

ภาคผนวก ง.

เอกสารผลการสอบเทียบเครื่องมือตรวจวัด



บริษัท เอ็นไวแล็บ จำกัด 540.540/1 ซอยบางแค 7 แขวงบางแค เขตบางแค กรุงเทพฯ 10160
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 & Needa Supply Instrument

TSP High Volume Sampler Calibration

Verification Report No.

C6702 -TSP 01

☒ PM

☐ Onsite

Site: บริษัท เอ็นไวแล็บ จำกัด

UTM : 47P N1514475 E654269

Sampler: NTSP-15

Recorder: NCRT1500903158

Date: 1 Feb 24

Technical: Sanayu J.

Approval: Wisan R.

CONDITIONS

Barometric Press. (hPa): 1014.0

Temperature (deg C): 33.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 760.6

Temperature (deg K): 306.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 5411

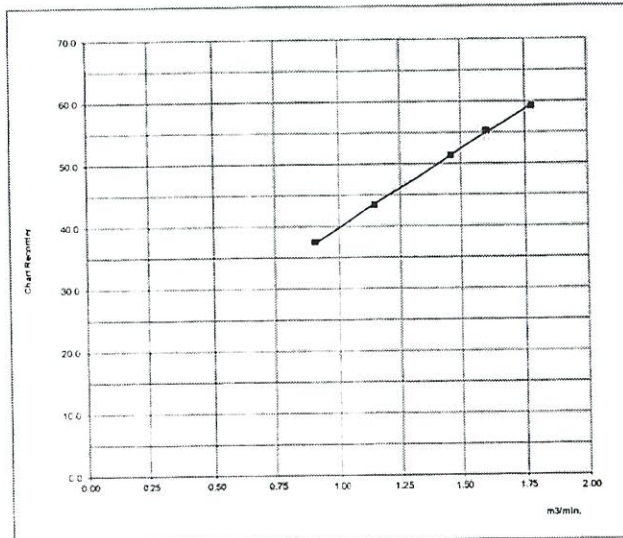
Qstd Slope: 2.02024

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	13.03	1.777	60.0	59.23	Slope = 25.1573
2	10.53	1.599	56.0	55.28	Intercept = 14.7090
3	8.74	1.458	52.0	51.33	Corr. coeff. = 0.9996
4	5.42	1.151	44.0	43.44	# of Observations: 5
5	3.31	0.902	38.0	37.51	Range of Chart at 1.1 - 1.7 m3/min. 43 58



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-29 Rev.00.01/02/63



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Envilab & NeedSai Supply Instruments

PM10 High Volume Sampler Calibration

Verification Report No.

C6702 -PM 02

<input checked="" type="checkbox"/> PM	<input type="checkbox"/> Onsite
Site: บริษัท เอ็นไวแล็บ จำกัด	
UTM: 47P N1514475 E654269	
Sampler: EPM-11	
Recorder: ECRDS01617254	
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

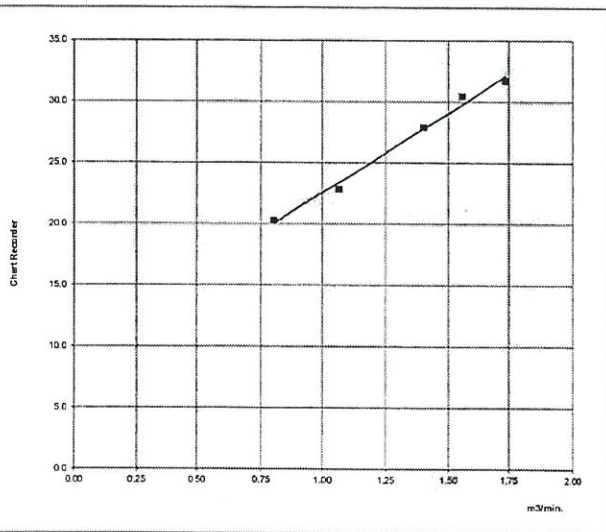
CALIBRATION ORIFICE

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

Qstd Slope: 1.26504
Qstd Intercept: -0.01677
Date Certified: 9 Feb 25

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 11.0451 Intercept = 12.0476 Corr. coeff. = 0.9936 SFR = 1.143 SSP = 38.85 # of Observations: 5 Range of Chart at SFR $\pm 10\%$
1	12.13	1.762	50.0	31.75	
2	9.18	1.534	46.0	29.21	
3	7.59	1.396	42.0	26.67	
4	4.42	1.069	38.0	24.13	
5	2.84	0.859	34.0	21.59	
					38
					40



Calibrated by :
(Sanayu Jantasorn)
1 February 2024

Approved by :
(Wisan Ritthikamon)
1 February 2024

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PM10 Cal. Rev.07 / Iss.Date: Mar 17, 2020

Environmental responsibility with accuracy measurement

FE-MNT-29 Rev.00.01/08/63



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SO₂ Analyzer Verification Test Report

Calibration Report No.: 6702005

Page:1/1

Calibrated Date: 1-Feb-24

☒ PM ☐ Onsite

Instruments Information

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

Calibration System

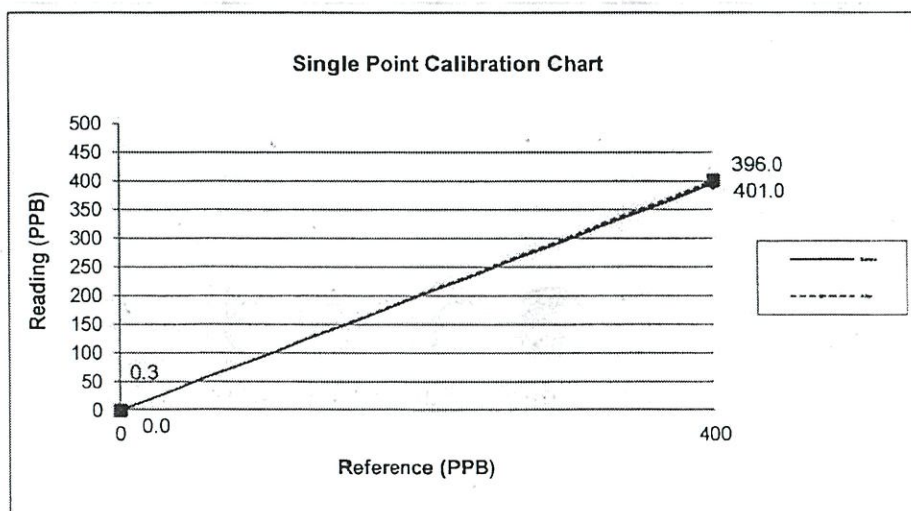
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NOx Conc 46.50 PPM NO Conc 46.50 PPM SO2 Conc 45.59 PPM CO Conc 4507 PPM Expire Date: Mar 31,2026 EB0160267

Environment: Temperature 26.9 °C

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

SO₂ Analyzer Verification Test Report

Calibration Report No.: 6702006

Page:1/1

Calibrated Date: 1-Feb-24

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer	Manufacturer THERMO
Model: THERMO.,43C	S/N: ESOTE43C103362

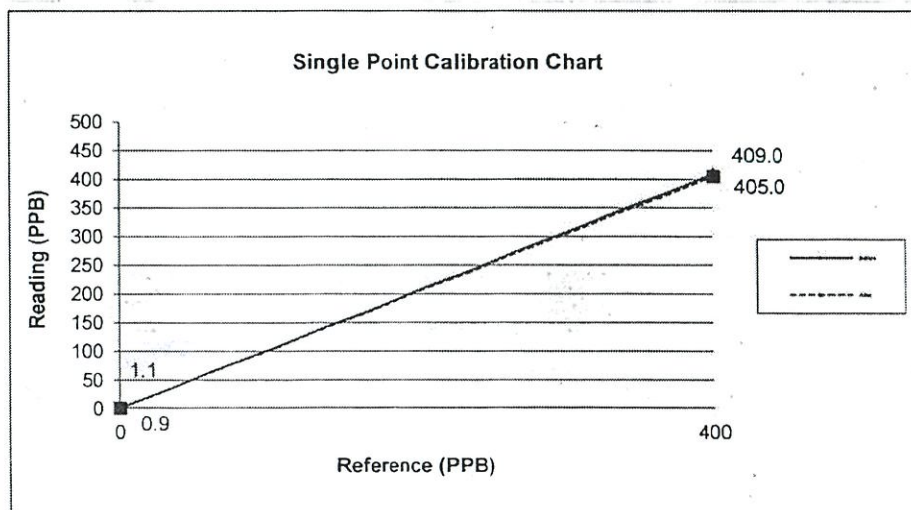
Calibration System

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

Environment: Temperature 26.6 °CHumidity: 64 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	1.1	1.1	400.0	409	2.3
After	0.0	0.9	0.9	400.0	405	1.3



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NOx Analyzer Verification Test Report

Calibration Report No.: 6702006

Page:1/2

Calibrated Date: 1-Feb-24

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42C106812
--	--

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

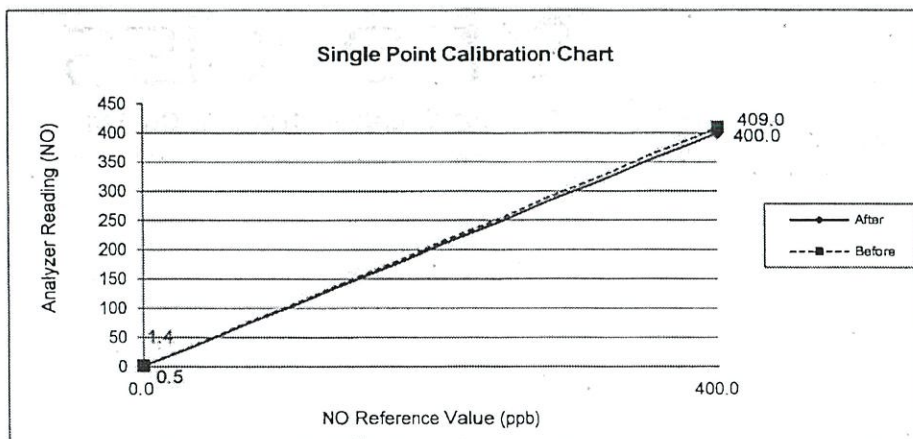
Humidity: 64 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	1.4	0.0	1.4	409	400.0	1.1
NO ₂	0.5	0.0	0.5	4.0	0.0	0.5
NOx	1.9	0.0	1.9	413	400.0	1.6

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.5	0.0	0.5	400	400.0	0.0
NO ₂	0.3	0.0	0.3	3.0	0.0	0.4
NOx	0.8	0.0	0.8	403	400.0	0.4



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**neediss**บริษัท นีดิส ซัพพลาย อินสตรูเมนต์ จำกัด
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Tel. 02-802-3980-2 Fax. 02-802-3988 E:info@neediss.com

NOx Analyzer Verification Test Report

Calibration Report No.: 6702008

Page:1/2

Calibrated Date: 1-Feb-24

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer
Model: 42CManufacturer THERMO
S/N: ENOTE42C304780

Calibration System

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

Environment: Temperature 24.5 °C

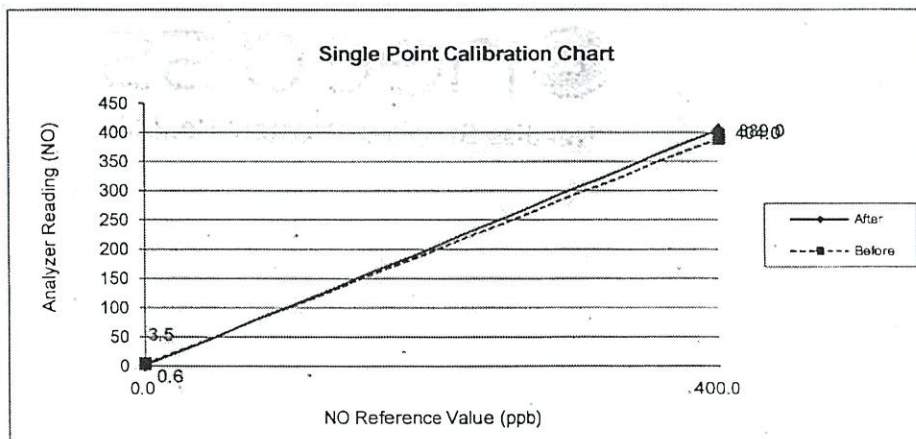
Humidity: 65 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	3.5	0.0	3.5	389	400.0	-1.4
NO ₂	0.3	0.0	0.3	8.0	0.0	1.0
NOx	3.8	0.0	3.8	397	400.0	-0.4

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.6	0.0	0.6	404	400.0	0.5
NO ₂	0.2	0.0	0.2	2.0	0.0	0.2
NOx	0.8	0.0	0.8	406	400.0	0.7



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Envilab Co., Ltd. 540.540/1 Soi Bangkhoe 7 Bangkhoe Bangkok 10160
Tel : 02-802-3577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



Envilab & Needless 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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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
QSTD	m=	2.02024	QA	m=	1.26504
	b=	-0.02667		b=	-0.01677
	r=	0.99993		r=	0.99993

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

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

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



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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

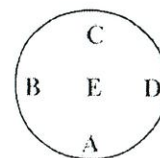
This result of calibration was found accurate as shown on date and place of calibration only.

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

- ๐๐๐ -

Handwritten signature



Measurement Results

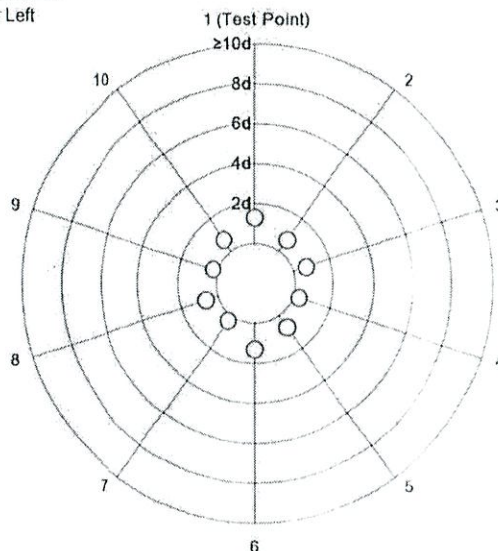
Repeatability

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.

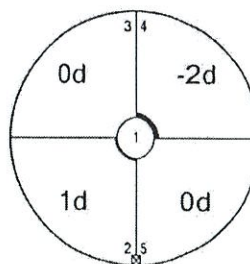
The results of this graph are based upon the absolute values of the differences from the mean value.

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.

Remarks

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.



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ผู้จัดการฝ่ายควบคุมคุณภาพ

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.

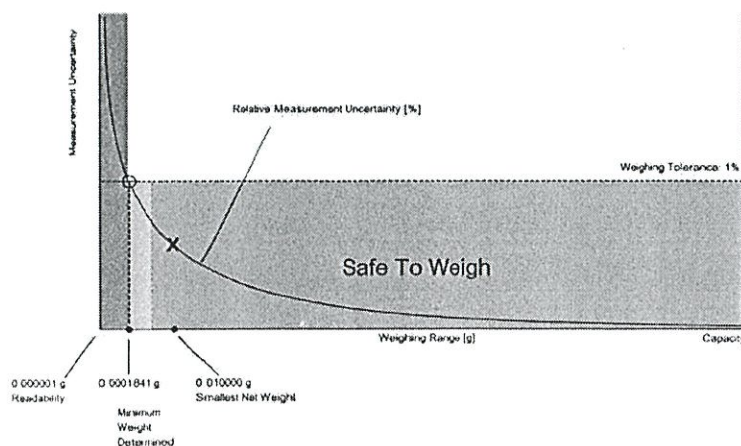
Process Requirements

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	0.0000002 g	✓	0.0000002 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.



Envilab Co., Ltd.

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ผู้จัดการฝ่ายควบคุมคุณภาพ

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@envilab.com
---------	-------------------------	---------------	--------------------	------------------------

Additional Remarks & Recommendations		Engineer Details	
		Date:	24-Mar-2022
		Name:	Suphat Suksawad
		Signature:	<i>Suphat</i>

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



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 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 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	94.10	0.10	± 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	1000.5	0.5	± 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	± 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 / 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.

FM.BL.MTC.002 Rev.4

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

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

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

Taindandi

Service Engineer

Approved by

Taraday Sangthong

Service Manager

Environmental Solution Integrator Co.,Ltd.

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

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



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ผู้จัดการฝ่ายควบคุมคุณภาพ



CALIBRATION LABORATORY Co., LTD.

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



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

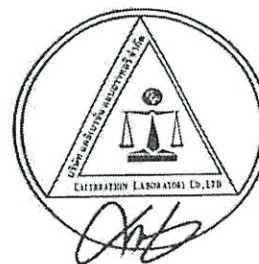
DATE OF RECEIVED : 20 October 2023

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

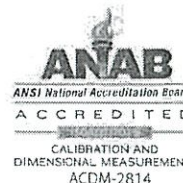


รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



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



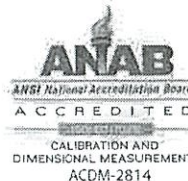
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ผู้จัดการฝ่ายควบคุมคุณภาพ





CALIBRATION LABORATORY CO., LTD.

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



REPORT OF CALIBRATION FOR

NOMENCLATURE	:	VIBRATION METER
MANUFACTURER	:	INSTANTEL
MODEL / TYPE	:	721A2601/721A3301
SERIAL NO.	:	UM16056/UM16056 [NVMINMMATE6056]
DATE OF CALIBRATION	:	24 October 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 Vibration Calibrator Amplifier which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Vibration Calibrator, The Modal Shop Model 9110D S/N. 11424.
2. Digital Multimeter, Hewlett Packard Model 34401A S/N. 3146A75935.
3. Programmable Timer/Counter, Philips Model PM6680B S/N. SM607101.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. AV-0030-23, Due Date 26 June 2024.
2. 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.
3. 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.

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. Q23117377

F3-011-04/01-12

page 2 of 3



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ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 66-420026-1

Page : 1 of 2

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

Equipment : pH Meter with electrode
pH meter

Manufacturer : Horiba

Model : F-74BW-G

Range : N/A pH

Resolution : 0.001 pH

Serial No. : B41J0001

ID No. : ELABPHHB74BW01

Electrode

Model : 9615S

Serial No. : 9X1K0003

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

Ambient Temperature : (23.8 to 24.8)° C

Relative Humidity : (54 to 57) %

Date of Received : 23 March 2023

Date of Calibration : 23 March 2023

Date of Issue : 24 March 2023

Calibrated by : Bunjerd Masri

Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)

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

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00473/64	27 Aug 2023	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.008	61270213	879344	13 Mar 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.986	61267169	879345	13 Mar 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61260481	879346	13 Mar 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

(Bunjerd Masri)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-400546-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
540, 540/1 Soi Bangkhac 7, Bangkhac, Bangkok 10160

Equipment : Air Chamber (Incubator)
Manufacturer : M-LAB Model : BIC-140
Range : N/A °C Resolution : 0.1 °C
Serial No. : 100613-1 ID No. : ELABBODC140N01

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

Ambient Temperature : (25.0 to 26.0) °C

Relative Humidity : (50 to 55) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 03 October 2023

Date of Calibration : 03 October 2023

Date of Issue : 06 October 2023

Calibrated by : Permpon Chanpu

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 RTD Probe

ID No.	Cert. No.	Due Date	Traceability
400029 & 400048	66-400454-1	05 Feb 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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES

534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250

TEL. 0-2717-3000 FAX. 0-2719-9484

Cert.No.: 23TW79

Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : Hanna
Model : HI9146-04
Serial No. : G00007931
ID No. : ELABDOHI914601
Received Date : 17 March 2023
Test Date : 20 March 2023
Reference : 2303-0651DN-1
Submitted by : Envilab Co.,Ltd (Head office)
540, 540/1 Soi Bangkhuae 7,
Bangkhuae, Bangkhuae, Bangkok 10160
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method
Tested by : Walalak Sirithean
Approved by : Malee Butkruea
Approved Signatory
(/) Malee Butkruea
() Saithip Meangmai
() Warakorn Lernagtrakul
Issue Date : 23 March 2023



B 0310344

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ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Certificate No. : 67-400054-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkhac7, Bangkhac, Bangkok 10160

Equipment : Water Bath

Manufacturer : Memmert

Model : WNB29

Range : N/A °C

Resolution : 0.1 °C

Serial No. : L617.0156

ID No. : ELABWBWNB29N01

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

Ambient Temperature : (25.0 to 26.0) °C

Relative Humidity : (45 to 50) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 01 February 2024

Date of Calibration : 01 February 2024

Date of Issue : 03 February 2024

Calibrated by : Kittisak Kokaeo

Calibration Method : This instrument was calibrated by In-house method CAL-M4006 based on ASTM E715-80
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 RTD probe

ID No.	Cert. No.	Due Date	Traceability
400046 & 400024	66-400547-2	02 Apr 2024	National Institute of Metrology Thailand (NIMT)

Approved by :



(Surachai Promthong)

Laboratory Manager

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Certificate of Calibration

Certificate No. : 66-400156-2

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 : UF 75

Range : N/A °C

Resolution : 0.1 °C

Serial No. : B319.0600

ID No. : ELABHAOVEN0600

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

Ambient Temperature : (30.0 to 30.8) °C

Relative Humidity : (60 to 65) %

Line Voltage : (224.2 to 225.2) V

Date of Received : 23 March 2023

Date of Calibration : 23 March 2023

Date of Issue : 25 March 2023

Calibrated by : Permpon Chanpu

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
400029 & 400030	65-400548-1	26 Apr 2023	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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CAL-F0031-03



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ผู้จัดการฝ่ายควบคุมคุณภาพ

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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Certificate of Calibration

Certificate No. : 66-300140-2

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Cylinder

Manufacturer : PYREX

Class : A

Capacity : 50 ml

Graduation : 1 ml

ID No. : C-WW-003/23

Environment : Ambient Temperature : (23 ± 2) °C

Relative Humidity : (50 ± 15) %

Air Pressure : 1009.9 mbar.

Date of Received : 15 March 2023

Date of Calibration : 20 March 2023

Date of Issue : 20 March 2023

Calibrated by : Areerat Sombun


Calibration Method : In-house method CAL-M3001 based on ASTM E 542-01

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

Electronic Balance

ID No.	Cert. No.	Due Date	Traceability
241002	65-200370-1	02 Jun 2023	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



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ผู้จัดการฝ่ายควบคุมคุณภาพ

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



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 66-300140-4

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Cylinder

Manufacturer : PYREX

Class : A

Capacity : 250 ml

Graduation : 2 ml

ID No. : C-WW-007/23

Environment : Ambient Temperature : (23 ± 2) °C

Relative Humidity : (50 ± 15) %

Air Pressure : 1009.9 mbar.

Date of Received : 15 March 2023

Date of Calibration : 20 March 2023

Date of Issue : 20 March 2023

Calibrated by : Areerat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-01

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

Electronic Balance

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
241002	65-200370-1	02 Jun 2023	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



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ผู้จัดการฝ่ายควบคุมคุณภาพ

