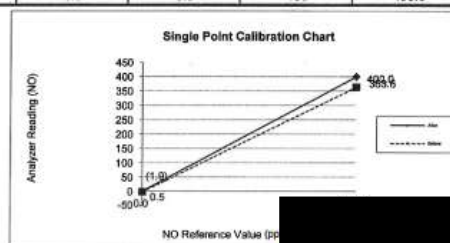
Humidity: 60 %RH

Validation Check (Before adjust)

| GAS | Zero | | | Span | | |
|-----------------|---------------------|----------------------|-------------|---------------------|----------------------|--------|
| | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) | Drift% |
| NO | -1.7 | 0.0 | -1.7 | 354.4 | 400.0 | -6.0 |
| NO ₂ | 2 | 0.0 | 2.0 | 9.2 | 0.0 | 1.3 |
| NOx | -1.9 | 0.0 | -1.9 | 363.6 | 400.0 | -4.8 |

Validation Check (After adjust)

| GAS | Zero | | | Span | | |
|-----------------|---------------------|----------------------|-------------|---------------------|----------------------|--------|
| | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) | Drift% |
| NO | 0.7 | 0.0 | 0.7 | 401 | 400.0 | 0.1 |
| NO ₂ | 0.2 | 0.0 | 0.2 | 1 | 0.0 | -0.1 |
| NOx | 0.5 | 0.0 | 0.5 | 400 | 400.0 | 0.0 |



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FN-SVM-05-08 Rev.00



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Validation Report No.: API-6810004

Validation Date: 1-Oct-25

☒ PM ☐ Onsite

| Analyzer Signal Values | | | | | |
|------------------------|----------|-------|----------------|-------|-------|
| Date | 1-Oct-25 | Time | 14:14 | | |
| Power Supplies | | | | | |
| Option | -13.52 | mV | +5 V Sensor | 4.99 | V |
| +3.3 V | 3.3 | V | +24 V | 23.96 | V |
| +12 V | 11.88 | V | +5 V | 4.99 | V |
| +4 V | 3974.3 | mV | + 24V | 2.4 | A |
| I O3 | 82.74 | mA | | | |
| Optical Bench | | | | | |
| Dark PM sig. | 0.0 | mV | PM NO sig. | 84.28 | mV |
| PM Nox sig. | 107.0 | mV | PM Ny sig. | 86.71 | mV |
| Sample | | | | | |
| Chamber T | 60 | deg.C | Internal Temp. | 33.33 | deg.C |
| Chamber P | 1720.8 | hPa | PM T. | 1.46 | deg.C |
| Flow | 47.21 | Nl/h | Sample Pr. | 993.2 | hPa |

Validation By: [Redacted]

Approve By: [Redacted]

Date: 1-Oct-25

Date: 1-Oct-25

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Neediss Supply Instrument Co.,Ltd

ประกาศใช้ 01/08/2568

FN-SVM-05-08 Rev.00

NOx Analyzer Verification Test Report

Page:1/2

Validation Report No.: API-6809007

Validation Date: 1-Oct-25

☒ PM ☐ Onsite

Instruments Information

| | |
|---|-------------------------------|
| Analyzer Type: NO/NO2/NOx Analyzer Model: 200E | Manufacturer API S/N: 3217 |
|---|-------------------------------|

Calibration System

| Calibrator Unit | Standard Gas |
|--|---|
| Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644 | NOx Conc 45.30 PPM NO Conc 45.30 PPM SO2 Conc 45.05 PPM CO Conc 4528 PPM Expire Date: OCT 23,2027 EB0170003 |

Environment: Temperature 24.9 °C

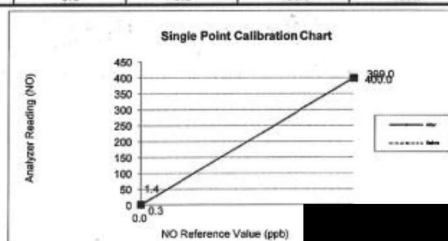
Humidity: 60 %RH

Validation Check (Before adjust)

| GAS | Zero | | | Span | | |
|-----------------|---------------------|----------------------|-------------|---------------------|----------------------|--------|
| | Reading Value (ppb) | Expected Value (ppb) | Drift (ppb) | Reading Value (ppb) | Expected Value (ppb) | Drift% |
| NO | 0 | 0.0 | 0.0 | 395.0 | 400.0 | -0.6 |
| NO ₂ | 1.4 | 0.0 | 1.4 | 4.0 | 0.0 | 0.5 |
| NOx | 1.4 | 0.0 | 1.4 | 399.0 | 400.0 | -0.1 |

Validation 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 | 401.0 | 400.0 | 0.1 |
| NO ₂ | 0.2 | 0.0 | 0.2 | 1.0 | 0.0 | -0.1 |
| NOx | 0.3 | 0.0 | 0.3 | 400.0 | 400.0 | 0.0 |



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FN-SVM-05-08 Rev.00

Page:2/2

Validation Report No.: API-6809007

Validation Date: 1-Oct-25

☒ PM ☐ Onsite

| Analyzer Signal Values | | | | | |
|------------------------|----------|-------|----------------|-------|-------|
| Date | 1-Oct-25 | Time | 14:14 | | |
| Power Supplies | | | | | |
| Option | -13.52 | mV | +5 V Sensor | 4.99 | V |
| +3.3 V | 3.3 | V | +24 V | 23.96 | V |
| +12 V | 11.88 | V | +5 V | 4.99 | V |
| +4 V | 3974.3 | mV | +24V | 2.4 | A |
| I O3 | 82.74 | mA | | | |
| Optical Bench | | | | | |
| Dark PM sig. | 0.0 | mV | PM NO sig. | 84.28 | mV |
| PM Nox sig. | 107.0 | mV | PM Ny sig. | 86.71 | mV |
| Sample | | | | | |
| Chamber T | 60 | deg.C | Internal Temp. | 33.33 | deg.C |
| Chamber P | 1720.8 | hPa | PM T. | 1.46 | deg.C |
| Flow | 47.21 | Nl/h | Sample Pr. | 993.2 | hPa |

Validation By: [Redacted]
Date: 1-Oct-25

Approve By: [Redacted]
Date: 1-Oct-25

neediss
Neediss Supply Instrument Co.,Ltd.

ประกาศใช้ 01/08/2568

Issued by : Calibration & Test Section : Meteorological Instruments Bureau
Date of Issue : 23 June, 2025 Certification No. 300/25
Page : 1 of 6

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : NovaLynx

Type : Data Logger 110-WS-25DL-D

Serial No. : EWSNV110WS2501

Customer :

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1006.1 hPa

NATIONAL STANDARD WIND TUNNEL : Vane Angel Bench Stand Model 18112

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119 : HOOK GAGE NO 1425

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94

Thermocouples No.9188 - testo - testo 645 Serial No. 02848057

The Result of Calibration

Sensor model EWSNV110WS2501 Certification No. 300/25

23 June, 2025

Page : 2 of 6

| Standard | HOOK GAGE NO. 1425 | | | TESTED ANEMOMETER | |
|-----------------------|--------------------|------------|----------|-------------------|------------|
| Ultrasonic Anemometer | Pressure | Vacuum | Velocity | Velocity | Correction |
| m/sec | inches H2O | inches H2O | m/sec | m/sec | m/sec |
| 1.00 | - | - | - | 0.3 | 0.70 |
| 3.02 | - | - | - | 2.4 | 0.62 |
| 5.00 | - | - | - | 4.8 | 0.20 |
| 7.04 | - | - | - | 6.9 | 0.14 |
| 9.02 | - | - | - | 8.8 | 0.22 |
| 11.01 | - | - | - | 10.8 | 0.21 |
| 13.01 | - | - | - | 12.8 | 0.21 |
| 15.01 | - | - | - | 15.0 | 0.01 |
| 17.02 | - | - | - | 16.8 | 0.22 |
| 20.02 | - | - | - | 20.0 | 0.02 |

Vane Angel Bench Stand Model 18112

Young Meteorological Instruments

| WIND DIRECTION | TESTED WIND DIRECTION |
|----------------|-----------------------|
| 0 | 0 |
| 90 | 92 |
| 180 | 181 |

Calibrated by

Mr.

The Result of Calibration

Sensor model EWSNV110WS2501

Certification No. 300/25

23 June, 2025

Page : 3 of 6

| Standard Barometer | Tested Barometer | Correction |
|--------------------|------------------|------------|
| Pressure | Pressure | |
| 1006.54 | 1006.70 | -0.16 |
| 1006.75 | 1006.83 | -0.08 |
| 1006.98 | 1007.12 | -0.14 |
| 1007.24 | 1007.35 | -0.11 |
| 1007.64 | 1007.72 | -0.08 |
| 1007.82 | 1007.91 | -0.09 |
| 1008.01 | 1008.11 | -0.10 |
| 1008.28 | 1008.30 | -0.02 |
| 1008.68 | 1008.74 | -0.06 |
| 1008.93 | 1009.00 | -0.07 |
| 1005.42 | 1005.51 | -0.09 |
| 1005.84 | 1005.94 | -0.10 |
| 1006.32 | 1006.41 | -0.09 |
| 1006.67 | 1006.91 | -0.04 |
| 1007.65 | 1007.73 | -0.08 |
| 1007.94 | 1008.02 | -0.08 |
| 1008.51 | 1008.64 | -0.13 |
| 1008.92 | 1009.05 | -0.13 |
| 1009.22 | 1009.32 | -0.10 |
| 1009.85 | 1009.91 | -0.06 |

The Result of Calibration

Sensor model

EWSNV110WS2501

Certification No. 300/25

23 June, 2025

Page : 4 of 6

| Standard Temp. °C | Temperature Sensor Reading | |
|----------------------|----------------------------|------------------|
| | Reading °C | Correction °C |
| 45.2 | 45.6 | -0.4 |
| 30.4 | 30.6 | -0.2 |
| 15.6 | 15.7 | -0.1 |

The Result of Calibration

Sensor model EWSNV110WS2501 Certification No. 300/25
23 June, 2025 Page : 5 of 6

| Standard Humidity % R.H. | Relative Humidity Sensor Reading | |
|-----------------------------|----------------------------------|----------------------|
| | Reading % R.H. | Correction % R.H. |
| 86.4 | 93.3 | -6.9 |
| 65.3 | 69.4 | -4.1 |
| 42.2 | 44.6 | -2.4 |



Date of Issue 23 June, 2025

Certification No. 300/25

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ชื่อ Davis Instruments แบบ TIPPING
BUCKET Product No. [REDACTED] ทำการสอบเทียบกับแก้ววัดฝน
แบบแก้วดวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No.
71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.2 mm./TIP)



ลงชื่อ

Issued by : Calibration & Test Section : Meteorological Instruments Bureau
Date of Issue 23 June, 2025 Certification No. 301/25
Page : 1 of 6

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : NovaLynx

Type : Data Logger 110-WS-25DL-D

Serial No. : EWSNV110WS2503

Customer :

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1006.6 hPa

NATIONAL STANDARD WIND TUNNEL : Vane Angel Bench Stand Model 18112
: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119 : HOOK GAGE NO 1425
N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec
: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94

: Thermocouple No.9188 : testo : testo 645 Serial No. 02848057

STANDARD BAROMETER : Dig

The Result of Calibration

Sensor model EWSNV110WS2503 Certification No. 301/25
23 June, 2025 Page : 2 of 6

| Standard | HOOK GAGE NO. 1425 | | | TESTED ANEMOMETER | |
|-----------------------|-------------------------|-------------------------|----------|-------------------|------------|
| Ultrasonic Anemometer | Pressure | Vacuum | Velocity | Velocity | Correction |
| m/sec | inches H ₂ O | inches H ₂ O | m/sec | m/sec | m/sec |
| 1.00 | - | - | - | 0.3 | 0.70 |
| 3.02 | - | - | - | 2.4 | 0.62 |
| 5.00 | - | - | - | 4.3 | 0.70 |
| 7.04 | - | - | - | 6.8 | 0.24 |
| 9.02 | - | - | - | 8.8 | 0.22 |
| 11.01 | - | - | - | 11.1 | -0.09 |
| 13.01 | - | - | - | 12.8 | 0.21 |
| 15.01 | - | - | - | 15.1 | -0.09 |
| 17.02 | - | - | - | 16.8 | 0.22 |
| 20.02 | - | - | - | 20.1 | -0.08 |

Vane Angel Bench Stand Model 18112
Young Meteorological Instruments

| WIND DIRECTION | TESTED WIND DIRECTION |
|----------------|-----------------------|
| 0 | 0 |
| 90 | 92 |
| 180 | 181 |
| 270 | |



The Result of Calibration

Sensor model EWSNV110WS2503

Certification No. 301/25

23 June, 2025

Page : 3 of 6

| Standard Barometer Pressure | Tested Barometer Pressure | Correction |
|--------------------------------|------------------------------|------------|
| 1006.54 | 1006.94 | -0.40 |
| 1006.75 | 1007.21 | -0.46 |
| 1006.98 | 1007.57 | -0.59 |
| 1007.24 | 1007.65 | -0.41 |
| 1007.64 | 1008.13 | -0.49 |
| 1007.82 | 1008.51 | -0.69 |
| 1008.01 | 1008.51 | -0.50 |
| 1008.28 | 1008.83 | -0.55 |
| 1008.68 | 1008.02 | -0.34 |
| 1008.93 | 1008.38 | -0.45 |
| 1005.42 | 1005.87 | -0.45 |
| 1005.84 | 1006.32 | -0.48 |
| 1006.32 | 1006.74 | -0.42 |
| 1006.67 | 1007.24 | -0.37 |
| 1007.65 | 1008.03 | -0.38 |
| 1007.94 | 1008.36 | -0.42 |
| 1008.51 | 1008.96 | -0.45 |
| 1008.92 | 1009.35 | -0.43 |
| 1009.22 | 1009.64 | -0.42 |
| 1009.85 | 1010.21 | -0.36 |

Average

The Result of Calibration

Sensor model

EWSNV110WS2503

Certification No. 301/25

23 June, 2025

Page : 4 of 6

| Standard Temp. °C | Temperature Sensor Reading | |
|-------------------------|----------------------------|------------------|
| | Reading °C | Correction °C |
| 45.2 | 45.5 | -0.3 |
| 30.4 | 30.6 | -0.2 |
| 15.6 | 15.5 | 0.1 |

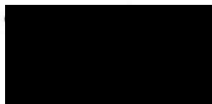




The Result of Calibration

Sensor model EWSNV110WS2503 Certification No. 301/25
23 June, 2025 Page : 5 of 6

| Standard Humidity % R.H. | Relative Humidity Sensor Reading | |
|--------------------------------|----------------------------------|----------------------|
| | Reading % R.H. | Correction % R.H. |
| 86.4 | 95.2 | -8.8 |
| 65.3 | 71.2 | -5.9 |
| 42.2 | 45.5 | -3.3 |



Date of Issue 23 June, 2025

Certification No. 301/25

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน อีหือ Davis Instruments แบบ TIPPING
BUCKET Product No. [Redacted] ทำการสอบเทียบกับแก้ววัดฝน
แบบแก้วดวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No.
71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.2 mm./TIP)



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0152 MTC No. EEL. BP. 65/0168

CALIBRATION CERTIFICATE

Submitted by [REDACTED]
Address [REDACTED]
Calibrated at [REDACTED]

| | |
|-----------------------------------|--|
| Instrument Calibrated : | Ambient Environment |
| Description : Acoustic Calibrator | Temperature : (23 ± 3) °C |
| Manufacturer : Pulsar | Relative Humidity : (50 ± 15) % |
| Model : 103 | Ambient Pressure : (101.325 ± 1.500) kPa |
| Serial No. : 98971 | |

Standards used :

1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Brüel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44003560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.
7. Condenser Microphone B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942:2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 10 Jan. 2025
Date of Calibration : 17 Jan. 2025

1 / 3

The results relate only to the items tested/calibrated or value assigned.
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0152 MTC No. EEL. BP. 65/0168

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 20µPa at 1000 Hz

Acoustic Output in dB re 20µPa , 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 Brüel&Kjaer 4180 | 93.93 | -0.07 | ± 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 Brüel&Kjaer 4180 | 1000.4 | 0.4 | ± 1.5 | ±1.0% |

3. Total distortion

| Standard Microphone Type | Measured Total distortion (%) | Uncertainty (%) | Tolerance limit IEC60942:2003 Class 1 |
|---------------------------|-------------------------------|-----------------|---------------------------------------|
| 1/2 inch Brüel&Kjaer 4180 | 1.40 | ± 0.50 | ±3.0% |

Note :

1. No adjustment.
2. The calibrator pressure correction was not included.
3. The microphone volume correction was not included.

Date of Calibration : 17 Jan. 2025

2 / 3

The results relate only to the items tested/calibrated or value assigned.
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

[REDACTED]

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0152 **MTC No.** EEL. BP. 65/0168

Nominal Output of Unit Under Test = 114 dB re 20µPa at 1000 Hz

Acoustic Output in dB re 20µPa, 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 | 114.01 | 0.01 | ± 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 | 1000.3 | 0.3 | ± 1.5 | ±3.0% |

3. Total Distortion

| Standard Microphone Type | Measured Total Distortion (%) | Uncertainty (%) | Tolerance limit IEC60942:2003 Class 1 |
|-----------------------------|----------------------------------|--------------------|--|
| 1/2 inch Bruel&Kjaer 4180 | 2.05 | ± 0.50 | ±3.0% |

Note : 1. No adjustment.
2. The calibrator pressure correction was not included.
3. The microphone volume correction was not included.

Calibrated by : [REDACTED]

Date of Calibration : 17 Jan. 2025
Date of Issue : 20 Jan. 2025

End of Certificate 3 / 3

The results relate only to the items tested/calibrated or value assigned.
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

[REDACTED]

เอกสารผลการสอบเทียบเครื่องมือตรวจวัด
โรงเรียนแสงหิรัญและสถาบันการบินพลเรือน
ครั้งที่ 2/2568
ตรวจวัดวันที่ 3-8 ธันวาคม 2568

TSP High Volume Sampler Calibration

Verification Report No.
SO250305-E001 -TSP 01

☐ PM ☒ Onsite
Site: 11 การป้องกัน
UTM: N 1526240 E 667896
Sampler: ETSP#34
Recorder: ECROSD016339508
Date: 3 Dec 25
Technical:
Approval:

CONDITIONS

Barometric Press. (hPa): 1007.5 Corrected Pressure (mm Hg): 755.7
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

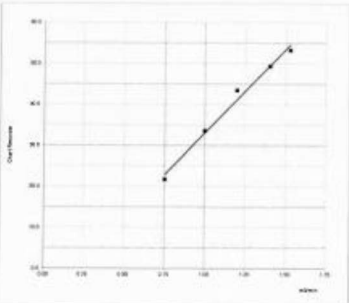
CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc. Qstd Slope: 2.06933
Model: TE-5025A Qstd Intercept: -0.02815
Serial#: 2067 Date Certified: 4 Mar 25
Due Date: 03-Mar-26

CALIBRATIONS

| Plate or Test # | H2O (in) | Qstd (m3/min) | I (chart) | IC (corrected) |
|-----------------|----------|---------------|-----------|----------------|
| 1 | 10.10 | 1.527 | 54.0 | 53.23 |
| 2 | 8.50 | 1.402 | 50.0 | 49.28 |
| 3 | 6.20 | 1.200 | 44.0 | 43.37 |
| 4 | 4.30 | 1.001 | 34.0 | 33.51 |
| 5 | 2.40 | 0.752 | 22.0 | 21.68 |

LINEAR REGRESSION
Slope = 40.7713
Intercept = -7.7493
Corr. coeff = 0.9937
of Observations: 5
Range of Chart at 1.1 - 1.7 m3/min: 38
62



Calibrated by:
3 December 2025
Approved by:
3 December 2025

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ประกอบใช้ 01/06/2168

TSP High Volume Sampler Calibration

Verification Report No.
SO250305-E001 -TSP 02

☐ PM ☒ Onsite
Site: 11 การป้องกัน
UTM: N 1516345 E 672853
Sampler: ETSP#33
Recorder: ECROSD016339509
Date: 3 Dec 25
Technical:
Approval:

CONDITIONS

Barometric Press. (hPa): 1007.4 Corrected Pressure (mm Hg): 755.6
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

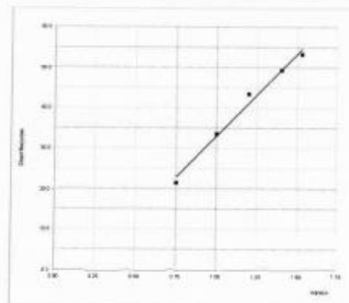
CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc. Qstd Slope: 2.06933
Model: TE-5025A Qstd Intercept: -0.02815
Serial#: 2067 Date Certified: 4 Mar 25
Due Date: 03-Mar-26

CALIBRATIONS

| Plate or Test # | H2O (in) | Qstd (m3/min) | I (chart) | IC (corrected) |
|-----------------|----------|---------------|-----------|----------------|
| 1 | 12.20 | 1.677 | 56.0 | 55.19 |
| 2 | 9.60 | 1.459 | 52.0 | 51.25 |
| 3 | 6.40 | 1.219 | 44.0 | 43.37 |
| 4 | 4.30 | 1.001 | 34.0 | 33.51 |
| 5 | 2.20 | 0.720 | 24.0 | 23.65 |

LINEAR REGRESSION
Slope = 33.7515
Intercept = 0.1752
Corr. coeff = 0.9937
of Observations: 5
Range of Chart at 1.1 - 1.7 m3/min: 38
58



Calibrated by:
3 December 2025
Approved by:
3 December 2025

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ประกอบใช้ 01/06/2508

PM10 High Volume Sampler Calibration

Verification Report No.
SO2500305-E001-PM-01

L PM ☐ Onsite
Site: ร.ร.การบดินทรเดชา
UTM: N 1526240 E 667886
Sampler: EPM10#16
Recorder: NCRDS014261033
Date: 3 Dec 25
Technical:
Approval:

CONDITIONS

Barometric Press. (hPa): 1007.5 Corrected Pressure (mm Hg): 755.7
Temperature (deg C): 32.0 Temperature (deg K): 305.0
Average Press. (hPa): 1013.0 Corrected Avg. Press. (mm Hg): 756.8
Average Temp. (deg C): 30.0 Average Temp. (deg K): 303.0

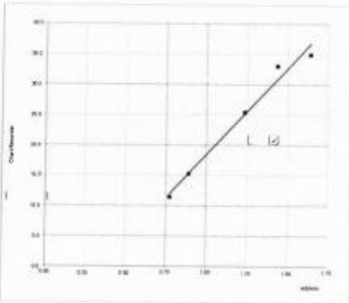
CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc. Slope: 1.29578
Model: TE-5025A Intercept: -0.01772
Serial#: 2067 Date Certified: 4 Mar 25
Due Date: 3 Mar 26

CALIBRATIONS

| Plate or Test # | H2O (in) | Qs (m3/min) | I (chart) | IC (corrected) |
|-----------------|----------|-------------|-----------|----------------|
| 1 | 11.00 | 1.640 | 55.0 | 34.94 |
| 2 | 8.40 | 1.435 | 52.0 | 33.04 |
| 3 | 6.20 | 1.234 | 40.0 | 25.41 |
| 4 | 3.20 | 0.891 | 24.0 | 15.25 |
| 5 | 2.40 | 0.773 | 18.0 | 11.44 |

LINEAR REGRESSION
Slope = 28.5429
Intercept = -10.0820
Corr. coeff = 0.9905
SFR = 1.000
SSP = 29.06
of Observations: 5
Range of Chart at SFR ±10%: 25
33



Calibrated by:
Approved by:
3 December 2025

วันที่ 01/06/2568

PM10 High Volume Sampler Calibration

Verification Report No.
SO2500305-E001-PM-02

L PM ☐ Onsite
Site: ร.ร.สวนจิตรลดา
UTM: N 1516345 E 672853
Sampler: EPM10#15
Recorder: NCRP1500900752
Date: 3 Dec 25
Technical:
Approval:

CONDITIONS

Barometric Press. (hPa): 1007.4 Corrected Pressure (mm Hg): 755.6
Temperature (deg C): 32.0 Temperature (deg K): 305.0
Average Press. (hPa): 1013.0 Corrected Avg. Press. (mm Hg): 756.8
Average Temp. (deg C): 30.0 Average Temp. (deg K): 303.0

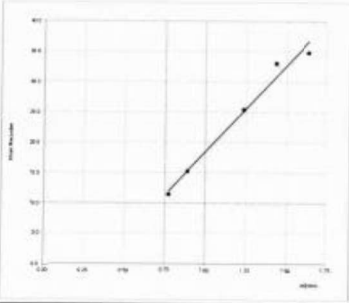
CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc. Slope: 1.29578
Model: TE-5025A Intercept: -0.01772
Serial#: 2067 Date Certified: 4 Mar 25
Due Date: 3 Mar 26

CALIBRATIONS

| Plate or Test # | H2O (in) | Qs (m3/min) | I (chart) | IC (corrected) |
|-----------------|----------|-------------|-----------|----------------|
| 1 | 12.80 | 1.768 | 56.0 | 35.58 |
| 2 | 10.40 | 1.595 | 54.0 | 34.31 |
| 3 | 7.30 | 1.338 | 43.0 | 27.32 |
| 4 | 4.40 | 1.042 | 32.0 | 20.33 |
| 5 | 2.70 | 0.819 | 20.0 | 12.71 |

LINEAR REGRESSION
Slope = 24.5513
Intercept = -6.1756
Corr. coeff = 0.9902
SFR = 1.000
SSP = 28.92
of Observations: 5
Range of Chart at SFR ±10%: 26
32



Calibrated by:
3 December 2025
Approved by:
3 December 2025

วันที่ 01/06/2568

Verification Test Report

Report No.: SQ2500304-E001 / 001
Verification Date : 03 December 2025

Operate Information ☐ PM ☒ Onsite
Site : ร.ร.การปั้นพลเรือน
GPS coordinates : 47P N 1526240 E 667986

Instrument Information
Equipment : Sound Level Meter
Manufacturer : Pulsar
Model : 44
Serial No : 1860
Scale Rang : 20dB-140dB
Class : 2

Reference Standard
Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971
Certificate No : EEL.BP.65/0168
Date due : 17 January 2026
Traceability : TISTR

Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %
Atmospheric pressure 1013.3 hpa

Measurement Data

| Refferance Value (dB) | Correction Value (dB) | Adjustment (dB) | UUR Reading | | Error (dB) | Acceptant Criteria (dB) |
|--------------------------|--------------------------|--------------------|-------------|-------|---------------|----------------------------|
| | | | Initial | Final | | |
| 93.93 | -0.3 | 93.63 | 93.87 | 94.03 | 0.16 | ±1.0 |

* UUR = Unit Under Reference flow
Acceptant Criteria : Sound Level Meter Class 1 ±0.5 dB
Sound Level Meter Class 2 ±1.0 dB

Calibrated By : Approve By :
Date : 03 December 2025
The Results shown in this verification report refer only to the equipment used.
This Calibration Certificate cannot be reproduced, except in full and without permission.

ประกาศใช้ 01/08/2568 FM-SVM-05-06 Rev.00

Verification Test Report

Report No.: SQ2500304-E001 / 001
Verification Date : 03 December 2025

Operate Information ☐ PM ☒ Onsite
Site : ร.ร.เทพศิรินทร์
GPS coordinates : 47P N 1516340 E 672853

Instrument Information
Equipment : Sound Level Meter
Manufacturer : Pulsar
Model : 44
Serial No : 2124
Scale Rang : 20dB-140dB
Class : 2

Reference Standard
Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971
Certificate No : EEL.BP.65/0168
Date due : 17 January 2026
Traceability : TISTR

Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %
Atmospheric pressure 1013.3 hpa

Measurement Data

| Refferance Value (dB) | Correction Value (dB) | Adjustment (dB) | UUR Reading | | Error (dB) | Acceptant Criteria (dB) |
|--------------------------|--------------------------|--------------------|-------------|-------|---------------|----------------------------|
| | | | Initial | Final | | |
| 93.93 | 0 | 93.93 | 93.27 | 93.09 | -0.18 | ±1.0 |

* UUR = Unit Under Reference flow
Acceptant value : Sound Level Meter Class 1 ±0.5 dB
Sound Level Meter Class 2 ±1.0 dB

Calibrated By : Approve By :
Date : 03 December 2025
The Results shown in this verification report refer only to the equipment used.
This Calibration Certificate cannot be reproduced, except in full and without permission.

ประกาศใช้ 01/08/2568 FM-SVM-05-06 Rev.00

Certificate of Calibration

| Calibration Certification Information | | | | | | |
|---------------------------------------|-------------------------|-----------|-------|--|--|--|
| Cal. Date: March 4, 2025 | Roots meter S/N: 438320 | Ta: 294 | °K | | | |
| Operator: Jim Tisch | | Pa: 746.0 | mm Hg | | | |
| Calibration Model #: TE-5025A | Calibrator S/N: 2067 | | | | | |

| Run | Vol. Init (m3) | Vol. Final (m3) | ΔVol. (m3) | ΔTime (min) | ΔP (mm Hg) | ΔH (in H2O) |
|-----|----------------|-----------------|------------|-------------|------------|-------------|
| 1 | 1 | 2 | 1 | 1.4220 | 3.2 | 2.00 |
| 2 | 3 | 4 | 1 | 1.0090 | 6.4 | 4.00 |
| 3 | 5 | 6 | 1 | 0.9030 | 8.0 | 5.00 |
| 4 | 7 | 8 | 1 | 0.8610 | 8.8 | 5.50 |
| 5 | 9 | 10 | 1 | 0.7090 | 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) |
| 0.9907 | 0.6967 | 1.4106 | 0.9957 | 0.7002 | 0.8878 |
| 0.9864 | 0.9776 | 1.9949 | 0.9914 | 0.9826 | 1.2556 |
| 0.9843 | 1.0900 | 2.2304 | 0.9893 | 1.0955 | 1.4038 |
| 0.9832 | 1.1419 | 2.3393 | 0.9882 | 1.1477 | 1.4723 |
| 0.9779 | 1.3792 | 2.8212 | 0.9828 | 1.3862 | 1.7756 |
| QSTD | | m= 2.06933 | QA | | m= 1.29578 |
| | | b= -0.02815 | | | b= -0.01772 |
| | | r= 0.99997 | | | r= 0.99997 |

| Calculations | |
|----------------------------------|---------------------|
| Vstd= ΔVol/(Pa-ΔP)/Pstd(Tstd/Ta) | Va= ΔVol/(Pa-ΔP)/Pa |
| Qstd= Vstd/ΔTime | Qa= Va/ΔTime |

For subsequent flow rate calculations:

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

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

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

www.tisch-env.com
TOLL FREE: (877)263-71
(513)467-9

Certificate of Calibration

Certificate No. : 68-200034-1 Page : 1 of 2

Submitted by : [REDACTED]

Equipment : Electronic Balance

Manufacturer : Sartorius Model : SECURA224-1S

Serial No. : 0034803270 ID No. : ELABBALANCEN04

Capacity : 220 g Resolution : 0.0001 g

Environment : [REDACTED]

Ambient Temperature : (20.4 to 21.0) °C

Relative Humidity : (41.9 to 42.9) %

Air Pressure : 1014.0 mbar

Date of Received : 28 January 2025

Date of Calibration : 28 January 2025

Date of Issue : 30 January 2025

Calibrated by : [REDACTED]

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 | C02242009 | 07 Nov 2025 | National Institute of Metrology (Thailand), (NIMT) |

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written

CAL-P0031-03

Certificate of Calibration

Certificate No. : 68-200034-1 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 ± (g) |
|----------------------|-------------------|----------------------|
| 0.01 | 0.0000 | 0.00012 |
| 0.1 | 0.0001 | 0.00012 |
| 1 | 0.0000 | 0.00013 |
| 2 | 0.0001 | 0.00013 |
| 5 | 0.0000 | 0.00013 |
| 10 | 0.0000 | 0.00013 |
| 20 | -0.0001 | 0.00014 |
| 50 | -0.0001 | 0.00015 |
| 100 | -0.0001 | 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 $k = 2.06$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

| A | B | C | D | E |
|--------|--------|--------|--------|--------|
| 0.0004 | 0.0004 | 0.0005 | 0.0004 | 0.0000 |

Repeatability

Load test : 200 g

Sidev. : 0.00005 g

-o0o-

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: AIR LIQUIDE
(THAILAND) LTD.
Part Number: E04N199E15A00V3
Cylinder Number: EB0170003
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12024
Gas Code: CO,NO,NOX,SO2,BALN

Reference Number: 160-403162930-1
Cylinder Volume: 144.0 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 660
Certification Date: Oct 23, 2024
Expiration Date: Oct 23, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800/8-12031, using the assay procedures listed. Analytical methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do Not Use This Cylinder below 100 psig, i.e. 6.7 megapascals.

| Component | Requested Concentration | Actual Concentration | Protocol Method | Total Relative Uncertainty | Assay Dates |
|-----------------|-------------------------|----------------------|-----------------|----------------------------|------------------------|
| NOX | 45.00 PPM | 45.30 PPM | G1 | ±1.0% NIST Traceable | 10/16/2024, 10/23/2024 |
| NITRIC OXIDE | 45.00 PPM | 45.30 PPM | G1 | ±1.0% NIST Traceable | 10/16/2024, 10/23/2024 |
| SULFUR DIOXIDE | 45.00 PPM | 45.05 PPM | G1 | ±0.7% NIST Traceable | 10/16/2024, 10/23/2024 |
| CARBON MONOXIDE | 4500 PPM | 4520 PPM | G1 | ±0.8% NIST Traceable | 10/16/2024 |
| NITROGEN | Balance | | | | |

| Type | Lot ID | Cylinder No | Concentration | Uncertainty | Expiration Date |
|-----------------|---------------|--------------|-------------------------------------|-------------|-----------------|
| GMIS | DCR1201202235 | CC790377 | 48.05 PPM NITRIC OXIDE/NITROGEN | ±0.5% | May 01, 2026 |
| PRM | 12404 | AFEX 1324267 | 50.94 PPM NITRIC OXIDE/NITROGEN | ±0.4% | Dec 22, 2023 |
| GMIS | 124206869128 | CC303207 | 4.239 PPM NITROGEN DIOXIDE/NITROGEN | ±2.0% | Jan 04, 2027 |
| PRM | C2380001.1 | O153445 | 9.87 PPM NITROGEN DIOXIDE/NITROGEN | ±2.0% | Nov 22, 2024 |
| GMIS | 0712202310 | CC494279 | 48.82 PPM SULFUR DIOXIDE/NITROGEN | ±0.7% | Jun 16, 2027 |
| SRM | 1893a | FF25487 | 50.33 PPM SULFUR DIOXIDE/NITROGEN | ±0.7% | Jun 27, 2023 |
| CARBON MONOXIDE | 080123 | KAL004712 | 4857 PPM CARBON MONOXIDE/NITROGEN | ±0.6% | Feb 20, 2030 |

The SRM, NTRM, PRM, or RM listed above is only in reference to the GMIS used in the assay and not part of the analysis.

| Instrument/Make/Model | Analytical Principle | Last Multipoint Calibration |
|---------------------------------|----------------------|-----------------------------|
| SIEMENS ULTRAMAT 6 N1M9050 | NDIR | Oct 09, 2024 |
| Nicolet 890 FTIR AUP2010245 NO | FTIR | Oct 17, 2024 |
| Nicolet 890 FTIR AUP2010245 NO2 | FTIR | Oct 03, 2024 |
| Nicolet 890 FTIR AUP2010245 SO2 | FTIR | Sep 26, 2024 |



Verification/Calibration Test Report

Report No.: API-6812007

Verification Date: 01 December 2025

Page: 1/2

Operate Information ☒ PM ☐ Onsite

Site: [Redacted]

GPS coordinates: 47P N 1514454 E 654233

Instrument Information

Equipment: SO2 Analyzer

Manufacturer: ESA

Model: AF22e

Serial No: 2506

Reference Standard

| Standard Gas | | Calibrator Unit | |
|-----------------|-------------|--------------------|-------------------|
| Cylinder No: | EB0170003 | ZERO AIR Generator | Model: ZAG7001 |
| Certificate No: | 2015 FO,G | | S/N: 644 |
| Date Due: | OCT 23,2027 | Dilutor | Model: ESA MGC101 |
| Traceability: | Air Liquide | | S/N: 792 |

Ambient Condition: Temperature 25.00 °C Relative humidity 56.30 %

Atmospheric pressure 1011.0 hpa

Measurement Data

| Calibration Gas Level | Zero Conc. (Indicate Unit) <input type="checkbox"/> ppb <input type="checkbox"/> ppm | Level 1 Conc. (Indicate Unit) <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | Level 2 Conc. (Indicate Unit) <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | Level 3 Conc. (Indicate Unit) <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | Level 4 Conc. (Indicate Unit) <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm |
|---|--|--|--|--|--|
| Calibrator Value (X) | 0.00 | 50.00 | 100.00 | 150.00 | 400.00 |
| Instrument Value (Y) | -0.15 | 49.15 | 97.13 | 147.67 | 398.40 |
| | -1.13 | 47.98 | 96.19 | 146.32 | 399.50 |
| | -1.13 | 49.98 | 98.19 | 149.32 | 397.10 |
| | -1.13 | 47.98 | 96.19 | 146.32 | 397.10 |
| Ins.Value Average | -0.47 | 48.92 | 98.12 | 148.11 | 397.10 |
| | -0.80 | 48.80 | 98.38 | 148.55 | 397.84 |
| Best Fit Concentration (Y=Mx+b) | | 48.82 | 98.67 | 148.52 | 397.77 |
| Point Difference(Best Fit - Average) | | 0.02 | 0.31 | -0.03 | -0.07 |
| Percent difference (Best fit vs Ins.(Y) Value | | -0.04% | -0.31% | 0.02% | 0.02% |
| Result Status (Pass/Fail) | | Pass | Pass | Pass | Pass |

Note:

1. Calibrator Value(X) is concentration points were evenly spaced across that range, with the highest test concentration generated approximately 80% full scale.

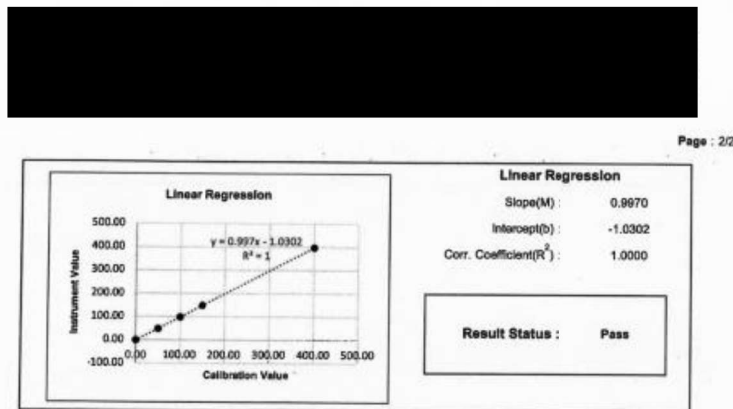
2. Instrument Value(Y) is Concentration values from instrument. The worksheet

ระกาศป๋ 01/08/2568



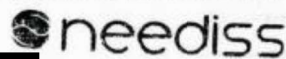
Page 2 of 1





Acceptance Criteria

For the gaseous pollutants, the calibration (including the multi-point verification) is considered acceptable if all test concentrations fall within 2%, or an absolute difference of 1.5 ppb for O₃, SO₂ and NO₂ and 0.03 ppm for CO, of the calibration scale, best-fit straight line Which acceptance criteria (percent or absolute difference) is used depends on the concentration of the calibration points. It is also recommended that the slope is within 1±0.05. See QA Handbook for Air Pollution Measurement Systems Volume II Ambient Air Quality Monitoring Program



Calibrated By:

neediss Supply Instrument Co., Ltd

Approve By:

Date : 01 December 2025

Date : 01 December 2025

The Results shown in this verification report refer only to the equipment verification unless otherwise stated
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**** End Verification/Calibration Test Report ****

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Verification/Calibration Test Report

Report No.: API-6812006

Verification Date : 01 December 2025

Page : 1/2

Operate Information ☒ PM ☐ Onsite

Site

GPS coordinates : 47P N 1514454 E 654233

Instrument Information

Equipment : SO₂ Analyzer

Manufacturer : ESA

Model : AF22e

Serial No : 2505

Reference Standard

| Standard Gas | | Calibrator Unit | |
|------------------|-------------|--------------------|--------------------|
| Cylinder No : | EB0170003 | ZERO AIR Generator | Model : ZAG7001 |
| Certificate No : | 2015 FO.G | | S/N : 644 |
| Date Due : | OCT 23,2027 | Dilutor | Model : ESA MGC101 |
| Traceability : | Air Liquide | | S/N : 792 |

Ambient Condition : Temperature 25.00 °C Relative humidity 56.30 %

Atmospheric pressure 1011.0 hpa

Measurement Data

| Calibration Gas Level | Zero Conc. (Indicate Unit) | Level 1 Conc. (Indicate Unit) | Level 2 Conc. (Indicate Unit) | Level 3 Conc. (Indicate Unit) | Level 4 Conc. (Indicate Unit) |
|---|---|--|--|--|--|
| | <input type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm |
| Calibrator Value (X) | 0.00 | 50.00 | 100.00 | 150.00 | 400.00 |
| Instrument Value (Y) | -0.15 | 49.15 | 97.13 | 147.67 | 401.10 |
| | -1.13 | 47.98 | 96.19 | 146.32 | 401.10 |
| | -1.13 | 49.98 | 99.19 | 149.32 | 402.50 |
| | -1.13 | 47.98 | 96.19 | 146.32 | 402.50 |
| | -0.47 | 48.92 | 99.12 | 149.11 | 401.20 |
| Ins.Value Average | -0.80 | 48.80 | 98.36 | 148.55 | 401.68 |
| Best Fit Concentration (Y=Mx+b) | | 48.66 | 99.03 | 149.39 | 401.22 |
| Point Difference(Best Fit - Average) | | -0.14 | 0.66 | 0.84 | -0.46 |
| Percent difference (Best fit vs Ins.(Y) Value | | 0.29% | -0.67% | -0.56% | 0.12% |
| Result Status (Pass/Fail) | | Pass | Pass | Pass | Pass |

Note :

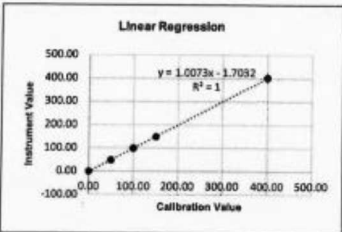
1. Calibrator Value(X) is concentration points were evenly spaced across that range, with the highest test concentration generated approximately 80% full scale.

2. Instrument Value(Y) is Concentration values from instrument. The worksheet

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Envilab Co., Ltd. กรุงเทพมหานคร

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Linear Regression
Slope(M) : 1.0073
Intercept(b) : -1.7032
Corr. Coefficient(R²) : 1.0000


Result Status : Pass

Acceptance Criteria


For the gaseous pollutants, the calibration (including the multi-point verification) is considered acceptable if all test concentrations fall within 2%, or an absolute difference of 1.5 ppb for O₃, SO₂ and NO₂ and 0.03 ppm for CO, of the calibration scale, best-fit straight line. Which acceptance criteria (percent or absolute difference) is used depends on the concentration of the calibration points. It is also recommended that the slope is within ± 0.05 . See QA Handbook for Air Pollution Measurement Systems Volume II Ambient Air Quality Monitoring Program



neediss Supply Instrument Co., Ltd

Calibrated By: 

Date : 01 December 2025

Approve By: 

Date : 01 December 2025

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Verification/Calibration Test Report

Report No.: API-0812008

Verification Date : 06 December 2025

Page : 1/2

Operate Information ☒ PM ☐ Onsite

Site: 

GPS coordinates : 47P N 1514454 E 654233

Instrument Information

Equipment : CO Analyzer Manufacturer : ESA
Model : CO12e Serial No : 355

Reference Standard

| Standard Gas | | Calibrator Unit | |
|------------------|-------------|-----------------|------------|
| Cylinder No : | EB0170003 | Model : | ZAG7001 |
| Certificate No : | 2015 FO.G | S/N : | 644 |
| Date Due : | OCT 23,2027 | Model : | ESA MGC101 |
| Traceability : | Air Liquide | S/N : | 782 |

Ambient Condition : Temperature 25.00 °C Relative humidity 59.30 %
Atmospheric pressure 1011.0 hpa

Measurement Data

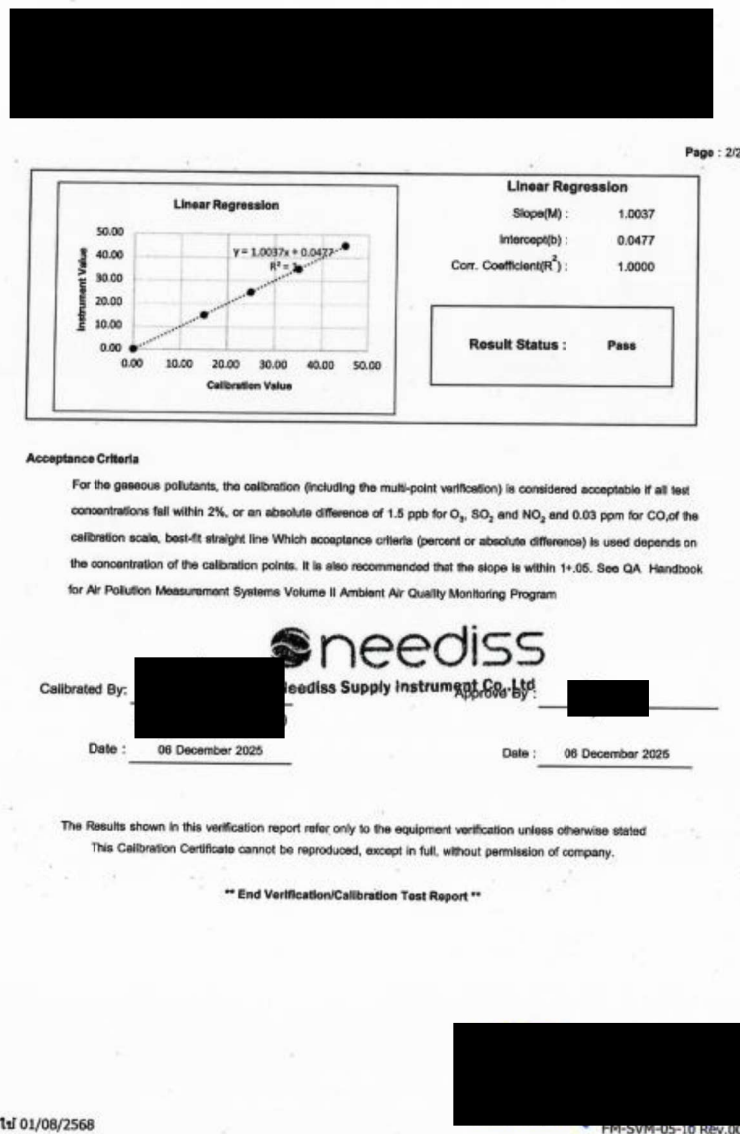
| Calibration Gas Level | Zero Conc. | Level 1 Conc. | Level 2 Conc. | Level 3 Conc. | Level 4 Conc. |
|---|---|---|---|---|---|
| | (Indicate Unit) <input type="checkbox"/> ppb <input checked="" type="checkbox"/> ppm | (Indicate Unit) <input type="checkbox"/> ppb <input checked="" type="checkbox"/> ppm | (Indicate Unit) <input type="checkbox"/> ppb <input checked="" type="checkbox"/> ppm | (Indicate Unit) <input type="checkbox"/> ppb <input checked="" type="checkbox"/> ppm | (Indicate Unit) <input type="checkbox"/> ppb <input checked="" type="checkbox"/> ppm |
| Calibrator Value (X) | 0.00 | 15.00 | 25.00 | 35.00 | 45.00 |
| Instrument Value (Y) | 0.15 | 15.11 | 25.14 | 35.12 | 45.55 |
| | 0.14 | 14.97 | 25.14 | 35.09 | 45.55 |
| | 0.13 | 14.97 | 25.14 | 34.99 | 45.55 |
| | 0.13 | 14.97 | 25.10 | 35.12 | 44.99 |
| | 0.15 | 14.99 | 25.14 | 35.12 | 44.99 |
| Ins.Value Average | 0.14 | 15.00 | 25.13 | 35.09 | 45.33 |
| Best Fit Concentration (Y=Mx+b) | | 15.10 | 25.14 | 35.18 | 45.22 |
| Point Difference(Best Fit - Average) | | 0.10 | 0.01 | 0.09 | -0.11 |
| Percent difference (Best fit vs Ins.(Y) Value | | -0.67% | -0.04% | -0.26% | 0.24% |
| Result Status (Pass/Fail) | | Pass | Pass | Pass | Pass |

Note :

1. Calibrator Value(X) is concentration points were evenly spaced across that range, with the highest test concentration generated approximately 80% full scale.

2. Instrument Value(Y) is Concentration values from Instrument. The worksheet also

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Verification/Calibration Test Report

Report No.: API-6812009
Verification Date : 06 December 2025

Operate information ☒ PM ☐ Onsite
Site:
GPS coordinates : 47P N 1514454 E 654233

Instrument information
Equipment : CO Analyzer
Model : CO12e
Manufacturer : ESA
Serial No : 356

Reference Standard

| Standard Gas | | Calibrator Unit | |
|------------------|-------------|--------------------|--------------------|
| Cylinder No : | EB0170003 | ZERO AIR Generator | Model : ZAG7001 |
| Certificate No : | 2015 FO,G | | S/N : 644 |
| Date Due : | OCT 23,2027 | Dilutor | Model : ESA MGC101 |
| Traceability : | Air Liquide | | S/N : 792 |

Ambient Condition : Temperature 25.00 °C Relative humidity 56.30 %
Atmospheric pressure 1011.0 hpa

Measurement Data

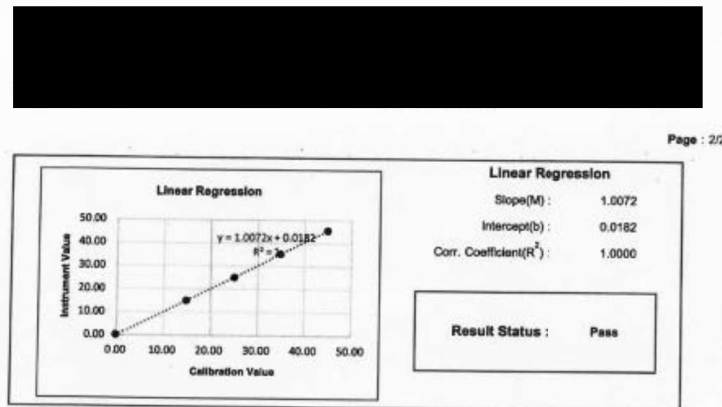
| Calibration Gas Level | Zero Conc. (Indicate Unit) <input type="checkbox"/> ppb <input checked="" type="checkbox"/> ppm | Level 1 Conc. (Indicate Unit) <input type="checkbox"/> ppb <input checked="" type="checkbox"/> ppm | Level 2 Conc. (Indicate Unit) <input type="checkbox"/> ppb <input checked="" type="checkbox"/> ppm | Level 3 Conc. (Indicate Unit) <input type="checkbox"/> ppb <input checked="" type="checkbox"/> ppm | Level 4 Conc. (Indicate Unit) <input type="checkbox"/> ppb <input checked="" type="checkbox"/> ppm |
|---|---|--|--|--|--|
| Calibrator Value (X) | 0.00 | 15.00 | 25.00 | 35.00 | 45.00 |
| Instrument Value (Y) | 0.15 | 15.11 | 25.14 | 35.42 | 45.55 |
| | 0.14 | 14.97 | 25.14 | 35.42 | 45.55 |
| | 0.13 | 14.97 | 25.14 | 34.94 | 45.54 |
| | 0.13 | 14.97 | 25.10 | 35.12 | 45.55 |
| | 0.11 | 14.98 | 25.14 | 35.42 | 44.94 |
| Ins.Value Average | 0.13 | 15.00 | 25.13 | 35.26 | 45.43 |
| Best Fit Concentration (Y=Mx+b) | | 15.13 | 25.20 | 35.27 | 45.34 |
| Point Difference(Best Fit - Average) | | 0.12 | 0.07 | 0.01 | -0.08 |
| Percent difference (Best fit vs Ins.(Y) Value | | -0.82% | -0.26% | -0.02% | 0.18% |
| Result Status (Pass/Fail) | | Pass | Pass | Pass | Pass |

Note :

1. Calibrator Value(X) is concentration points were evenly spaced across that range with the highest test point generated approximately 80% full scale.

2. Instrument Value(Y) is Concentration values from instrument. The worksheet also

ประกาศใช้ 01/08/2568



Acceptance Criteria

For the gaseous pollutants, the calibration (including the multi-point verification) is considered acceptable if all test concentrations fall within 2%, or an absolute difference of 1.5 ppb for O₃, SO₂ and NO₂ and 0.03 ppm for CO, of the calibration scale, best-fit straight line. Which acceptance criteria (percent or absolute difference) is used depends on the concentration of the calibration points. It is also recommended that the slope is within 1±.05. See QA Handbook for Air Pollution Measurement Systems Volume II Ambient Air Quality Monitoring Program

Calibrated By: **neediss** Supply Instrument Co., Ltd.
Date : 06 December 2025
Approved By:
Date : 08 December 2025

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** End Verification/Calibration Test Report **

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Verification/Calibration Test Report

Report No.: ESA-8612002
Verification Date : 01 December 2025
Page : 1/2

Operate Information ☒ PM ☐ Onsite
Site : Envilab Co., Ltd.
GPS coordinates : 47P N 1514454 E 654233

Instrument Information
Equipment : NO2 Analyzer
Model : AC32e
Manufacturer : ESA
Serial No : 2399

| Standard Gas | | Calibrator Unit | |
|------------------|-------------|--------------------|--------------------|
| Cylinder No : | EB0170003 | ZERO AIR Generator | Model : ZAG7001 |
| Certificate No : | 2015 FO,G | | S/N : 644 |
| Date Due : | OCT 23,2027 | Dilutor | Model : ESA MGC101 |
| Traceability : | Air Liquide | | S/N : 792 |

Ambient Condition : Temperature 25.00 °C
Relative humidity 56.30 %
Atmospheric pressure 1011.0 hpa

Measurement Data

| Calibration Gas Level | Zero Conc. (Indicate Unit) | | Level 1 Conc. (Indicate Unit) | | Level 2 Conc. (Indicate Unit) | | Level 3 Conc. (Indicate Unit) | | Level 4 Conc. (Indicate Unit) | |
|---|---|--|--|--|--|--|--|--|--|--|
| | <input type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm | <input checked="" type="checkbox"/> ppb <input type="checkbox"/> ppm |
| Calibrator Value (X) | Nox | NO | Nox | NO | Nox | NO | Nox | NO | Nox | NO |
| Instrument Value (Y) | 0.00 | 0.00 | 50.00 | 50.00 | 100.00 | 100.00 | 150.00 | 150.00 | 400.00 | 400.00 |
| | 0.11 | -0.15 | 49.64 | 49.30 | 100.19 | 98.29 | 148.89 | 148.16 | 402.73 | 402.40 |
| | 0.12 | -1.13 | 49.72 | 49.03 | 100.47 | 99.37 | 148.25 | 150.56 | 405.20 | 405.20 |
| | 0.13 | -1.13 | 49.51 | 49.28 | 99.82 | 98.86 | 147.43 | 149.42 | 403.1 | 403.1 |
| Ins. Value Average | 0.13 | -1.13 | 49.11 | 48.57 | 100.39 | 98.08 | 147.61 | 152.44 | 402.50 | 402.40 |
| | 0.14 | -0.47 | 50.45 | 50.32 | 98.42 | 99.19 | 151.27 | 147.07 | 403.10 | 405.20 |
| Ins. Value Average | 0.13 | -0.80 | 49.69 | 49.30 | 99.66 | 98.72 | 148.69 | 149.73 | 403.38 | 403.80 |
| Best Fit Concentration (Y=Mx+b) | | 49.48 | 49.02 | 99.94 | 99.85 | 150.40 | 150.27 | 402.70 | 403.40 | |
| Point Difference(Best Fit - Average) | | -0.20 | -0.28 | 0.28 | 0.83 | 1.71 | 0.54 | -0.69 | -0.40 | |
| Percent difference (Best fit vs Ins.(Y) Value | | 0.41% | 0.56% | -0.28% | -0.83% | -1.14% | -0.36% | 0.17% | 0.10% | |
| Result Status (Pass/Fail) | | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | |

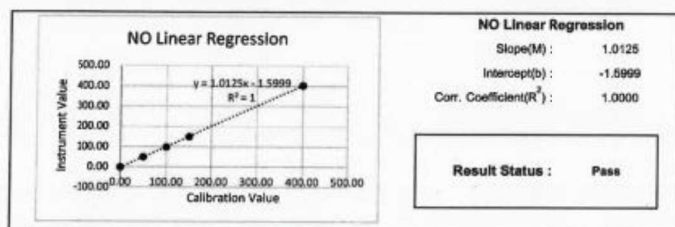
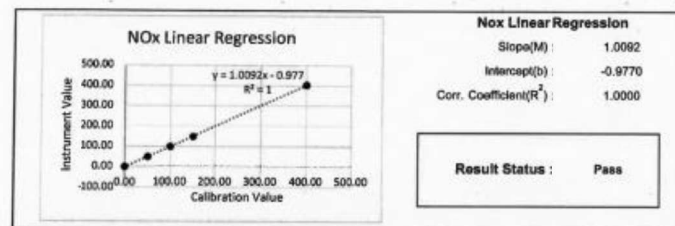
Note :

1. Calibrator Value(X) is concentration points were evenly spaced across that generated approximately 80% full scale.
2. Instrument Value(Y) is Concentration values from instrument. The worksheet

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Page : 2/2



Acceptance Criteria

For the gaseous pollutants, the calibration (including the multi-point verification) is considered acceptable if all test concentrations fall within 2%, or an absolute difference of 1.5 ppb for O₃, SO₂ and NO₂ and 0.03 ppm for CO, of the calibration scale, best-fit straight line. Which acceptance criteria (percent or absolute difference) is used depends on the concentration of the calibration points. It is also recommended that the slope is within 1±.05. See QA Handbook for Air Pollution Measurement Systems Volume II Ambient Air Quality Monitoring Program

Calibrated By: **neediss** Supply Instrument Co., Ltd. Approve By:

Date : 01 December 2025

Date : 01 December 2025

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** End Verification/Calibration Test Report *

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Verification/Calibration Test Report

Report No.: ESA-6812003

Verification Date : 01 December 2025

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Operate Information ☒ PM ☐ Onsite

Site : Envilab Co., Ltd.

GPS coordinates : 47P N 1514454 E 654233

Instrument Information

Equipment : NO2 Analyzer

Manufacturer : ESA

Model : AC32e

Serial No : 2400

Reference Standard

| Standard Gas | | Calibrator Unit | |
|------------------|-------------|-----------------|------------|
| Cylinder No : | EB0170003 | Model : | ZAG7001 |
| Certificate No : | 2015 FO,G | S/N : | 844 |
| Date Due : | OCT 23,2027 | Model : | ESA MGC101 |
| Traceability : | Air Liquide | S/N : | 792 |

Ambient Condition : Temperature 25.00 °C Relative humidity 58.30 %

Atmospheric pressure 1011.0 hpa

Measurement Data

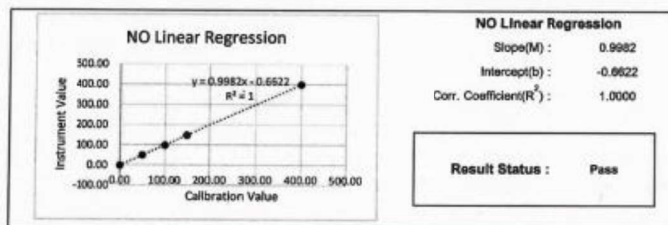
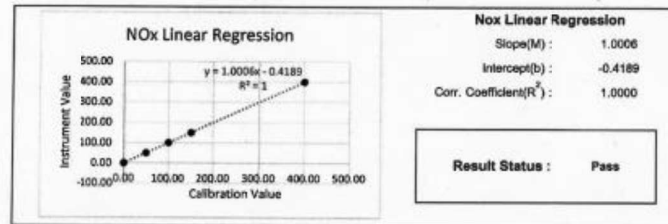
| Calibration Gas Level | Zero Conc. (Indicate Unit) | | Level 1 Conc. (Indicate Unit) | | Level 2 Conc. (Indicate Unit) | | Level 3 Conc. (Indicate Unit) | | Level 4 Conc. (Indicate Unit) | |
|--|-------------------------------|-------|----------------------------------|--------|----------------------------------|--------|----------------------------------|--------|----------------------------------|--------|
| | ppb | ppm | ppb | ppm | ppb | ppm | ppb | ppm | ppb | ppm |
| Calibrator Value (X) | 0.00 | 0.00 | 50.00 | 50.00 | 100.00 | 100.00 | 150.00 | 150.00 | 400.00 | 400.00 |
| Instrument Value (Y) | 0.11 | -0.15 | 49.64 | 49.30 | 100.19 | 98.29 | 148.89 | 149.16 | 402.73 | 397.31 |
| | 0.12 | -1.13 | 49.72 | 49.03 | 100.47 | 99.37 | 148.25 | 150.56 | 399.76 | 397.31 |
| | 0.13 | -1.13 | 49.51 | 49.26 | 99.82 | 98.66 | 147.43 | 149.42 | 398.27 | 398.06 |
| | 0.13 | -1.13 | 49.11 | 48.57 | 100.39 | 98.08 | 147.61 | 152.44 | 399.78 | 399.79 |
| Ins. Value Average | 0.14 | -0.47 | 50.45 | 50.32 | 99.42 | 99.19 | 151.27 | 147.07 | 400.45 | 399.79 |
| | 0.13 | -0.80 | 49.69 | 49.30 | 99.66 | 98.72 | 148.69 | 149.73 | 400.20 | 398.45 |
| Best Fit Concentration (Y=MX+b) | 49.61 | 49.25 | 99.65 | 99.15 | 149.88 | 149.06 | 399.84 | 398.60 | | |
| Point Difference(Best Fit - Average) | -0.07 | -0.05 | -0.01 | 0.44 | 0.99 | -0.87 | -0.36 | 0.15 | | |
| Percent difference (Best fit vs Ins.(Y) Value) | 0.15% | 0.11% | 0.01% | -0.44% | -0.66% | 0.45% | 0.09% | -0.04% | | |
| Result Status (Pass/Fail) | Pass | Pass | Pass | Pass | Pass | Pass | Pass | Pass | | |

Note :

1. Calibrator Value(X) is concentration points were evenly spaced across that range generated approximately 80% full scale.

2. Instrument Value(Y) is Concentration values from instrument. The worksheet also

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Acceptance Criteria

For the gaseous pollutants, the calibration (including the multi-point verification) is considered acceptable if all test concentrations fall within 2%, or an absolute difference of 1.5 ppb for O₃, SO₂ and NO₂ and 0.03 ppm for CO, of the calibration scale, best-fit straight line. Which acceptance criteria (percent or absolute difference) is used depends on the concentration of the calibration points. It is also recommended that the slope is within ± 0.05 . See QA Handbook for Air Pollution Measurement Systems Volume II Ambient Air Quality Monitoring Program

Calibrated By: Approved By: Date: 01 December 2025 Date: 01 December 2025

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*** End Verification/Calibration Test Report ***

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0152 MTC No. EEL. BP. 65/0168

CALIBRATION CERTIFICATE

Submitted by:
Address:
Calibrated at:

Instrument Calibrated:
Description : Acoustic Calibrator
Manufacturer : Pulsar
Model : 103
Serial No. : 98971

Ambient Environment
Temperature : (23 \pm 3) °C
Relative Humidity : (50 \pm 15) %
Ambient Pressure : (101.325 \pm 1.500) kPa

Standards used:

1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.
7. Condenser Microphone B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 10 Jan. 2025
Date of Calibration : 17 Jan. 2025

The results relate only to the items tested/calibrated or value assigned. Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Chongwatthani 32120, Thailand
Tel. (66) 0 2577 9036
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668 Mu 2 Tambon Bangpoomai, Amphoe Mu
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9440
E-mail : mtc@tistr.or.th Website : www.tistr

FM.BL.MTC.002 Rev.5

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0152 **MTC No.** EEL. BP. 65/0168

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 | 93.93 | -0.07 | ± 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 | 1000.4 | 0.4 | ± 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 | 1.40 | ± 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.

Date of Calibration : 17 Jan. 2025 2/3

The results relate only to the items tested/calibrated or value assigned.
 Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0152 **MTC No.** EEL. BP. 65/0168

Nominal Output of Unit Under Test = 114 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 | 114.01 | 0.01 | ± 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 | 1000.3 | 0.3 | ± 1.5 | $\pm 3.0\%$ |

3. Total Distortion

| Standard Microphone Type | Measured Total Distortion (%) | Uncertainty (%) | Tolerance limit IEC60942:2003 Class 1 |
|---------------------------|-------------------------------|-----------------|---------------------------------------|
| 1/2 inch Bruel&Kjaer 4180 | 2.05 | ± 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 : **Approved by**

Electrical and Mechanical Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 17 Jan. 2025 **Ref :** 2011268011000116001
Date of Issue : 20 Jan. 2025 **End of Certificate** 3 / 3

The results relate only to the items tested/calibrated or value assigned.
 Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

Issued by : Calibration & Test Section : Meteorological Instruments Bureau
Date of Issue : 8 July, 2025 Certification No. 332/25
Page : 1 of 6

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : Novallynx

Type : Data Logger 110-WS-25DL-D

Serial No. : EWSNV110WS2506

Customer :

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1006.6 hPa

NATIONAL STANDARD WIND TUNNEL : Vane Angel Bench Stand Model 18112

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119 : HOOK GAGE NO 1425

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 6389/94

: Thermoschneider No.9188 : testo, testo 645 Serial No. 02849057

The Result of Calibration

Sensor model EWSNV110WS2506 Certification No. 332/25

8 July, 2025

Page : 2 of 6

| Standard Ultrasonic Anemometer m/sec | HOOK GAGE NO. 1425 | | | TESTED ANEMOMETER | |
|--|-------------------------------------|-----------------------------------|-------------------|-------------------|---------------------|
| | Pressure inches H ₂ O | Vacuum inches H ₂ O | Velocity m/sec | Velocity m/sec | Correction m/sec |
| 1.00 | - | - | - | 0.8 | 0.20 |
| 3.02 | - | - | - | 3.0 | 0.02 |
| 5.00 | - | - | - | 4.9 | 0.10 |
| 7.04 | - | - | - | 7.0 | 0.04 |
| 9.02 | - | - | - | 9.0 | 0.02 |
| 11.01 | - | - | - | 10.1 | 0.91 |
| 13.01 | - | - | - | 13.0 | 0.01 |
| 15.01 | - | - | - | 15.1 | -0.09 |
| 17.02 | - | - | - | 17.0 | 0.02 |
| 20.02 | - | - | - | 20.1 | -0.08 |

Vane Angel Bench Stand Model 18112

Young Meteorological Instruments

| WIND DIRECTION | TESTED WIND DIRECTION |
|----------------|-----------------------|
| 0 | 0 |
| 90 | 90 |
| 180 | 180 |
| 270 | |

Calibrated





The Result of Calibration

Sensor model EWSNV110WS2506

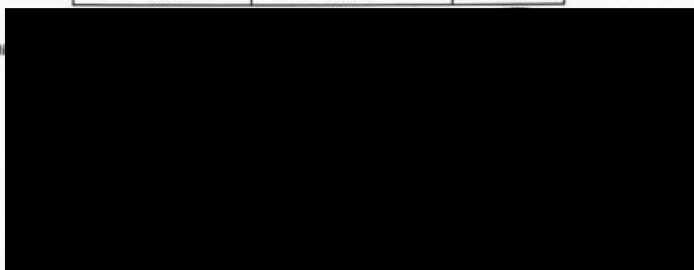
Certification No. 332/25

8 July, 2025

Page : 3 of 6

| Standard Barometer Pressure | Tested Barometer Pressure | Correction |
|--------------------------------|------------------------------|------------|
| 1011.60 | 1012.52 | -0.92 |
| 1011.24 | 1012.05 | -0.81 |
| 1010.86 | 1011.64 | -0.78 |
| 1010.21 | 1011.03 | -0.82 |
| 1009.82 | 1010.64 | -0.82 |
| 1009.45 | 1010.25 | -0.80 |
| 1009.06 | 1010.02 | -0.96 |
| 1008.83 | 1009.61 | -0.78 |
| 1008.43 | 1009.12 | -0.69 |
| 1008.22 | 1009.14 | -0.92 |
| 1007.75 | 1008.61 | -0.86 |
| 1007.37 | 1008.15 | -0.77 |
| 1007.17 | 1008.15 | -0.98 |
| 1006.84 | 1007.79 | -0.95 |
| 1010.63 | 1011.61 | -0.98 |
| 1010.06 | 1010.86 | -0.78 |
| 1009.77 | 1010.63 | -0.86 |
| 1008.97 | 1009.88 | -0.91 |
| 1008.24 | 1009.13 | -0.89 |
| 1007.23 | 1008.06 | -0.83 |

Call



The Result of Calibration

Sensor model EWSNV110WS2506

Certification No. 332/25

8 July, 2025

Page : 4 of 6

| Standard Temp. °C | Temperature Sensor Reading | |
|-------------------------|----------------------------|------------------|
| | Reading °C | Correction °C |
| 45.7 | 46.0 | -0.3 |
| 30.4 | 30.5 | -0.1 |
| 15.6 | 15.7 | -0.1 |



| The Result of Calibration | | |
|--|---|-------------------|
| Sensor model EWSNV110WS2506 Certification No. 332/25 | | |
| 8 July, 2025 Page : 5 of 6 | | |
| Standard Humidity % R.H. | Relative Humidity Sensor Reading Reading % R.H. | Correction % R.H. |
| 87.5 | 83 | 4.5 |
| 63.2 | 61 | 2.2 |
| 45.1 | 44 | 1.1 |

Calibrated

กรมอุตุนิยมวิทยา
METEOROLOGICAL DEPARTMENT

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ชีฟส์ Davis Instruments แบบ TIPPING BUCKET Product No. [REDACTED] ผ่านการสอบเทียบกับแก้ววัดฝน แบบแก้วดวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.2 mm./TIP)

กรมอุตุนิยมวิทยา
METEOROLOGICAL DEPARTMENT



Issued by : Calibration & Test Section : Meteorological Instruments Bureau
Date of Issue 8 July, 2025 Certification No. 333/25
Page : 1 of 6

Object : เครื่องมือตรวจวัดอุณหภูมิตามอากาศ
Manufacturer : NovusLynx
Type : Data Logger 110-WS-25DL-D
Serial No. : EWSNV110WS2507
Customer : Envislab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhao 7, Bangkhao, Bangkok
Bangkok 10160,Thailand.
Calibration Condition : Temperature 25.1 °C Barometric Pressure 1007.2 hPa
NATIONAL STANDARD WIND TUNNEL : Vane Angel Bench Stand Model 18112
: Micromanometer Theodor Friedrich FC014 Serial No. 9310119 : HOOK GAGE NO 1425
N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec
: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec
STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94
: Thermoschneider No.9188 : testo, testo 545 Serial No. 02848057



The Result of Calibration

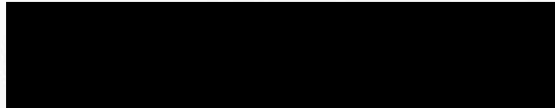
Sensor model EWSNV110WS2507 Certification No. 333/25
8 July, 2025 Page : 2 of 6

| Standard Ultrasonic Anemometer m/sec | HOOK GAGE NO. 1425 | | | TESTED ANEMOMETER | |
|--|------------------------|----------------------|-------------------|-------------------|---------------------|
| | Pressure inches H2O | Vacuum inches H2O | Velocity m/sec | Velocity m/sec | Correction m/sec |
| 1.00 | - | - | - | 0.9 | 0.10 |
| 3.02 | - | - | - | 2.7 | 0.32 |
| 5.00 | - | - | - | 4.9 | 0.10 |
| 7.04 | - | - | - | 7.0 | 0.04 |
| 9.02 | - | - | - | 9.0 | 0.02 |
| 11.01 | - | - | - | 11.1 | -0.09 |
| 13.01 | - | - | - | 13.0 | 0.01 |
| 15.01 | - | - | - | 15.2 | -0.19 |
| 17.02 | - | - | - | 17.0 | 0.02 |
| 20.02 | - | - | - | | |

| | |
|--|-----|
| Vane Angel Bench Stand Model 18112 Young Meteorological Instrument Co. Ltd. | |
| WIND DIRECTION | |
| 0 | 0 |
| 90 | 90 |
| 180 | 180 |
| 270 | |



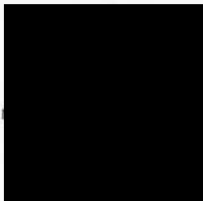
| <div></div> <div> <h3>The Result of Calibration</h3> <p>Sensor model EWSNV110WS2507</p> <p>8 July, 2025 Certification No. 333/25 Page : 3 of 6</p> <table> <tr> <th>Standard Barometer Pressure</th><th>Tested Barometer Pressure</th><th>Correction</th></tr> <tr><td>1011.60</td><td>1011.28</td><td>0.32</td></tr> <tr><td>1011.24</td><td>1010.86</td><td>0.38</td></tr> <tr><td>1010.86</td><td>1010.52</td><td>0.34</td></tr> <tr><td>1010.21</td><td>1009.85</td><td>0.36</td></tr> <tr><td>1009.82</td><td>1009.45</td><td>0.37</td></tr> <tr><td>1009.45</td><td>1009.12</td><td>0.33</td></tr> <tr><td>1009.06</td><td>1008.71</td><td>0.35</td></tr> <tr><td>1008.83</td><td>1008.48</td><td>0.35</td></tr> <tr><td>1008.43</td><td>1008.03</td><td>0.40</td></tr> <tr><td>1008.22</td><td>1007.86</td><td>0.36</td></tr> <tr><td>1007.75</td><td>1007.42</td><td>0.33</td></tr> <tr><td>1007.37</td><td>1006.98</td><td>0.39</td></tr> <tr><td>1007.17</td><td>1006.73</td><td>0.44</td></tr> <tr><td>1006.84</td><td>1006.51</td><td>0.33</td></tr> <tr><td>1010.63</td><td>1010.32</td><td>0.31</td></tr> <tr><td>1010.06</td><td>1009.62</td><td>0.46</td></tr> <tr><td>1009.77</td><td>1009.43</td><td>0.34</td></tr> <tr><td>1008.97</td><td>1008.56</td><td>0.41</td></tr> <tr><td>1008.24</td><td>1007.97</td><td>0.27</td></tr> <tr><td>1007.23</td><td>1006.86</td><td>0.37</td></tr> <tr> <td colspan="2">Average</td><td></td></tr> </table> </div> | | | Standard Barometer Pressure | Tested Barometer Pressure | Correction | 1011.60 | 1011.28 | 0.32 | 1011.24 | 1010.86 | 0.38 | 1010.86 | 1010.52 | 0.34 | 1010.21 | 1009.85 | 0.36 | 1009.82 | 1009.45 | 0.37 | 1009.45 | 1009.12 | 0.33 | 1009.06 | 1008.71 | 0.35 | 1008.83 | 1008.48 | 0.35 | 1008.43 | 1008.03 | 0.40 | 1008.22 | 1007.86 | 0.36 | 1007.75 | 1007.42 | 0.33 | 1007.37 | 1006.98 | 0.39 | 1007.17 | 1006.73 | 0.44 | 1006.84 | 1006.51 | 0.33 | 1010.63 | 1010.32 | 0.31 | 1010.06 | 1009.62 | 0.46 | 1009.77 | 1009.43 | 0.34 | 1008.97 | 1008.56 | 0.41 | 1008.24 | 1007.97 | 0.27 | 1007.23 | 1006.86 | 0.37 | Average | | |
|--|------------------------------|------------------|--------------------------------|------------------------------|------------|---------------|------------------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|---------|------|---------|--|--|
| Standard Barometer Pressure | Tested Barometer Pressure | Correction | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1011.60 | 1011.28 | 0.32 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1011.24 | 1010.86 | 0.38 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1010.86 | 1010.52 | 0.34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1010.21 | 1009.85 | 0.36 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1009.82 | 1009.45 | 0.37 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1009.45 | 1009.12 | 0.33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1009.06 | 1008.71 | 0.35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1008.83 | 1008.48 | 0.35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1008.43 | 1008.03 | 0.40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1008.22 | 1007.86 | 0.36 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1007.75 | 1007.42 | 0.33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1007.37 | 1006.98 | 0.39 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1007.17 | 1006.73 | 0.44 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1006.84 | 1006.51 | 0.33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1010.63 | 1010.32 | 0.31 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1010.06 | 1009.62 | 0.46 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1009.77 | 1009.43 | 0.34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1008.97 | 1008.56 | 0.41 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1008.24 | 1007.97 | 0.27 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1007.23 | 1006.86 | 0.37 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Average | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div></div> <div> <h3>The Result of Calibration</h3> <p>Sensor model EWSNV110WS2507</p> <p>8 July, 2025 Certification No. 333/25 Page : 4 of 6</p> <table> <tr> <th rowspan="2">Standard Temp. °C</th><th colspan="2">Temperature Sensor Reading</th></tr> <tr> <th>Reading °C</th><th>Correction °C</th></tr> <tr><td>45.7</td><td>45.9</td><td>-0.2</td></tr> <tr><td>30.4</td><td>30.5</td><td>-0.1</td></tr> <tr><td>15.6</td><td>15.8</td><td>-0.2</td></tr> </table> </div> | | | Standard Temp. °C | Temperature Sensor Reading | | Reading °C | Correction °C | 45.7 | 45.9 | -0.2 | 30.4 | 30.5 | -0.1 | 15.6 | 15.8 | -0.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Standard Temp. °C | Temperature Sensor Reading | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Reading °C | Correction °C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 45.7 | 45.9 | -0.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30.4 | 30.5 | -0.1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15.6 | 15.8 | -0.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



The Result of Calibration

Sensor model EWSNV110WS2507 Certification No. 333/25
8 July, 2025 Page : 5 of 6

| Standard Humidity % R.H. | Relative Humidity Sensor Reading | |
|-----------------------------|----------------------------------|----------------------|
| | Reading % R.H. | Correction % R.H. |
| 87.5 | 92 | -4.5 |
| 63.2 | 67 | -3.8 |
| 45.1 | 47 | -1.9 |



Date of Issue 8 July, 2025

Certification No. 333/25

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ชีฟส์ Davis Instruments แบบ TIPPING
BUCKET Product No. [REDACTED] ทำการสอบเทียบกับแก้ววัดฝน
แบบแก้วควง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No.
71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.2 mm./TIP)

