

## Certificate of Calibration

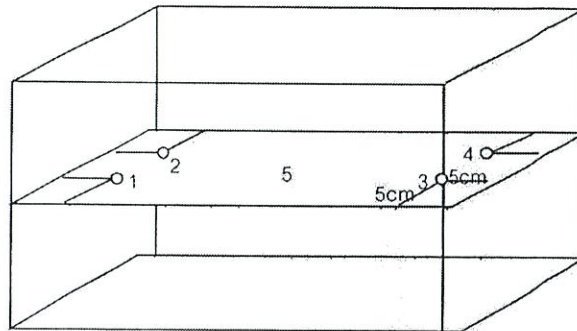
Certificate No. : 67-400054-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point ( ° C )	Setting Temperature ( ° C )	Indicating Temperature ( ° C )	Measured Temperature ( ° C ) @ Sensor					Uncertainty ( ± ° C )	Measured Uniformity ( ° C )	Measured Stability ( ° C )
			No.							
			1	2	3	4	5			
95.0	95.0	95.0	95.38	95.52	95.56	95.74	95.55	0.20	0.27	0.07

Remark The uncertainty is not combine uniformity of the water bath

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  $k = 2$ , providing a level of confidence of approximately 95%

- o0o -

*Handwritten signature*



## Calibratech Co.,Ltd.

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

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

## Certificate of Calibration

Certificate No. : 66-400387-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Air Chamber (Oven)

Manufacturer : Memmert

Model : UF55

Range : N/A °C

Resolution : 0.1 °C

Serial No. : B215.1147

ID No. : ELABHAOVEN1147

Environment : On site calibration was carried out at the Laboratory, Envilab Co., Ltd.

Ambient Temperature : (28.5 to 29.6) °C

Relative Humidity : (50 to 55) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 11 July 2023

Date of Calibration : 11 July 2023

Date of Issue : 15 July 2023

Calibrated by : Bunjerd Masri

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units  
Standard Digital Thermometer with Thermocouple probe

ID No.	Cert. No.	Due Date	Traceability
400046 & 400023	66-400184-1	03 Oct 2023	National Institute of Metrology Thailand (NIMT)

Approved by :



( Bunjerd Masri )

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03

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## Certificate of Calibration

Certificate No. : 66-400387-1

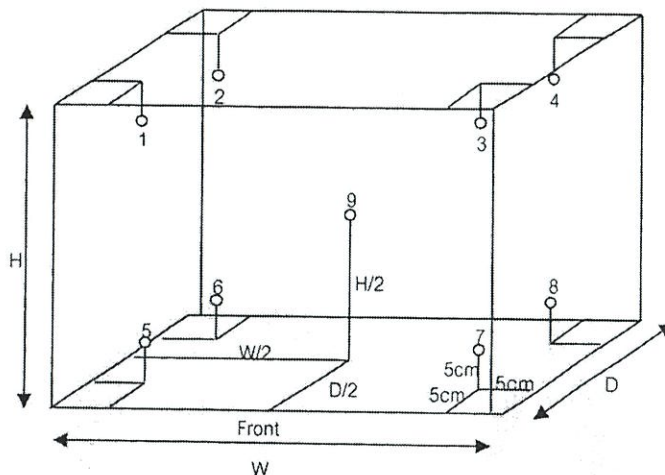
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.40 m

D = 0.34 m

H = 0.40 m

Capacity = 0.05 m<sup>3</sup>

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
104.0	104.0	104.0	104.2	104.0	104.1	104.0	104.1	104.0	103.9	104.0	104.1	0.69
110.0	110.0	110.0	110.3	110.0	110.1	110.0	110.1	110.0	110.1	109.7	110.1	0.69
180.0	180.0	180.0	179.7	179.6	180.1	180.2	180.6	180.2	178.9	179.9	180.8	1.0

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	104.0	104.0	0.3	0.1	0.5
110.0	110.0	110.0	0.5	0.1	0.8
180.0	180.0	180.0	2.2	0.3	2.6

Remark The uncertainty is not combine uniformity of the air chamber

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  $k = 2$ , providing a level of confidence of approximately 95%

- ooo -

*B*



## Certificate of Calibration

**Certificate No. :** 67-200034-1

**Page :** 1 of 2

**Submitted by :** Envilab Co.,Ltd.

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

**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 :** (22.8 to 23.6) °C

**Relative Humidity :** (44.6 to 45.3) %

**Air Pressure :** 1014.0 mbar

**Date of Received :** 01 February 2024

**Date of Calibration :** 01 February 2024

**Date of Issue :** 06 February 2024

**Calibrated by :** Akaradath Thippichai

**Calibration Method :** In-house method CAL-M2001 based on UKAS Publication ref : LAB 14

Edition 7 - November 2022

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02232088	08 Nov 2024	National Institute of Metrology (Thailand), (NIMT)

Approved by :



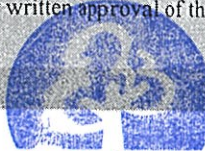
( Surachai Promthong )

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



Envilab Co.,Ltd.

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ผู้จัดการฝ่ายควบคุมคุณภาพ

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## Certificate of Calibration

Certificate No. : 67-300147-2

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Cylinder

Manufacturer : PYREX

Class : A

Capacity : 50 ml

Graduation : 1 ml

ID No. : C-WW-011/23

Environment : Ambient Temperature :  $(20 \pm 3)$  °CRelative Humidity :  $(50 \pm 10)$  %

Air Pressure : 1009.4 mbar.

Date of Received : 13 March 2024

Date of Calibration : 19 March 2024

Date of Issue : 19 March 2024

Calibrated by : Areerat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID No.	Cert. No.	Due Date	Traceability
241002	66-200388-1	02 Jun 2024	National Institute of Metrology (Thailand) (NIMT)

Approved by :

( Wipa Tovadee )

Supervisor

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Calibratech Co.,Ltd.

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## Certificate of Calibration

Certificate No. : 67-300147-2

Page : 2 of 2

Result of Calibration : This result of true Volume is referred to standard temperature at 20 °C

UUC Condition As-Received : Good

Nominal Volume ( ml )	Measuring Volume ( ml )
30	29.69
50	49.87

Uncertainty of measurement with in  $\pm$  0.054 ml

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

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

- o0o -



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NSC-TISI-TIS17025  
CALIBRATION 0030

## Certificate of Calibration

Certificate No. : 67-300147-6

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Cylinder

Manufacturer : PYREX

Class : A

Capacity : 1000 ml

Graduation : 10 ml

ID No. : C-WW-001/24

Environment : Ambient Temperature :  $(20 \pm 3)$  °C

Relative Humidity :  $(50 \pm 10)$  %

Air Pressure : 1009.3 mbar.

Date of Received : 13 March 2024

Date of Calibration : 19 March 2024

Date of Issue : 19 March 2024

Calibrated by : Arcerat Sombun

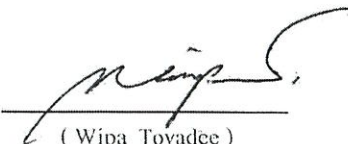
Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID No.	Cert. No.	Due Date	Traceability
241002	66-200388-1	02 Jun 2024	National Institute of Metrology (Thailand) (NIMT)

Approved by :

  
( Wipa Tovadee )

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



Envilab Co.,Ltd.

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# CAL

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## Certificate of Calibration

Certificate No. : 67-300147-6

Page : 2 of 2

Result of Calibration : This result of true Volume is referred to standard temperature at 20 °C

UUC Condition As-Received : Good

Nominal Volume ( ml )	Measuring Volume ( ml )
500	500.75
1000	1000.66

Uncertainty of measurement with in  $\pm$  0.17 ml

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

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

- o0o -





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



Envilab & Needless Supply Instrument

## TSP High Volume Sampler Calibration

Verification Report No.

A6702 -TSP 02

☒ PM ☐ Onsite

Site: บริษัท เอ็นไวแล็บ จำกัด

UTM : 47P N1514475 E654269

Sampler: NTSP-07

Recorder: NCRTI500903158

Date: 1 Feb 24

Technical: Sanayu J.

Approval: Wisan R.

### CONDITIONS

Barometric Press. (hPa): 1008.4

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 756.4

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

### CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 5411

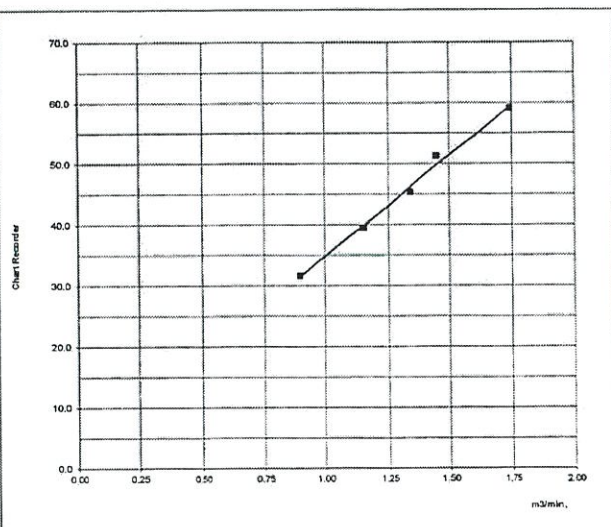
Qstd Slope: 2.02024

Qstd Intercept: -0.02667

Date Certified: 9 Feb 25

### CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	12.34	1.728	56.0	55.22	Slope = 26.8716
2	9.61	1.526	52.0	51.28	Intercept = 8.8405
3	8.35	1.424	46.0	45.36	Corr. coeff. = 0.9916
4	5.23	1.129	40.0	39.44	# of Observations: 5
5	3.41	0.915	34.0	33.53	Range of Chart at 1.1 - 1.7 m3/min. 39
					55



Calibrated by :

( Sanayu Jantasorn )  
1 February 2024

Approved by :

( Wisan Ritthikamon )  
1 February 2024

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Environmental responsibility with accuracy measurement

FE-MNT-25 Rev.00/08/63

บริษัท เอ็นไวแล็บ จำกัด  
540,540/1 ซอยบางแค 7 แขวงบางแค เขตบางแค กรุงเทพฯ 10160



รับรองสำเนาถูกต้อง  
ผู้จัดการฝ่ายควบคุมคุณภาพ

**neediss**บริษัท นีดิส ซัพพลาย อินสตรูเมนต์ จำกัด  
Neediss Supply Instrument Co., Ltd.536 ซอยวิภาวดี 7 แขวงวิภาวดี เขตวิภาวดี กรุงเทพมหานคร 10160 536 Soi Bangkhoe 7 Bangkhoe Bangkok  
Tel. 02-402-3980-2 Fax 02-602-3988 E-mail: neediss.com

## Verification Report of Ambient Air Sampling



PM



Onsite UTM :

Report No :

6702014

Instrument :

PM-2.5 Sampler SINGLE

Validation Date:

1-Feb-24

Manufacturer :

Tisch Environmental

Model :

TE-Wilbur 2.5

Serial/ID No. :

EP2TIWILBU0481

Environment :

Humidity(%RH) :

62

Temperature (°C) :

25.9

Pressure (mmHg) :

745

### Reference Standard:

Temperature Calibrator : DIGICON, model: CC-VTR-SH, Serial No.091109269

Flow Calibrator: Mesalabs Defender, model : 520-H , Serial No.164578

Leak Test :

Pass

### Diagnostic Check:

PM-10 Inlet	PM-2.5 Size Selective	Filter Cassette	Fan	Valve	Pump %
Pass	Pass	Pass	Pass	Pass	Pass

### Result of Instrument Validation :

Calibrator Simulator					Temperature Measurement	
Temperature Audit and Adjust with Calibrator ( °C )					Instrument	Reference
Set point	-10.0	0.0	20.0	45.0	Reading( Avg.)	TC Reading
ambient	-10.0	0.0	20.0	45.0	25.0	24.9
Filter	-10.0	0.0	20.0	45.0	29.6	29.5

### Flow Control :

Calibration mode : AMB Flow Device

Flow set : 16.67 LPM

Avg. Pressure at Ref. : 746 mmHg.

Flow Measure (Avg.)	Flow Calibrator(Avg.10)	Flow Difference
16.67 LPM	16.78 LPM	-0.11 LPM

**neediss**

Neediss Supply Instrument Co.,Ltd.

Engineer :

Sirirat Poonlak

Approve By:

Sarawut Keawsrinual

Issu Date:

1-Feb-24

Date:

1-Feb-24



Envilab Co.,Ltd.

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ผู้จัดการฝ่ายควบคุมคุณภาพ

**neediss**บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด  
Neediss Supply Instrument Co., Ltd.536 ซอยบางแค 7 แขวงบางแค เขตบางแค กรุงเทพฯ 10160 536 Soi Bangkhae 7 Bangkhae Bangkok Bangkok  
Tel. 02-802-3980-2 Fax. 02-802-3988 E:info@neediss.com

## SO<sub>2</sub> Analyzer Verification Test Report

Calibration Report No.: 6702005

Page:1/1

Calibrated Date: 1-Feb-24

☒ PM ☐ Onsite

### Instruments Information

Analyzer Type: SO <sub>2</sub> Analyzer Model: THERMO_43C	Manufacturer THERMO S/N: ESOTE43C069871
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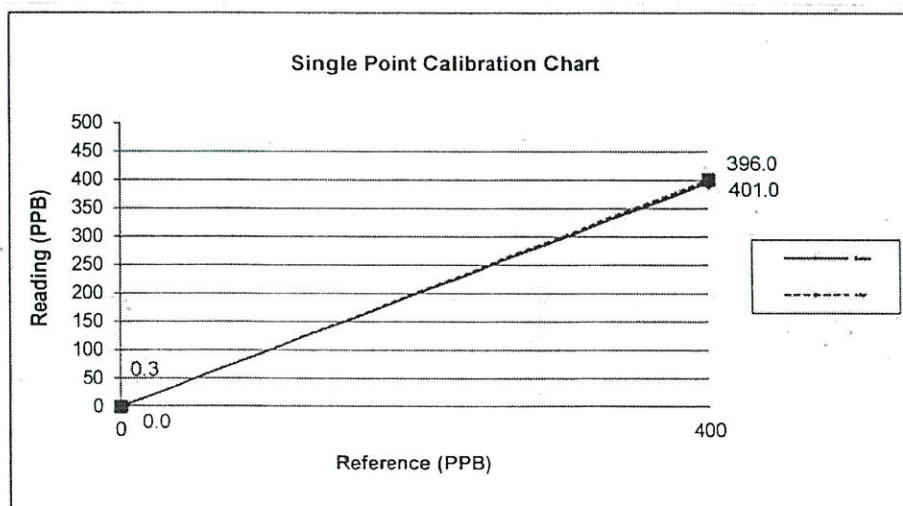
### Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO <sub>x</sub> Conc 46.50 PPM NO Conc 46.50 PPM SO <sub>2</sub> Conc 45.59 PPM CO Conc 4507 PPM Expire Date: Mar 31,2026 EB0160267

Environment: Temperature 26.9 °CHumidity: 64 %RH

### Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.3	0.3	400.0	396	-1.0
After	0.0	0.0	0.0	400.0	401	0.3



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Neediss Supply Instrument Co., Ltd.536 ซอยบางพลี 7 แขวงบางพลี เขตบางพลี กรุงเทพฯ 10160 536 Soi Bangkhoe 7 Bangkhoe Bangkok Bangkok  
Tel. 02-802-3980-2 Fax: 02-802-3988 E: info@neediss.com**NOx Analyzer Verification Test Report**

Calibration Report No.: 6702004

Page:1/2

Calibrated Date: 1-Feb-24

☒ PM ☐ Onsite**Instruments Information**

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42CD75279
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**Calibration System**

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NOx Conc 46.50 PPM NO Conc 46.50 PPM SO2 Conc 45.59 PPM CO Conc 4507 PPM Expire Date: Mar 31,2026 EB0160267

Environment: Temperature 26.9 °C

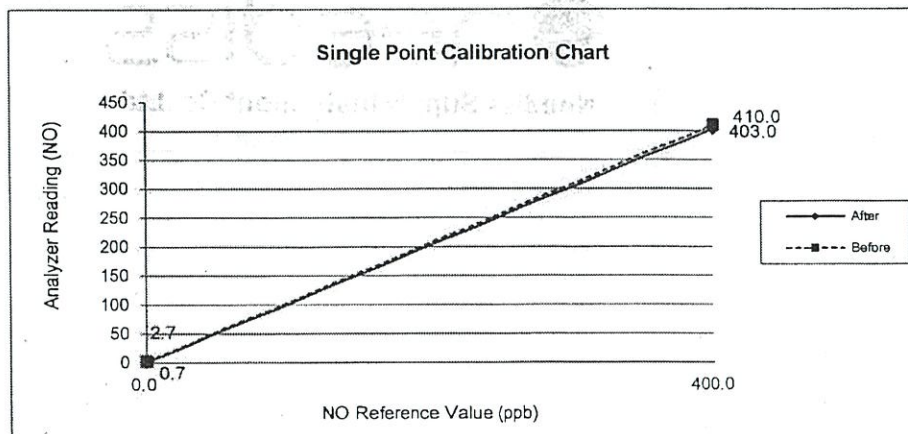
Humidity: 66 %RH

**Calibration Check ( Before adjust )**

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	2.7	0.0	2.7	410	400.0	1.2
NO <sub>2</sub>	0.5	0.0	0.5	2.0	0.0	0.2
NOx	3.2	0.0	3.2	412	400.0	1.5

**Calibration 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	403	400.0	0.4
NO <sub>2</sub>	0.3	0.0	0.3	2.0	0.0	0.2
NOx	1.0	0.0	1.0	405	400.0	0.6



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Envilab Co., Ltd. 540,540/1 Soi Bangkhae 7 Bangkhae Bangkok Bangkok 10160  
Tel : 02-802-3577-8 Fax. 02-802-3773 E-mail : info@evltesting.com



Envilab & Neediss Supply Instrument

## Verification Test Report

Report No.:

CONDO -SLM 07

☒ PM

☐ Onsite UTM :

47P N 1514455 E 654248

Calibrated Date: 1 February 2024

Site : บริษัทเอ็นไวแล็บ จำกัด

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0024

Environment: Temperature 25 °C Humidity 65 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer

Serial No.1351075

Date of Calibration : 16 March 2023

### Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.78	93.81	0.03	93.78

Calibrated By:

( Sanayu Jantason )

Date:

1 February 2024

Approve By:

( Wisan Ritthikamon )

Date:

1 February 2024

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Envilab Co., Ltd. 540,540/1 Soi Bongkhoe 7 Bongkhoe Bangkok Bangkok 10160  
Tel : 02-802-3577-8 Fax. 02-802-3773 E-mail : info@evltesting.com



Envilab & Needles Supply Instruments

## TSP High Volume Sampler Calibration

Verification Report No.

A6702 -TSP 01

<input checked="" type="checkbox"/> PM <input type="checkbox"/> Onsite	Site: บริษัท เอ็นไวแล็บ จำกัด	Date: 1 Feb 24
	UTM : 47P N1514475 E654269	Technical: Sanayu J.
	Sampler: NTSP-19	Approval: Wisan R.
	Recorder: ECRANG15315224	

### CONDITIONS

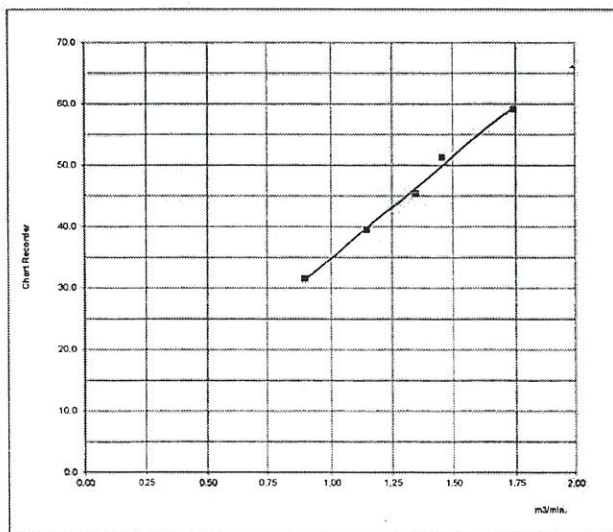
Barometric Press. (hPa): 1008.4	Corrected Pressure (mm Hg): 756.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

### CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Qstd Slope: 2.02024
Model: TE-5025A	Qstd Intercept: -0.02667
Serial#: 5411	Date Certified: 9 Feb 25

### CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	12.54	1.742	60.0	59.17	Slope = 33.2315
2	8.69	1.452	52.0	51.28	Intercept = 1.6235
3	7.42	1.343	46.0	45.36	Corr. coeff. = 0.9966
4	5.42	1.150	40.0	39.44	# of Observations: 5
5	3.26	0.894	32.0	31.55	Range of Chart 39
					at 1.1 - 1.7 m3/min. 58



Calibrated by :   
( Sanayu Jantasorn )  
1 February 2024

Approved by :   
( Wisan Ritthikamon )  
1 February 2024

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FE-MHT-25 Rev.00/01/08/63



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ผู้จัดการฝ่ายควบคุมคุณภาพ



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บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด  
Neediss Supply Instrument Co., Ltd.

535 ซอย บางหว้า 7 แขวงบางหว้า เขตภาษีเจริญ กรุงเทพฯ 10160 535 Soi Bangkhuae 7 Bangkhuae Bangkok Bangkok  
Tel. 02-602-2760-2 Fax. 02-602-3798 E-mail: info@neediss.com



## Verification Report of Ambient Air Sampling



PM



Onsite UTM :

Report No :

6702015

Instrument :

PM-2.5 Sampler SINGLE

Validation Date:

1-Feb-24

Manufacturer :

Tisch Environmental

Model :

TE-Wilbur 2.5

Serial/ID No. :

EP2TIWILBU0482

Environment :

Humidity(%RH) :

62

Temperature (°C) :

25.8

Pressure (mmHg) :

745

### Reference Standard:

Temperature Calibrator : DIGICON, model: CC-VTR-SH, Serial No.091109269

Flow Calibrator: Mesalabs Defender, model : 520-H, Serial No.164578

Leak Test :

Pass

### Diagnostic Check:

PM-10 Inlet	PM-2.5 Size Selective	Filter Cassette	Fan	Valve	Pump %
Pass	Pass	Pass	Pass	Pass	Pass

### Result of Instrument Validation :

Calibrator Simulator					Temperature Measurement	
Temperature Audit and Adjust with Calibrator (°C )					Instrument	Reference
Set point	-10.0	0.0	20.0	45.0	Reading( Avg.)	TC Reading
ambient	-10.0	0.0	20.0	45.0	25.0	24.9
Filter	-10.0	0.0	20.0	45.0	29.6	29.5

### Flow Control :

Calibration mode : AMB Flow Device

Flow set : 16.67 LPM

Avg. Pressure at Ref. : 746 mmHg.

Flow Measure (Avg.)	Flow Calibrator(Avg.10)	Flow Difference
16.67 LPM	16.68 LPM	-0.01 LPM

neediss

Neediss Supply Instrument Co., Ltd.

Engineer :

*Sirirat*

Sirirat Poonlak

Approve By:

*Sarawut*

Sarawut Keawsrinual

Issu Date:

1-Feb-24

Date:

1-Feb-24



Envilab Co., Ltd.

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## NOx Analyzer Verification Test Report

Calibration Report No.: 6702002

Page:1/2

Calibrated Date: 1-Feb-24

☒ PM ☐ Onsite

### Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42C671356
--	--

### Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NOx Conc 46.50 PPM NO Conc 46.50 PPM SO2 Conc 45.59 PPM CO Conc 4507 PPM Expire Date: Mar 31,2026 EB0160267

Environment: Temperature 26.8 °C

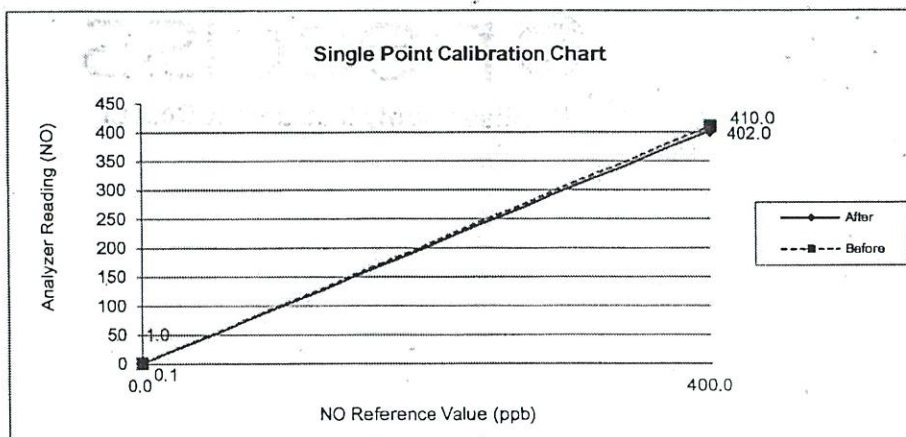
Humidity: 64 %RH

### Calibration Check ( Before adjust )

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	1.0	0.0	1.0	410	400.0	1.2
NO <sub>2</sub>	1.8	0.0	1.8	4.0	0.0	0.5
NOx	2.8	0.0	2.8	414	400.0	1.7

### Calibration Check ( After adjust )

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.1	0.0	0.1	402	400.0	0.2
NO <sub>2</sub>	0.4	0.0	0.4	2.0	0.0	0.2
NOx	0.5	0.0	0.5	404	400.0	0.5



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Envilab Co., Ltd. 540,540/1 Soi Bangkhoe 7 Bangkhoe Bangkhoe Bangkok 10160  
Tel : 02-802-3577-8 Fax. 02-802-3773 E-mail : info@evltesting.com



Envilab & Neediss Supply Instrument

## Verification Test Report

Report No.:

CONDO -SLM 03

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

Calibrated Date: 1 February 2024

Site : บริษัทเอ็นไวแล็บ จำกัด

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0015

Environment: Temperature 25 °C Humidity 65 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer

Serial No.1351075

Date of Calibration : 16 March 2023

### Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.78	93.80	0.02	93.78

Calibrated By:

( Sanayu Jantason )

Date:

1 February 2024

Approve By:

( Wisan Ritthikamon )

Date:

1 February 2024

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Envilab Co., Ltd. 540,540/1 Soi Bangkhae 7 Bangkhoe Bangkhoe Bangkok 10160  
Tel : 02-802-3577-8 Fax. 02-802-3773 E-mail : info@evltesting.com



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## Verification Test Report

Report No.:

CONDO -SLM 08

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

Calibrated Date: 1 February 2024

Site : บริษัทเอ็นไวแล็บ จำกัด

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0027

Environment: Temperature 25 °C Humidity 65 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer


Serial No.1351075

Date of Calibration : 16 March 2023

### Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.78	93.81	0.03	93.78


Calibrated By:

  
( Sanayu Jantason )

Date:

1 February 2024

Approve By:

  
( Wisan Ritthikamon )

Date:

1 February 2024

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Envilab Co., Ltd. 540,540/1 Soi Bangkhoe 7 Bangkhoe Bangkok Bangkok 10160  
Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



Envilab & Needles Supply Instrument

### TSP High Volume Sampler Calibration

Verification Report No.

A6702-TSP 03

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: บริษัท เอ็นโวลแล็บ จำกัด	
UTM : 47P N1514475 E654269	
Sampler: ETSP#16	
Recorder: ECRANG15315224	
Date: 1 Feb 24	
Technical: Sanayu J.	
Approval: Wisan R.	

#### CONDITIONS

Barometric Press. (hPa): 1008.4  
Temperature (deg C): 32.0  
Average Press. (hPa): 1013.0  
Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 756.4  
Temperature (deg K): 305.0  
Corrected Avg.Press. (mm Hg): 759.8  
Average Temp. (deg K): 303.0

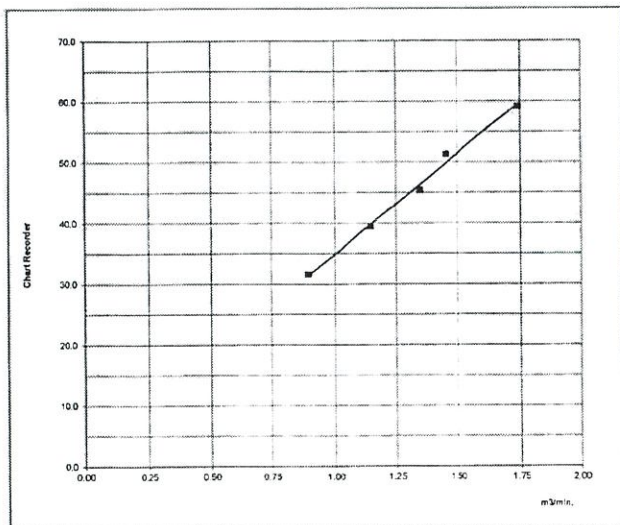
#### CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc  
Model: TE-5025A  
Serial#: 5411

Qstd Slope: 2.02024  
Qstd Intercept: -0.02667  
Date Certified: 9 Feb 25

#### CALIBRATIONS

Plate or Test #	H <sub>2</sub> O (in)	Qstd (m <sup>3</sup> /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	13.26	1.791	54.0	53.25	Slope = 24.0261
2	10.68	1.608	48.0	47.33	Intercept = 8.9715
3	8.23	1.413	42.0	41.42	Corr. coeff.= 0.9909
4	5.22	1.128	36.0	35.50	
5	3.25	0.893	32.0	31.55	
					# of Observations: 5
					Range of Chart at 1.1 - 1.7 m <sup>3</sup> /min. 36 50



Calibrated by :

( Sanayu Jantasom )  
1 February 2024

Approved by :

( Wisan Ritthikamon )  
1 February 2024

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ตามมาตรฐานสากล



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536 ซอยบางเขน 7 แขวงบางเขน เขตบางเขน กรุงเทพฯ 10160 536 Soi Bangkhae 7 Bangkok Bangkhae Bangkok  
Tel. 02-802-3766-2 Fax 02-802-3768 E-mail: neediss@neediss.co.th



## Verification Report of Ambient Air Sampling



PM



Onsite UTM :

Report No :

6701016

Instrument :

PM-2.5 Sampler SINGLE

Validation Date:

1-Feb-24

Manufacturer :

Met one

Model :

E-FRM PM 2.5

Serial/ID No. :

NP2MOEFRM16425

Environment :

Humidity(%RH) :

59

Temperature (°C) :

23.7

Pressure (mmHg) :

745

### Reference Standard:

Temperature Calibrator : DIGICON, model: CC-VTR-SH, Serial No.091109269

Flow Calibrator: Mesalabs Defender, model : 520-H , Serial No.164578

Leak Test :

Pass

### Diagnostic Check:

PM-10 Inlet	PM-2.5 Size Selective	Filter Cassette	Fan	Valve	Pump %
Pass	Pass	Pass	Pass	Pass	Pass

### Result of Instrument Validation :

Calibrator Simulator					Temperature Measurement	
Temperature Audit and Adjust with Calibrator ( °C )					Instrument	Reference
Set point	-10.0	0.0	20.0	45.0	Reading( Avg.)	TC Reading
ambient	-10.0	0.0	20.0	45.0	25.0	24.9
Filter	-10.0	0.0	20.0	45.0	29.6	29.5

### Flow Control :

Calibration mode : AMB Flow Device

Flow set : 16.67 LPM

Avg. Pressure at Ref. : 746 mmHg.

Flow Measure (Avg.)	Flow Calibrator(Avg.10)	Flow Difference
16.67 LPM	16.59 LPM	0.08 LPM

Engineer :

Sirirat Poonlak

**neediss**

Neediss Supply Instrument Co., Ltd.

Approve By:

Sarawut Keawsrinual

Issu Date:

1-Feb-24

Date:

1-Feb-24



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Neediss Supply Instrument Co., Ltd.  
536 ซอยบางแค 7 แขวงบางแค เขตบางแค กรุงเทพฯ 10160 536 Soi Bangkhae 7 Bangkhae Bangkok Bangkok  
Tel. 02-802-3980-2 Fax. 02-802-3988 Email: neediss.com



## SO<sub>2</sub> Analyzer Verification Test Report

Calibration Report No.: 6702008

Page:1/1

Calibrated Date: 1-Feb-24

☒ PM ☐ Onsite

### Instruments Information

Analyzer Type: SO <sub>2</sub> Analyzer Model: THERMO.,43C	Manufacturer THERMO S/N: ESOTE43C703317
---	--

### Calibration System

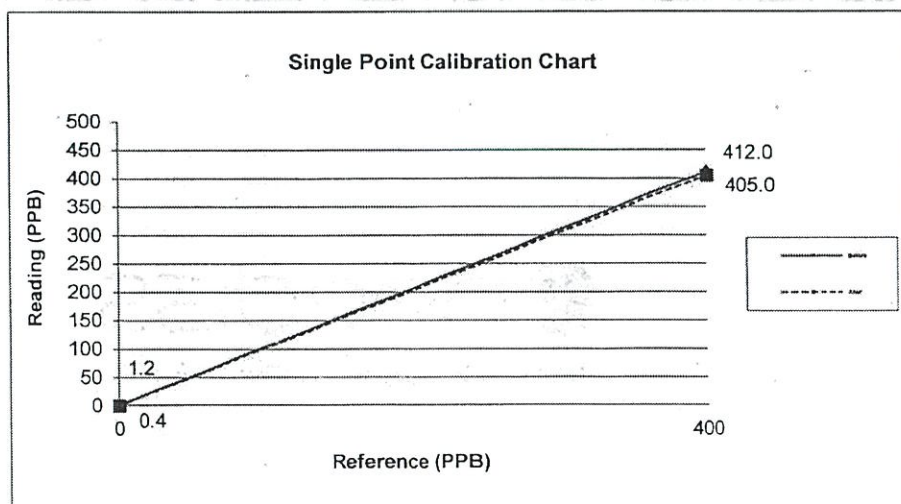
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NOx Conc 46.50 PPM NO Conc 46.50 PPM SO <sub>2</sub> Conc 45.59 PPM CO Conc 4507 PPM Expire Date: Mar 31,2026 EB0160267

Environment: Temperature 26.8 °C

Humidity: 62 %RH

### Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	1.2	1.2	400.0	412	3.0
After	0.0	0.4	0.4	400.0	405	1.3



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## NOx Analyzer Verification Test Report

Calibration Report No.: 6702005

Page:1/2

Calibrated Date: 1-Feb-24

☒ PM ☐ Onsite

### Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42C497375
--	--

### Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NOx Conc 46.50 PPM NO Conc 46.50 PPM SO2 Conc 45.59 PPM CO Conc 4507 PPM Expire Date: Mar 31,2026 EB0160267

Environment: Temperature 26.9 °C

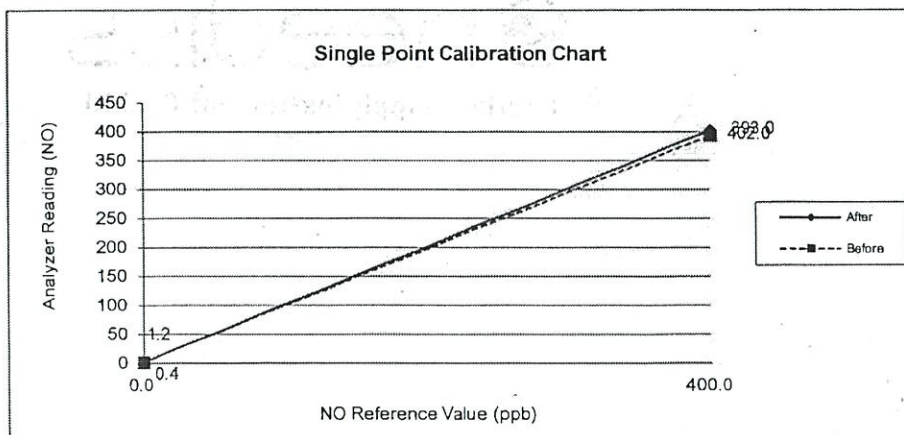
Humidity: 65 %RH

### Calibration Check ( Before adjust )

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	1.2	0.0	1.2	393	400.0	-0.9
NO <sub>2</sub>	0.8	0.0	0.8	2.0	0.0	0.3
NOx	2.0	0.0	2.0	395	400.0	-0.6

### Calibration Check ( After adjust )

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.4	0.0	0.4	402	400.0	0.2
NO <sub>2</sub>	0.1	0.0	0.1	1.0	0.0	0.1
NOx	0.5	0.0	0.5	403	400.0	0.4



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Envilab Co., Ltd. 540,540/1 Soi Bangkhoe 7 Bangkhoe Bangkok Bangkok 10160  
Tel : 02-802-3577-8 Fax. 02-802-3773 E-mail : info@evltesting.com



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## Verification Test Report

Report No.:

CONDO -SLM 09

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

Calibrated Date: 1 February 2024

Site : บริษัทเอ็นไวแล็บ จำกัด

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0033

Environment: Temperature 25 °C Humidity 65 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer

Serial No.1351075

Date of Calibration : 16 March 2023

### Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.78	93.81	0.03	93.78

Calibrated By:

( Sanayu Jantason )

Date:

1 February 2024

Approve By:

( Wisan Ritthikamon )

Date:

1 February 2024

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## Certificate of Calibration

### Calibration Certification Information

Cal. Date: February 9, 2024      Rootsmeter S/N: 438320      Ta: 295 °K  
 Operator: Jim Tisch      Pa: 749.0 mm Hg  
 Calibration Model #: TE-5025A      Calibrator S/N: 5411

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3950	3.2	2.00
2	3	4	1	0.9840	6.4	4.00
3	5	6	1	0.8790	7.9	5.00
4	7	8	1	0.8430	8.8	5.50
5	9	10	1	0.6940	12.7	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)
0.9914	0.7106	1.4111	0.9957	0.7138	0.8875
0.9871	1.0032	1.9956	0.9915	1.0076	1.2551
0.9851	1.1207	2.2312	0.9895	1.1257	1.4033
0.9839	1.1672	2.3401	0.9883	1.1723	1.4718
0.9787	1.4103	2.8222	0.9830	1.4165	1.7750
<b>QSTD</b>	m=	<b>2.02024</b>	<b>QA</b>	m=	<b>1.26504</b>
	b=	<b>-0.02667</b>		b=	<b>-0.01677</b>
	r=	<b>0.99993</b>		r=	<b>0.99993</b>

### Calculations

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

### For subsequent flow rate calculations:

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

### Standard Conditions

Tstd: 298.15 °K  
 Pstd: 760 mm Hg

### Key

ΔH: calibrator manometer reading (in H2O)  
 ΔP: rootsmeter manometer reading (mm Hg)  
 Ta: actual absolute temperature (°K)  
 Pa: actual barometric pressure (mm Hg)  
 b: intercept  
 m: slope

### RECALIBRATION

US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30

# CAL

Calibratech Co.,Ltd.

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

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

## Certificate of Calibration

Certificate No. : 67-200034-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

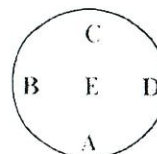
Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty $\pm$ (g)
0.01	0.0001	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  
-0.0001 -0.0001 -0.0001 0.0001 0.0000      g

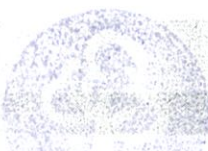


Repeatability      Load test :      200      g  
Stdev. :      0.00005      g

- o0o -

ABJ

CAL-F0031-03



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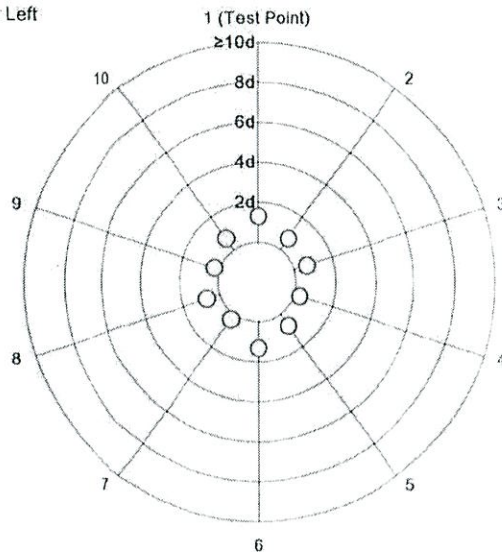
## Measurement Results

### Repeatability

Test Load: 1 g

	As Found	As Left
1	0.999992 g	N/A
2	0.999994 g	N/A
3	0.999994 g	N/A
4	0.999993 g	N/A
5	0.999994 g	N/A
6	0.999992 g	N/A
7	0.999993 g	N/A
8	0.999994 g	N/A
9	0.999993 g	N/A
10	0.999994 g	N/A
Standard Deviation	0.0000008 g	N/A

○ As Found  
◆ As Left



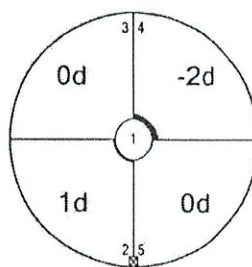
The "d" in the graph represents the readability of the range/interval in which the test was performed.

The results of this graph are based upon the absolute values of the differences from the mean value.

### Eccentricity

Test Load: 1 g

Position	As Found	As Left
1	0.999992 g	N/A
2	0.999993 g	N/A
3	0.999992 g	N/A
4	0.999990 g	N/A
5	0.999992 g	N/A
Maximum Deviation	0.000002 g	N/A



As Found

The "d" in the graph represents the readability of the range/interval in which the test was performed.

FACT adjustment functionality activated  
Equipment condition: Good  
Next calibration according to customer's procedure  
Calibration data not decide by calibration laboratory

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

# GWP® Certificate



As  
Found



As  
Left



The weighing device meets the given  
process requirements.

The weighing device meets the given  
process requirements.

Tests Performed: ☒ As Found ☐ As Left ☒ No adjustments/modifications made. As Left results correspond to As Found.

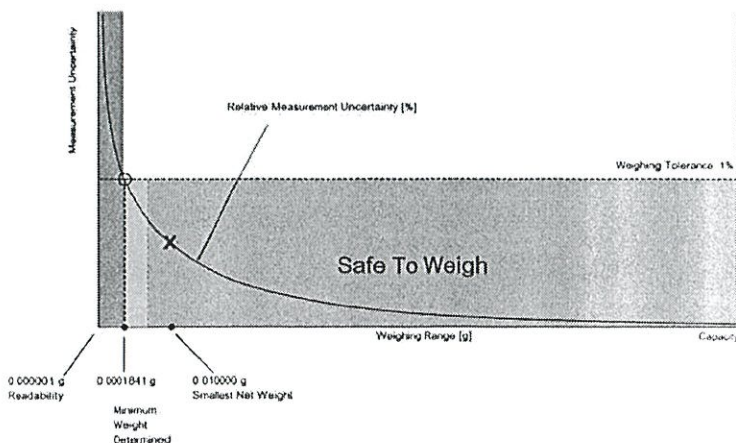
## Process Requirements

Weighing Tolerance: 1%

Smallest Net Weight: 0.010000 g

Safety Factor: 2

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.

## Measurement Results

### Results Summary

	Repeatability	Eccentricity	Error of Indication
As Found	✓	✓	✓
As Left	✓	✓	✓

✓ = Passed

✗ = Failed

⚠ = Safety Factor not met

### Repeatability

Test Load: 1 g

Tolerance	Control Limit	As Found		As Left	
		Std. Deviation	Result	Std. Deviation	Result
0.1%	0.0000050 g	0.0000008 g	✓	0.0000008 g	✓
0.2%	0.0000100 g		✓		✓
0.5%	0.0000250 g		✓		✓
1%	0.0000500 g		✓		✓
2%	0.0001000 g		✓		✓
5%	0.0002500 g		✓		✓

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

### Eccentricity

Test Load: 1 g

Tolerance	Control Limit	As Found		As Left	
		Deviation	Result	Deviation	Result
0.1%	0.000500 g	0.000002 g	✓	0.000002 g	✓
0.2%	0.001000 g		✓		✓
0.5%	0.002500 g		✓		✓
1%	0.005000 g		✓		✓
2%	0.010000 g		✓		✓
5%	0.025000 g		✓		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

Service Date: 2022-03-24  
 Document Number: TH2055-721-032422-LABBalanceHR  
 EnviLab Co., Ltd.  
 540, 540/1 Soi Bang Khae 7, Bang Khae, Bangkok 10160  
 Arpornrat Aphidet

# METTLER TOLEDO

## Balance Health Report

### Device Details

System Details			
Manufacturer:	Mettler Toledo	Accessory 1:	
Model:	XPR2	Accessory 2:	
Serial number:	C011158261	Weight set for routine testing:	Yes /
Firmware:	2.0.205.6		

### History

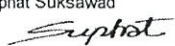
Device History		Service History	
Instrument in use:	Yes	Last preventive maintenance:	1-3 years
Instrument age:	< 3 years	Last instrument calibration:	1-3 years
Spare parts available:	Yes	Last minimum weight determination:	
Regulations:	ISO		
Process tolerance in %:	1%	Routine testing performed:	Yes
Smallest sample net weight:	0.001g		

### Check List

Environmental Conditions		General & Functional Checks	
Room temperature fluctuation	✓	Levelling	✓
Exposure to direct sun	✓	Cleanliness	✓
Vibrations	✓	Completeness - missing parts see additional remarks	✓
Draft	✓	Settings optimized for operating environment	✓
Dirt or dust	✓	Other - objections noted as additional remarks	—
Static	✓	Electrical Component Checks	
Mechanical Component Checks		Power supply	✓
Draft shield	✓	Sliding door drive	✓
Weighing pan position	✓	Internal weight drive	✓
Housing	✓	Display	✓
Other - objections noted as additional remarks	—	Other - objections noted as additional remarks	—

### Recommendations

Measurement Result Quality		Process Efficiency	
Instrument calibration		Uninstall instrument	
Identify safe weighing range		Replace instrument	
GWP verification / risk assessment		Replace / add parts (see additional remarks)	
Preventive maintenance		Onsite repair	
Perform routine testing with test weights		Depot repair	
User training		Use of accessories (see additional remarks)	

Contact	Name: Arpornrat Aphidet	Position: N/A	Phone: 098-8973884	Email: Tec@evtesting.com
Additional Remarks & Recommendations			Engineer Details	
			Date: 24-Mar-2022	
			Name: Suphat Suksawat	
			Signature: 	

This is not a certificate.

It should not be used to interpret final results for the testing of these devices.

Legend: ✓ Good/Pass    ⚠ Needs Attention    ✗ Bad/Fail    — Not Applicable



รับรองสำเนาถูกต้อง  
 ผู้จัดการฝ่ายควบคุมคุณภาพ

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0148

MTC No. EEL. BP. 28/1266

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 $\mu$ Pa at 1000 Hz

Acoustic Output in dB re 20 $\mu$ 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	94.10	0.10	$\pm 0.10$	$\pm 0.40$ 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	1000.5	0.5	$\pm 1.5$	$\pm 1.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1.65	$\pm 0.50$	$\pm 3.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Date of Calibration : 18 Dec. 2023

2 / 1

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.

FM.BL.MTC.002 Rev.4

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

Office/Laboratory  
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,  
Amphoe Muang, Changwat Samutprakan 10180, Thailand  
Tel. (66) 0 2373 1672-80 ext. 111-113  
Fax. (66) 0 2373 1665  
E-mail : mtc@tistr.or.th

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




รับรองสำเนาถูกต้อง  
ผู้จัดการฝ่ายควบคุมคุณภาพ

# SINGLE-POINT CALIBRATION REPORT

Customer : Envilab  
Application : AQMS AND CEMs  
Location (s) : Environmental Solution Integrator Co., Ltd.

Calibration Date : 9/06/2023  
Calibration Time : 14.00  
Calibrated by : Environmental Solution Integrator Co., Ltd.

Gas Measurement	: CH4,HCNM,THC
Measuring Range	: 0-1000 PPM
Cylinder ID Number	: EB0109077
Certification Date	: Mar 28,2019
Expiry Date	: Mar 28,2027
K	: before calibration CH4 : 1.325
K	: after calibration CH4 : 1.395
CH4 Reading	: before calibration : 1.98
	: after calibration : 2.15

Manufacturer	 Environnement S.A. L'Instrumentation de l'Environnement
Analyzer Model	: HC51M
Serial Number	: 845
Note	: GAS METHANE CONC 454.9 PPM

## Zero Calibration

Gas	Before Calibration		
	Zero Adjustment	Reading	Result
CH4	0	0	PASS
Note			

After Calibration		
Zero Adjustment	Reading	Result
0	0	PASS
Note		

## Span Calibration

Gas	Before Calibration		
	K	Reading	Result
CH4	1.325	9.52	PASS
Note			

After Calibration		
K	Reading	Result
1.395	10.01	PASS
Note		
Expect 10.0 PPM		

Remark :

Performed by

Taichandhi

Service Engineer

Approved by

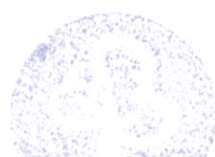
Tenaday Sangthong

Service Manager

Environmental Solution Integrator Co.,Ltd.

82/42 Moo.19 Phutharmonthon Sai2 Road, Sala Thammasop, Thawi Watthana, Bangkok 10170

Phone: 0-2408-2042 • Fax: 0-2408-2043 • www.esithailand.com

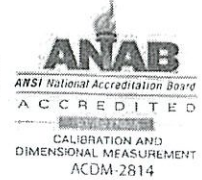




CLC  
Accredited  
ISO/IEC 17025

# CALIBRATION LABORATORY Co., LTD.

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



Supplement to Calibration Certificate No. Q23101517

## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : VIBRATION METER  
MANUFACTURER : INSTANTEL  
MODEL / TYPE : 721A2601  
SERIAL NO. : UM11737/UM11737 [EVMINMMATE1737]  
CLID. NO. : 252301795  
JOB CONTROL NO. : 230913101517

CUSTOMER : ENVILAB CO., LTD. (HEAD OFFICE)

540, 540/1 SOI BANGKHAE 7,

BANGKHAE, BANGKHAE, BANGKOK 10160

DATE OF RECEIVED : 13 September 2023

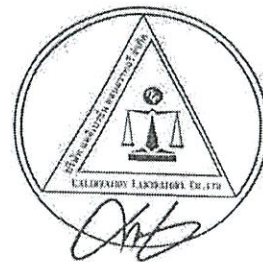
DATE OF ISSUED : 30 September 2023

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

Calibrated By :

Suwit Phuanbusabong

Calibration Engineer



Approved By :

Mongkol Yotsoontorn

Authorized Signatory

30 September 2023

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

Certificate No. Q23101517A1

F3-012-04/01-12

page 1 of 3

บริษัท แอลบีซี จำกัด  
2560-2561



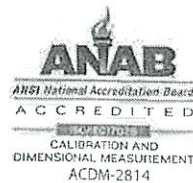
รับรองสำเนาถูกต้อง  
ผู้จัดการฝ่ายควบคุมคุณภาพ





# CALIBRATION LABORATORY CO., LTD.

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



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment

## CALIBRATION DATA

### VELOCITY RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
( mm/s )	( frequency )		( mm/s )	( mm/s )	( mm/s )	± ( % of rdg. )
10.000	160 Hz	peak	10.000	10.125	-0.125	1.8
20.000	160 Hz		20.000	20.156	-0.156	1.8
30.000	160 Hz		30.000	30.189	-0.189	1.8
40.000	160 Hz		40.000	40.215	-0.215	1.0
50.000	160 Hz		50.000	50.269	-0.269	1.0

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

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

### End of Certificate ###

Certificate No. Q23101517

F3-011-04/01-12

page 3 of 3



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ผู้จัดการฝ่ายควบคุมคุณภาพ

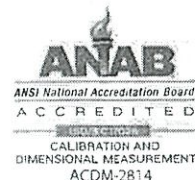




CLC  
Accredited  
ISO/IEC 17025

# CALIBRATION LABORATORY Co., LTD.

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



## REPORT OF CALIBRATION FOR

NOMENCLATURE	:	VIBRATION METER
MANUFACTURER	:	INSTANTEL
MODEL / TYPE	:	721A2601/721A3301
SERIAL NO.	:	UM13338/UM13338 [EVMINMMATE3338]
DATE OF CALIBRATION	:	14 September 2023

### ENVIRONMENT CONDITIONS :

Temperature :  $(23 \pm 2) ^\circ\text{C}$

Relative Humidity :  $(55 \pm 15) \% \text{RH}$

### PROCEDURE USED :

This instrument was calibrated under procedure No. **CLC-CPEE-08** based on **ISO 16063-21** as calibration guideline.

The calibration was performed by using Digital Multimeter, Programmable Timer/Counter and Accelerometer with Conditioning Amplifier which maintained by the Calibration Laboratory Co., Ltd.

### REFERENCE STANDARD USED :

1. Digital Multimeter, Hewlett Packard Model 34401A S/N. 3146A75935.
2. Programmable Timer/Counter, Philips Model PM6680B S/N. SM607101.
3. Accelerometer with Conditioning Amplifier, Bruel & Kjaer Model 8305, 2626 S/N. 705491, 1741406.

### TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. EE-0136-22, Due Date 11 November 2023.
2. The measurements are traceable to International System of Units (SI), through Aeronautical Radio of Thailand Ltd. Certificate No. 07-0043/23, Due Date 12 April 2024.
3. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. AV-0025-22, Due Date 12 October 2023.

### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2,00$  which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. **Q23101518**

F3-011-04/01-12

page 2 of 3



รับรองสำเนาถูกต้อง  
ผู้จัดการฝ่ายควบคุมคุณภาพ





# CALIBRATION LABORATORY Co., LTD.

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



## CERTIFICATE OF CALIBRATION FOR

NOMENCLATURE	:	VIBRATION METER
MANUFACTURER	:	INSTANTEL
MODEL / TYPE	:	721A2601/721A3301
SERIAL NO.	:	UM16055/UM16055 [NVMINMMATE6055]
CLID. NO.	:	252302143
JOB CONTROL NO.	:	231020117376

CUSTOMER : NEEDISS SUPPLY INSTRUMENT CO., LTD. (HEAD OFFICE)  
536 SOI BANGKHAE 7, BANGKHAE,  
BANGKHAE, BANGKOK 10160

DATE OF RECEIVED : 20 October 2023

DATE OF ISSUED : 26 October 2023

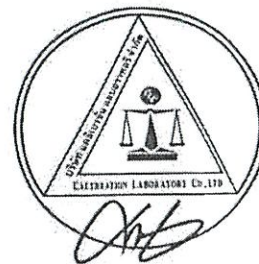
Report of calibration screening must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Suwit Phuanbusabong  
Calibration Engineer

Approved By :

Mongkol Yotsoontorn  
Authorized Signatory  
26 October 2023



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

Certificate No. Q23117376

F3-011-04/01-12

page 1 of 3

บริษัท แอลบี จำกัด  
2/10-11,14,55 ซอย ประเสริฐมนูกิต 29 แขวง 4, ถนน ประเสริฐมนูกิต, เขต ดาดก๊วย, กรุงเทพมหานคร 10230



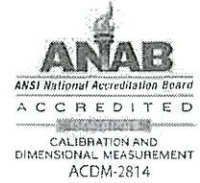
รับรองสำเนาถูกต้อง  
ผู้จัดการฝ่ายควบคุมคุณภาพ





# CALIBRATION LABORATORY CO., LTD.

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



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment

## CALIBRATION DATA

### VELOCITY RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
( mm/s )	( frequency )		( mm/s )	( mm/s )	( mm/s )	$\pm$ ( % of rdg. )
10	160 Hz	peak	10.000	9.945	+0.055	1.9
20	160 Hz		20.000	20.026	-0.026	1.8
30	160 Hz		30.000	30.126	-0.126	1.8
40	160 Hz		40.000	40.256	-0.256	1.8
50	160 Hz		50.000	50.312	-0.312	1.8

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 009 Page 2 of 59

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

### End of Certificate ###

Certificate No. Q23117376

F3-011-04/01-12

page 3 of 3

บริษัท แอลบี จำกัด  
100 ปี 100 ปี 100 ปี



รับรองสำเนาถูกต้อง  
ผู้จัดการฝ่ายควบคุมคุณภาพ



## Certificate of Calibration

Certificate No. : 66-420026-1

Page : 2 of 2

### Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

Performing standard curve by Multiproduct Calibrator at pH (4,7,10)

Adjustment Curve at nominal pH	Applied Voltage ( mV )	Nominal Value ( pH )	UUC Reading		Correction ( mV )	Uncertainty ( ± mV )
			( pH )	( mV )		
4, 7, 10	177.4800	4	4.00	177.5	0.0	0.12
	0.0000	7	7.00	0.0	0.0	0.086
	-177.4800	10	10.00	-177.6	0.1	0.12

Function : pH meter with electrode

Performing a three - buffer standard curve using buffer nominal pH (4,7,10)

Adjustment Curve at nominal pH	Standard Buffer ( pH )	UUC Reading ( pH )	Correction ( pH )	Uncertainty ( ± pH )
4, 7, 10	4.008	4.006	0.002	0.0084
	6.986	7.000	-0.014	0.0094
	10.010	10.008	0.002	0.014

### Remark

UUC : Unit Under Calibration

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

This reported uncertainty of measurment was based on a standard uncertainty multiplied by a coverage factor  $k = 2$  ,  
providing a level of confidence of approximately 95%

- ๐๐๐ -

*(Signature)*



# CAL

Calibratech Co.,Ltd.

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

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

## Certificate of Calibration

Certificate No. : 66-400546-1

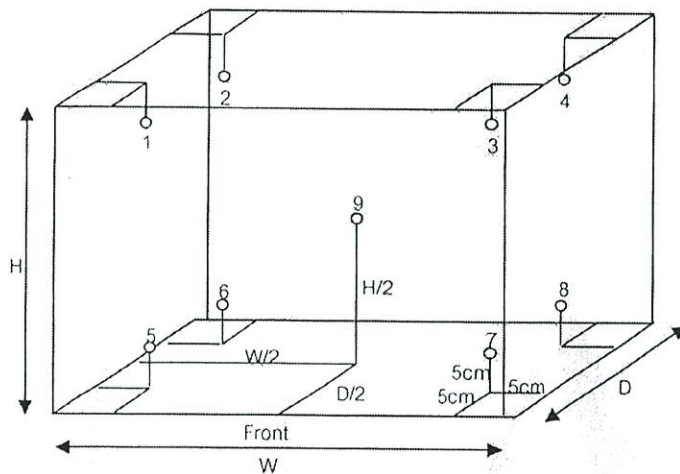
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.38 m

D = 0.35 m

H = 1.15 m

Capacity = 0.15 m<sup>3</sup>

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
20.0	20.0	20.0	20.18	19.98	20.08	19.97	20.39	20.36	20.20	20.18	20.28	0.30

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.0	20.0	0.35	0.03	0.47

Remark The uncertainty is not combine uniformity of the air chamber

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  $k = 2$ , providing a level of confidence of approximately 95%

- o0o -

Handwritten signature





Cert.No.: 23TW79

Page.: 2 of 2

**Condition of this result of calibration**

**1. Reference Standard Instruments :**

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

<u>Instruments</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Burette	-	130BU10	21CG1389	25 Mar 2023
2) Balance	1126143764	140RC004	22MM50	20 Sep 2023

**2. Standard Material :-**

<u>Material</u>	<u>Manufacturer</u>	<u>Lot.No.</u>	<u>Assay</u>
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

**Result :** Dissolved Oxygen Meter Adjustment With Air 100 %

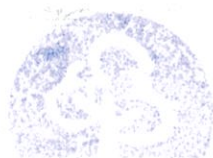
Dissolved Oxygen Probe No.: KC1A01TAF

<b>Titration Method (Azide Modification Method) (mg/L)</b>	<b>DO Meter Reading (mg/L)</b>	<b>Standard Deviation (mg/L)</b>
8.14	8.16	0.0084

This report was certified only for the instrument we tested. It is allowable to use for study the system efficiency, The environmental impact control and present to organization it may concerned. Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced other in full, without written approval of the laboratory

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Malu .



## Certificate of Calibration

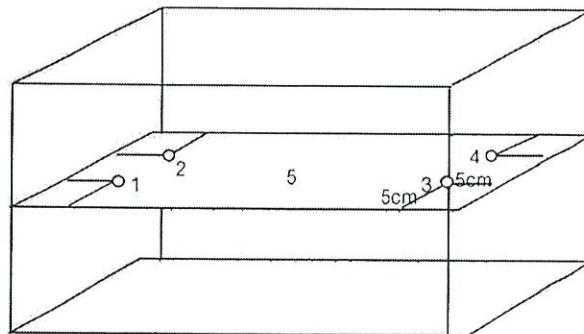
Certificate No. : 67-400054-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point ( ° C )	Setting Temperature ( ° C )	Indicating Temperature ( ° C )	Measured Temperature ( ° C ) @ Sensor					Uncertainty ( ± ° C )	Measured Uniformity ( ° C )	Measured Stability ( ° C )
			No.							
			1	2	3	4	5			
95.0	95.0	95.0	95.38	95.52	95.56	95.74	95.55	0.20	0.27	0.07

Remark The uncertainty is not combine uniformity of the water bath

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  $k = 2$ , providing a level of confidence of approximately 95%

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## Certificate of Calibration

Certificate No. : 66-400387-1

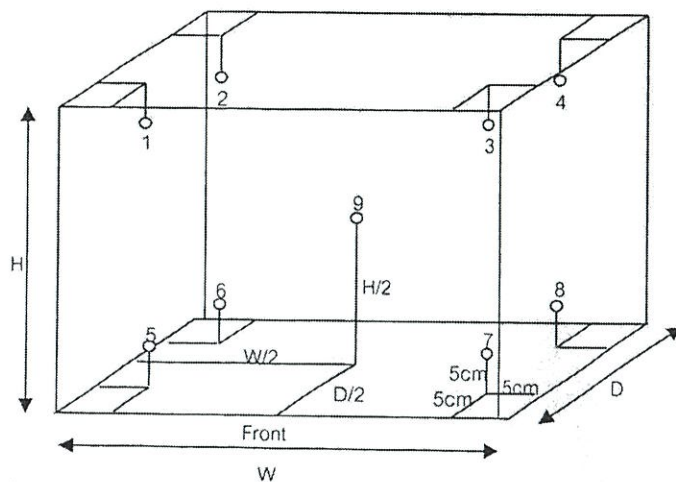
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.40 m

D = 0.34 m

H = 0.40 m

Capacity = 0.05 m<sup>3</sup>

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
104.0	104.0	104.0	104.2	104.0	104.1	104.0	104.1	104.0	103.9	104.0	104.1	0.69
110.0	110.0	110.0	110.3	110.0	110.1	110.0	110.1	110.0	110.1	109.7	110.1	0.69
180.0	180.0	180.0	179.7	179.6	180.1	180.2	180.6	180.2	178.9	179.9	180.8	1.0

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	104.0	104.0	0.3	0.1	0.5
110.0	110.0	110.0	0.5	0.1	0.8
180.0	180.0	180.0	2.2	0.3	2.6

**Remark** The uncertainty is not combine uniformity of the air chamber

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  $k = 2$  providing a level of confidence of approximately 95%

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*B*



# CAL

Calibratech Co.,Ltd.

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

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

## Certificate of Calibration

Certificate No. : 67-200034-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

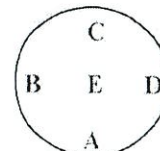
Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty $\pm$ (g)
0.01	0.0001	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  
-0.0001 -0.0001 -0.0001 0.0001 0.0000      g



Repeatability      Load test :      200      g  
Stdev. :      0.00005      g

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# CAL

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## Certificate of Calibration

Certificate No. : 66-300140-2

Page : 2 of 2

Result of Calibration : This result of true Volume is referred to standard temperature at 20 °C

UUC Condition As-Received : Good

Nominal Volume ( ml )	Measuring Volume ( ml )
30	29.98
50	50.12

Uncertainty of measurement with in  $\pm$  0.054 ml

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

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

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D.



# CAL

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## Certificate of Calibration

Certificate No. : 66-300140-6

Page : 2 of 2

Result of Calibration : This result of true Volume is referred to standard temperature at 20 °C

UUC Condition As-Received : Good

Nominal Volume ( ml )	Measuring Volume ( ml )
500	499.57
1000	999.89

Uncertainty of measurement with in  $\pm$  0.17 ml

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

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

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D.

