

ภาคผนวก ง.

เอกสารผลการสอบเทียบเครื่องมือตรวจวัด



Envilab Co., Ltd. 540/540/1 Moo 1 Bangkhen Subdistrict, Bangkhen District, Bangkok 10160
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TSP High Volume Sampler Calibration

Verification Report No.

A6701 -TSP 02

☐ PM ☐ Onsite

Site: บริษัท เอนไวแล็บ จำกัด

UTM : 47P N1514475 E654269

Sampler: NTSP-07

Recorder: NCRT1500903158

Date: 1 Jan 24

Technical: Sanayu J.

Approval: Wisan R.

CONDITIONS

Barometric Press. (hPa): 1008.1

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 756.2

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5028A

Serial#: 1328

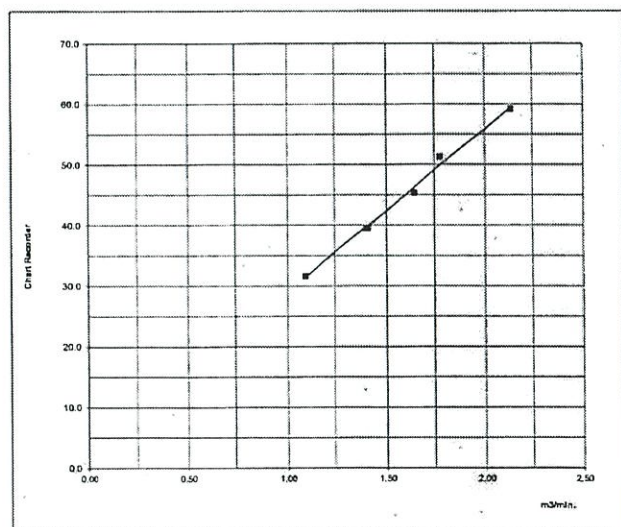
Qstd Slope: 1.63957

Qstd Intercept: -0.01202

Date Certified: 19 Jan 2023

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	12.34	2.120	56.0	55.21	Slope = 21.8083
2	9.61	1.872	52.0	51.27	Intercept = 9.0341
3	8.35	1.745	46.0	45.35	Corr. coeff = 0.9916
4	5.23	1.383	40.0	39.44	# of Observations: 5
5	3.41	1.118	34.0	33.52	Range of Chart: 34
					at 1.1 - 1.7 m3/min. 46



Calibrated by :

(Sanayu Jantason)

1 January 2024

Approved by :

(Wisan Ritthikamon)

1 January 2024

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



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

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Tel. 02-802-3980-2 Fax: 02-802-3988 E: info@neediss.com



Verification Report of Ambient Air Sampling



PM



Onsite UTM:

Report No :

6701015

Instrument :

PM-2.5 Sampler SINGLE

Validation Date:

3-Jan-24

Manufacturer :

Tisch Environmental

Model :

TE-Wilbur 2.5

Serial/ID No. :

EP2TIWILBU0482

Environment :

Humidity(%RH) :

57

Temperature (°C) :

23.6

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	16.64 LPM	0.03 LPM



Engineer :

Sirir Poonlak

Sirirat Poonlak

Approve By:

Signature

Sarawut Keawsrinal

Issu Date:

3-Jan-24

Date:

3-Jan-24

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SO₂ Analyzer Verification Test Report

Calibration Report No.: 6701002

Page:1/1

Calibrated Date: 3-Jan-24

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO2 Analyzer Model: THERMO.,43C	Manufacturer THERMO S/N: ESOTE43C069865
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Calibration System

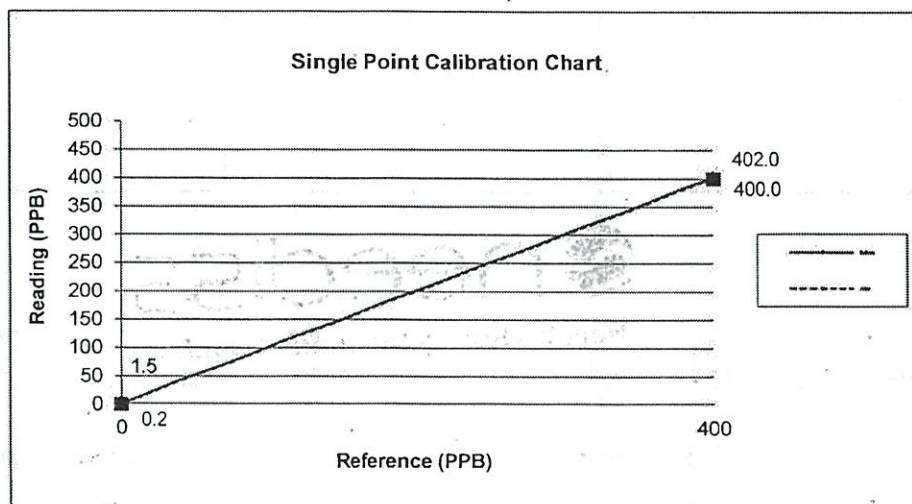
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NOx Conc 46.50 PPM NO Conc 46.50 PPM SO2 Conc 45.59 PPM CO Conc 4507 PPM Expire Date: Mar 31,2026 EB0160267

Environment: Temperature 23.8 °C

Humidity: 64 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	1.5	1.5	400.0	402	0.5
After	0.0	0.2	0.2	400.0	400	0.0



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Tel. 02-802-3980-2 Fax: 02-802-3988 Email: neediss.com



NOx Analyzer Verification Test Report

Calibration Report No.: 6701001

Page:1/2

Calibrated Date: 3-Jan-24

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42C304779
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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 24.2 °C

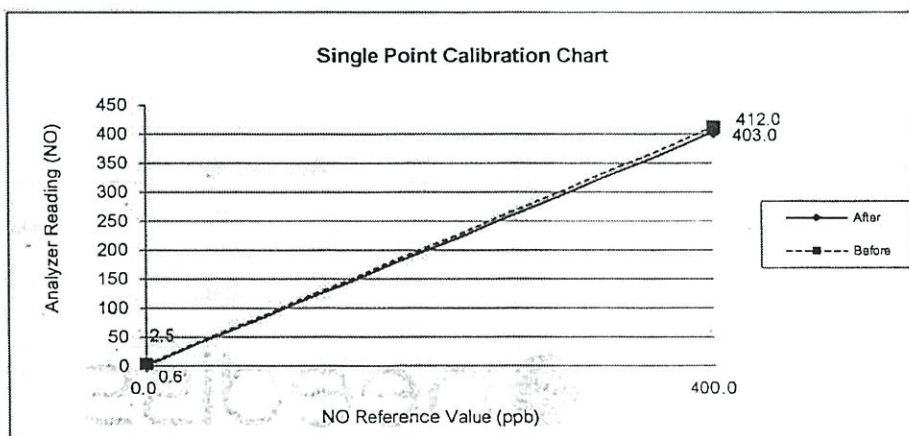
Humidity: 64 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	2.5	0.0	2.5	412	400.0	1.5
NO ₂	1.3	0.0	1.3	2.0	0.0	0.2
NOx	3.8	0.0	3.8	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	0.6	0.0	0.6	403	400.0	0.4
NO ₂	-0.1	0.0	-0.1	-2.0	0.0	-0.2
NOx	0.5	0.0	0.5	401	400.0	0.1



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Envilab & Mantis Family Enterprise

Verification Test Report

Report No.:

CONDO -SLM 01

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

Calibrated Date: 1 January 2024

Site : บริษัทเอ็นไวแล็บ จำกัด

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0012

Environment: Temperature 25 °C Humidity 65 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Briel&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	93.79	0.01	93.78

Calibrated By:

(Sanayu Jantason)

Date:

1 January 2024

Approve By:

(Wisan Ritthikamon)

Date:

1 January 2024

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Envilab Co., Ltd. 540,540/1 Soi Bangkok 7 Bangkok Bangkok 10160
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Environmental responsibility with accuracy measurement

TSP High Volume Sampler Calibration

Verification Report No.

A6701 -TSP 01

☒ PM ☐ Onsite

Site: บริษัท เอ็นวิลแลบ จำกัด

UTM : 47P N1514475 E654269

Sampler: NTSP-19

Recorder: NCRT1500904867

Date: 1 Jan 24

Technical: Sanayu J.

Approval: Wisan R.

CONDITIONS

Barometric Press. (hPa): 1008.1

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 756.2

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5028A

Serial#: 1328

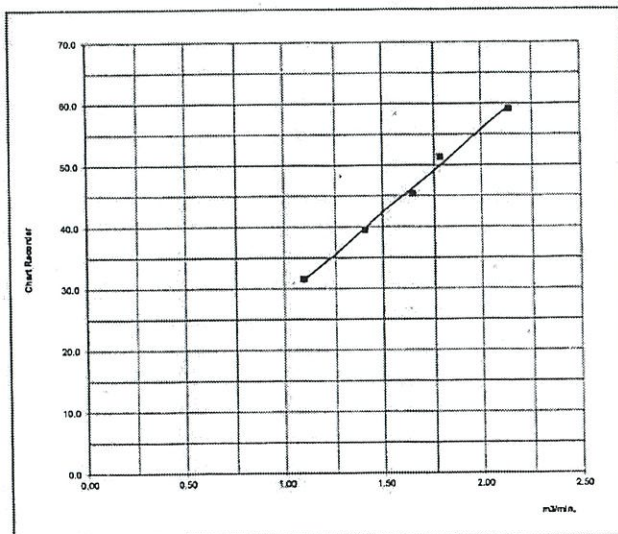
Qstd Slope: 1.63957

Qstd Intercept: -0.01202

Date Certified: 19 Jan 2023

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 26.9698 Intercept = 1.8642 Corr. coeff. = 0.9966 # of Observations: 5 Range of Chart at 1.1 - 1.7 m ³ /min, 32 - 48
1	12.54	2.137	60.0	59.16	
2	8.69	1.780	52.0	51.27	
3	7.42	1.645	46.0	45.35	
4	5.42	1.407	40.0	39.44	
5	3.26	1.093	32.0	31.55	



Calibrated by :

(Sanayu Jantason)

1 January 2024

Approved by :

(Wisan Ritthikamon)

1 January 2024

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FE-MNT-29 Rev.00-01/08/03



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SO₂ Analyzer Verification Test Report

Calibration Report No.: 6701008

Page:1/1

Calibrated Date: 3-Jan-24

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO2 Analyzer Model: THERMO_43C	Manufacturer THERMO S/N: ESOTE43C703317
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Calibration System

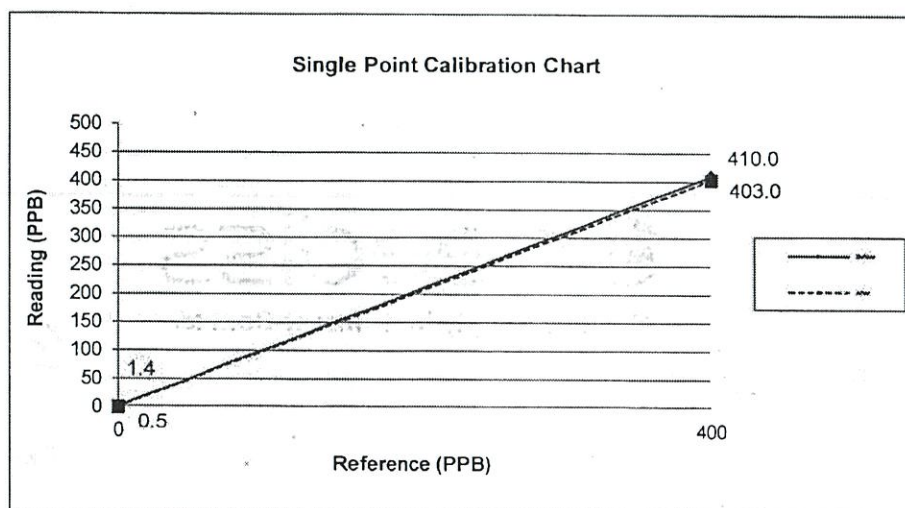
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NOx Conc 46.50 PPM NO Conc 46.50 PPM SO2 Conc 45.59 PPM CO Conc 4507 PPM Expire Date: Mar 31,2026 EB0160267

Environment: Temperature 24.1 °C

Humidity: 65 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	1.4	1.4	400.0	410	2.5
After	0.0	0.5	0.5	400.0	403	0.8



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Tel. 02-802-3980-2 Fax. 02-802-3988 E:info@neediss.com



Verification Report of Ambient Air Sampling



PM



Onsite UTM:

Report No :

6701014

Instrument :

PM-2.5 Sampler SINGLE

Validation Date:

3-Jan-24

Manufacturer :

Tisch Environmental

Model :

TE-Wilbur 2.5

Serial/ID No. :

EP2TIWILBU0481

Environment :

Humidity(%RH) :

58

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

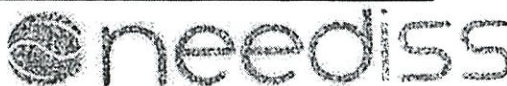
Flow Control :

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	16.75 LPM	-0.08 LPM



Engineer :

Sirirak Poonlak

Neediss Supply Instrument Co., Ltd

Approve By:

K

Sirirak Poonlak

Sarawat Keawsrinual

Issu Date:

3-Jan-24

Date:

3-Jan-24

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NOx Analyzer Verification Test Report

Calibration Report No.: 6701008
Calibrated Date: 3-Jan-24

Page:1/2

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42C304780
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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 24.5 °C

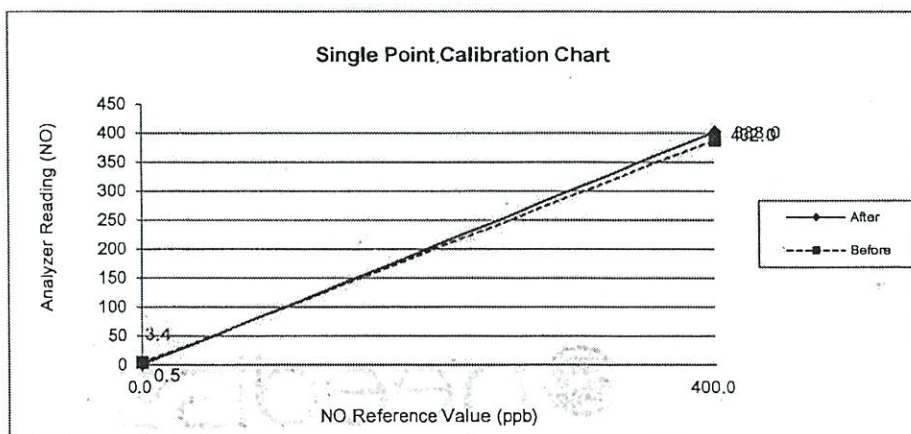
Humidity: 65 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	3.4	0.0	3.4	388	400.0	-1.5
NO ₂	0.3	0.0	0.3	8.0	0.0	1.0
NOx	3.7	0.0	3.7	396	400.0	-0.5

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.5	0.0	0.5	402	400.0	0.2
NO ₂	0.1	0.0	0.1	-2.0	0.0	-0.2
NOx	0.6	0.0	0.6	400	400.0	0.0



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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 02

☐ PM

☐ Onsite UTM :

47P N 1514455 E 654248

Calibrated Date: 1 January 2024

Site : บริษัทเอ็นไวแล็บ จำกัด

Equipment: Sound Level Meter

Manufacturer: PULSAR

Model: 45

Serial : 0013

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	93.79	0.01	93.78

Calibrated By:

(Sanayu Jantason)

Date:

1 January 2024

Approve By:

(Wisan Ritthikamon)

Date:

1 January 2024

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10150, 10150, 10150, 10150, 10150, 10150, 10150, 10150
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TSP High Volume Sampler Calibration

Verification Report No.

B6605 -TSP 02

☐ PM ☐ Onsite

Site: บริษัท เอ็นวีแล็บ จำกัด

UTM: 47P N1514475 E654269

Sampler: ETSP#09

Recorder: ECRANG15315224

Date: 1 Jan 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-5028A

Serial#: 1328

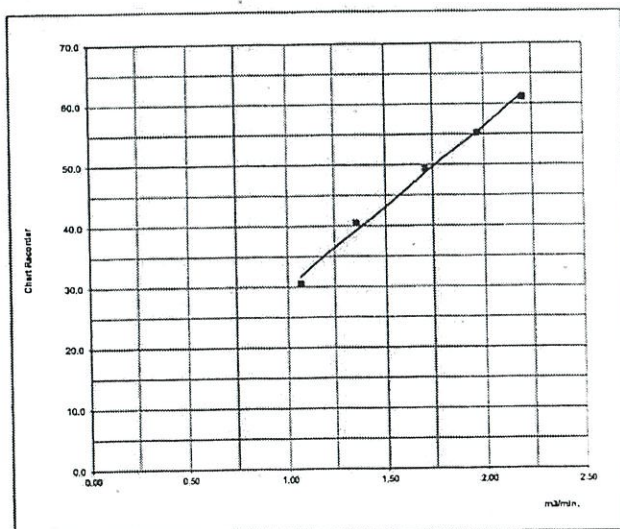
Qstd Slope: 1.63957

Qstd Intercept: -0.01202

Date Certified: 19 Jan 2023

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	13.10	2.184	56.0	55.22	Slope = 21.0539
2	10.20	1.928	49.0	48.32	Intercept = 8.1849
3	8.10	1.719	44.0	43.39	Corr. coeff. = 0.9954
4	5.10	1.366	37.0	36.49	# of Observations: 5
5	3.12	1.070	32.0	31.55	Range of Chart 32
					at 1.1 - 1.7 m3/min. 44



Calibrated by:

(Sanayu Jantason)
1 January 2024

Approved by:

(Wisan Ritthikamon)
1 January 2024

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Verification Report of Ambient Air Sampling



PM



Onsite UTM :

Report No :

6701013

Instrument :

PM-2.5 Sampler SINGLE

Validation Date:

3-Jan-24

Manufacturer :

Rupprecht Patashnick

Model :

200 H

Serial/ID No. :

EP2RP200039702

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

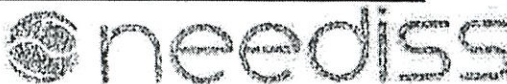
Flow Control :

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	16.64 LPM	0.03 LPM



Engineer :

Sirir Pm

Neediss Supply Instrument Co., Ltd.

Approve By:

K

Sirirat Poonlak

Sarawut Keawsrinal

Issu Date:

3-Jan-24

Date:

3-Jan-24

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SO₂ Analyzer Verification Test Report

Calibration Report No.: 6701005

Page:1/1

Calibrated Date: 3-Jan-24

☒ PM ☐ Onsite

Instruments Information

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

Calibration System

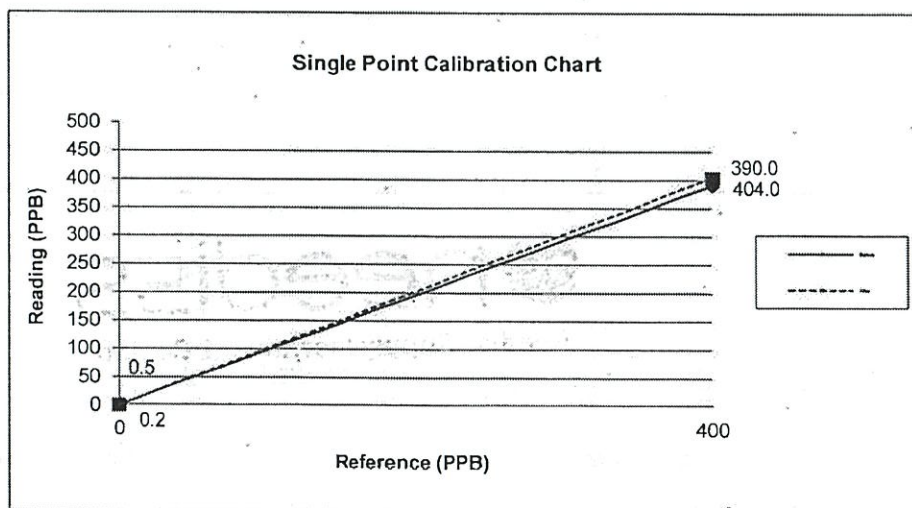
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NOx Conc 46.50 PPM NO Conc 46.50 PPM SO2 Conc 45.59 PPM CO Conc 4507 PPM Expire Date: Mar 31,2026 EB0160267

Environment: Temperature 24.1 °C

Humidity: 65 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.5	0.5	400.0	390	-2.5
After	0.0	0.2	0.2	400.0	404	1.0



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NOx Analyzer Verification Test Report

Calibration Report No.: 6701002

Page:1/2

Calibrated Date: 3-Jan-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 24.2 °C

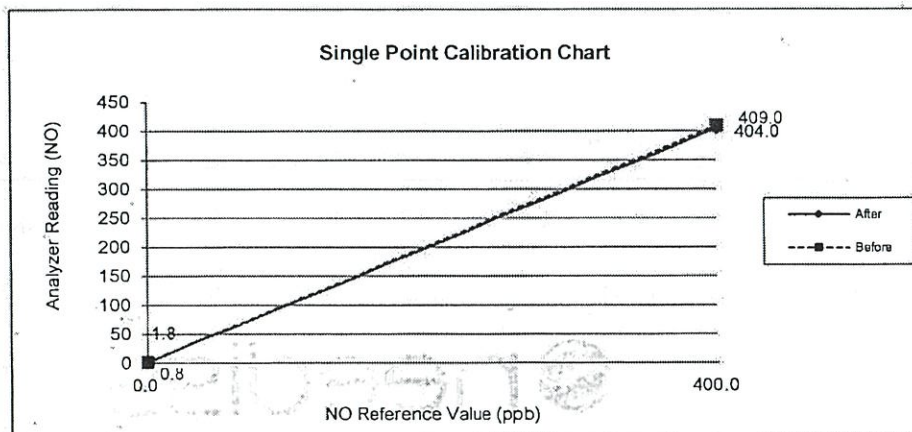
Humidity: 64 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	1.8	0.0	1.8	409	400.0	1.1
NO ₂	0.5	0.0	0.5	4.0	0.0	0.5
NOx	2.3	0.0	2.3	413	400.0	1.6

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.8	0.0	0.8	404	400.0	0.5
NO ₂	0.3	0.0	0.3	-2.0	0.0	-0.2
NOx	1.1	0.0	1.1	402	400.0	0.2



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บริษัท เอ็นไวแล็บ จำกัด 540.540/1 ซอยบางแค 7 บางแค บางแค กรุงเทพฯ 10160
Envilab Co., Ltd. 540.540/1 Soi Bangkhae 7 Bangkhae Bangkok Bangkok 10160
Tel : 02-802-9577-8 Fax: 02-802-3773 E-mail : info@evltesting.com



envilab & Evltest Accuracy Measurement

Verification Test Report

Report No.:

CONDO -SLM 03

☒ PM

☐ Onsite UTM :

47P N 1514455 E 654248

Calibrated Date: 1 January 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 January 2024

Approve By:

(Wisan Ritthikamon)

Date:

1 January 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=	$\Delta Vol \left(\frac{Pa - \Delta P}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)$	Va=	$\Delta Vol \left(\frac{Pa - \Delta P}{Pa} \right)$
Qstd=	$Vstd / \Delta Time$	Qa=	$Va / \Delta Time$
For subsequent flow rate calculations:			
Qstd=	$1/m \left(\left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} \right) - b \right)$	Qa=	$1/m \left(\left(\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)} \right) - b \right)$

Standard Conditions

Tstd: 298.15 °K
 Pstd: 760 mm Hg

Key

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

RECALIBRATION

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



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. : 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

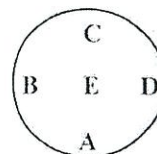
This result of calibration was found accurate as shown on date and place of calibration only.

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

- o o o -

Handwritten signature




Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+66 2723 0382
MT-TH.ServiceSupport@mt.com



Accuracy Calibration Certificate

Customer

Company: EnviLab Co., Ltd.
Address: 540, 540/1 Soi Bang Khae 7, Bang Khae
City: Bang Khae Contact: Arpornrat Aphidet
Zip / Postal: 10160
State / Province: Bangkok
Order Number:  * 0 3 3 2 3 7 8 4 1 3 *

Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: XPR2 Asset Number: ELABBALANCEN07
Serial No.: C011158261 Terminal Model: N/A
Building: N/A Terminal Serial No.: N/A
Floor: 3 Terminal Asset No.: N/A
Room: Balance

Range	Max. Capacity	Readability (d)
1	2.1 g	0.000001 g

Procedure


Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CP/W002/20

This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.

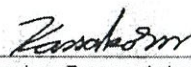
The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.

In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature		Humidity	
As Found	Start: 25.6 °C	End: 25.1 °C	Start: 65.9 %	End: 62.2 %

As Found Calibration Date: 24-Mar-2022 Calibrator: 
As Left Calibration Date: N/A
Issue Date: 25-Mar-2022

Approved Signatory:


☒ Kassakorn Tassanachaisakul
☐ Santi Jitniyom
☐ Surachet Sukkate



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Measurement Results

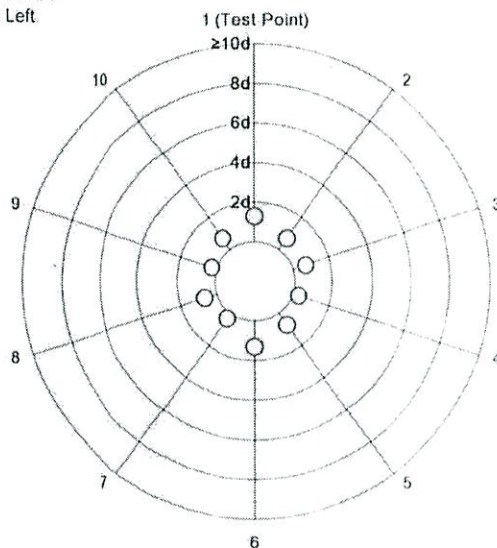
Repeatability

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.

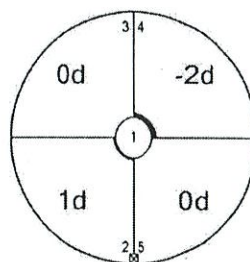
The results of this graph are based upon the absolute values of the differences from the mean value.

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

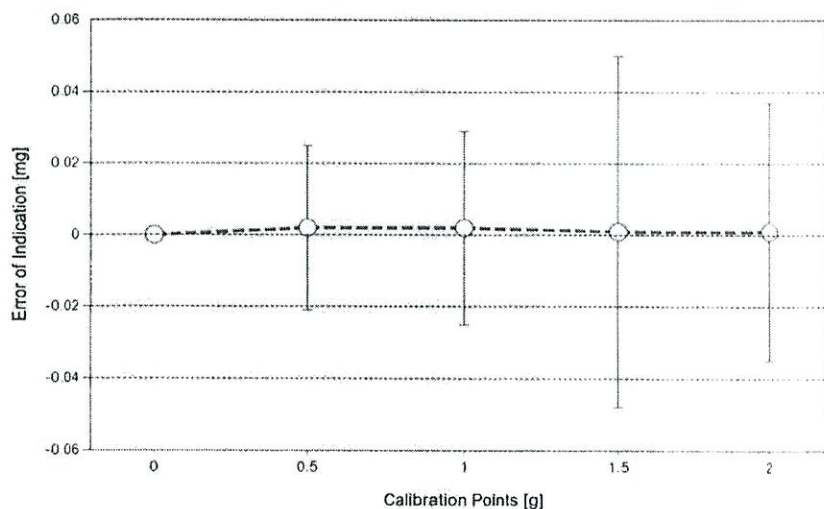
The "d" in the graph represents the readability of the range/interval in which the test was performed.

Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1 *	0.000000 g	0.000000 g	0.000000 g	0.0054 mg	2
2	0.001000 g	0.001001 g	0.000001 g	0.0056 mg	2
3	0.005000 g	0.005000 g	0.000000 g	0.0056 mg	2
4	0.009999 g	0.010000 g	0.000001 g	0.0073 mg	2
5	0.019999 g	0.019999 g	0.000000 g	0.0091 mg	2
6 *	0.050000 g	0.050000 g	0.000000 g	0.011 mg	2
7 *	0.100000 g	0.099999 g	-0.000001 g	0.015 mg	2
8 *	0.500004 g	0.500006 g	0.000002 g	0.023 mg	2
9 *	0.999990 g	0.999992 g	0.000002 g	0.027 mg	2
10	1.499994 g	1.499995 g	0.000001 g	0.049 mg	2
11 *	1.999977 g	1.999978 g	0.000001 g	0.036 mg	2

*The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



○ As Found

◆ As Left

For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.:	WS01	Date of Issue:	03-May-2021
Certificate Number:	172902	Calibration Due Date:	29-Oct-2022

Thermo Hygrometer

Equipment No.:	IN284	Date of Issue:	25-May-2021
Certificate Number:	21H1103	Calibration Due Date:	10-May-2022

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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Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with $k=2$ in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $1.0 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: 4 K

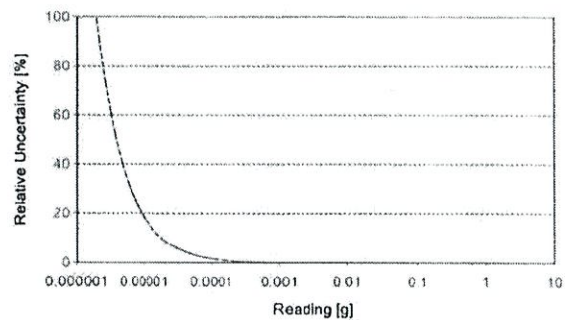
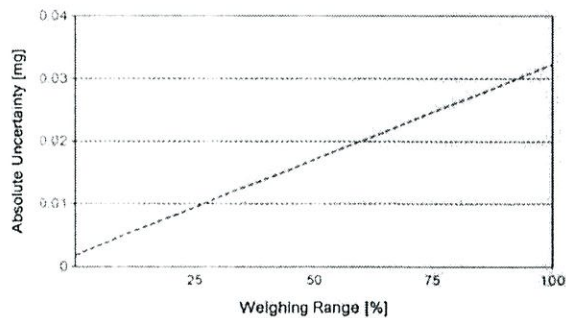
Linearization of Uncertainty Equation

Range			As Found	As Left
	d	Max		
1	0.000001 g	2.1 g	$U_1 = 0.0018 \text{ mg} + 0.0145 \text{ mg/g} \cdot R$	N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found		As Left	
0.000210 g	0.0018 mg	0.86%	N/A	N/A
0.002100 g	0.0018 mg	0.087%	N/A	N/A
0.021000 g	0.0021 mg	0.010%	N/A	N/A
0.210000 g	0.0048 mg	0.0023%	N/A	N/A
2.100000 g	0.032 mg	0.0015%	N/A	N/A



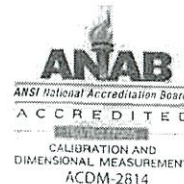


CLC
Accredited
ISO/IEC 17025

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

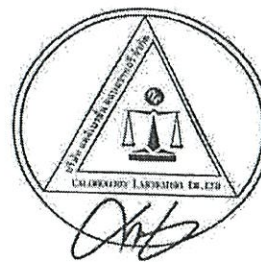
DATE OF ISSUED : 30 September 2023

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



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@clccalibration



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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
SERIAL NO. : UM11737/UM11737 [EVMINMMATE1737]
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. Q23101517

F3-011-04/01-12

page 2 of 3



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calibration

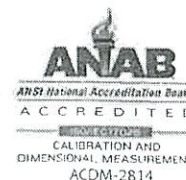


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Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230

Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

VELOCITY RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
(mm/s)	(frequency)		(mm/s)	(mm/s)	(mm/s)	\pm (% of rdg.)
10.000	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



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

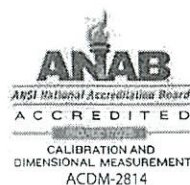


Calibration



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. Q23101518

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VIBRATION METER
MANUFACTURER : INSTANTEL
MODEL / TYPE : 721A2601/721A3301
SERIAL NO. : UM13338/UM13338 [EVMINMMATE3338]
CLID. NO. : 252301796
JOB CONTROL NO. : 230913101518

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. Q23101518A1

F3-012-04/01-12

page 1 of 3



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



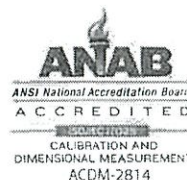
@clccalibration



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



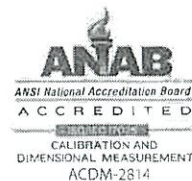
@clccalibration



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



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	10.118	-0.118	1.8
20.000	160 Hz		20.000	20.143	-0.143	1.8
30.000	160 Hz		30.000	30.181	-0.181	1.8
40.000	160 Hz		40.000	40.206	-0.206	1.0
50.000	160 Hz		50.000	50.258	-0.258	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. Q23101518

F3-011-04/01-12

page 3 of 3



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



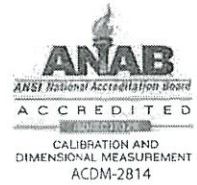
@clccalibration



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



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

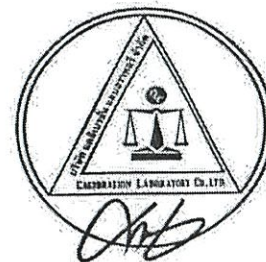
DATE OF RECEIVED : 20 October 2023

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

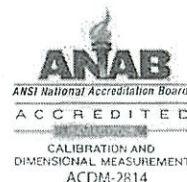


@clccalibration



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. : UM16055/UM16055 [NVMINMMATE6055]
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. Q23117376

F3-011-04/01-12

page 2 of 3



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



@clccalibration



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



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



@clccalibration

Certificate of Calibration

Certificate No. : 67-420024-1

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : pH Meter with electrode

pH meter

Manufacturer : Adwa

Model : AD 12

Range : N/A pH

Resolution : 0.01 pH

Serial No. : 11105360111

ID No. : ELABPHADWA1208

Environment : Ambient Temperature : $(25 \pm 2) ^\circ \text{C}$ Relative Humidity : $(50 \pm 15) \%$

Date of Received : 20 February 2024

Date of Calibration : 27 February 2024

Date of Issue : 27 February 2024


Calibrated by : Permpon Chanpu

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

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

Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.008	61293328	944535	27 Nov 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.986	61281486	944537	17 Nov 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
9.997	61281073	944536	17 Nov 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by : 

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.



Certificate of Calibration

Certificate No. : 67-420024-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

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	4.008	4.01	0.00	0.0097
	6.986	7.01	-0.02	0.011
7,10	6.986	7.01	-0.02	0.011
	9.997	10.01	-0.01	0.014

Remark

1 UUC : Unit Under Calibration

2 pH meter does not have voltage mode because the plug can not BNC socket

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%

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Handwritten signature



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%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.

CAL-F0031-03



Envilab Co.,Ltd.

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 66-400546-1

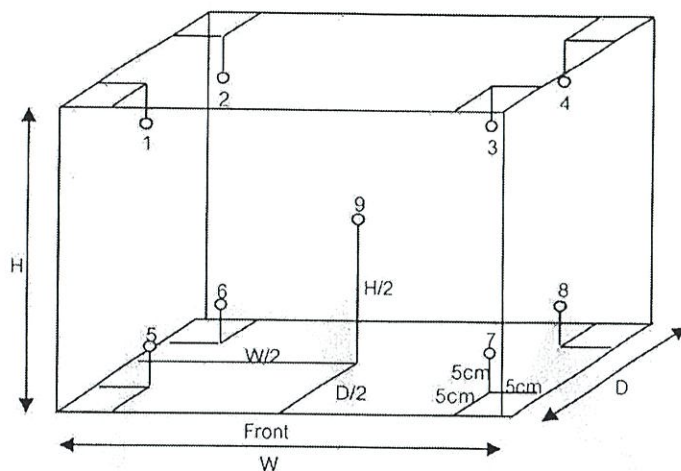
Page : 2 of 2

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 m³

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





SCIMET Co., Ltd.
1194 Soi Wachirathamsathit 57, Bangchak,
Phrakhanong, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel:095-552-4939

Certificate No. C27240001

Calibration Certificate

Equipment: DO METER
Model: HI9147
Serial No.(or ID): H00007030
Manufacturer: HANNA
Condition: In Condition

Job No.: KSMT2400445
Received Date: 04 March 2024
Issued Date: 14 March 2024
Page: 1 of 2

Customer

Envilab Co., Ltd.
540, 540/1 Soi Bangkhuae 7, Bangkhuae, Bangkhuae, Bangkok 10160

Calibration Place

Environment Laboratory, SCIMET Co., Ltd.
1194 Soi Wachirathamsathit 57, Bangchak, Prakhanong, Bangkok 10260 Thailand

Calibration Date

14 March 2024

Environment Condition

Temperature: 23 °C \pm 2 °C
Humidity: 50 %RH \pm 15 %RH

The Method used

In-house method, WI27 , By comparison with certified dissolved oxygen solution standard

Traceability

This is certificate is traceable to SI Units , Sample test and temperature test are assured through HANNA instruments company certificate No. 29E31, through Quality Reborn Co.,LTD certificate No.QR23-1169

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor ($k=2$) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SCIMET Co., Ltd.

Mr.Dumrong Boonsopon
Person in charge



Mr. Thalerngkeat POUNGNGARM
Authorized signatory



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Calibration Results:

Electrode Serial No. KC3N05V1R
Model : H176409
Brand : HANNA

Electrode Test

Atmospheric pressure measured while calibrating. 755.54 mmHg
Temperature measured while calibrating. (± 0.2 °C) 25.0 °C
The Oxygen Solubility was calculated from the ambient conditions. 8.21 \pm 0.03 mg/L
The Oxygen Solubility reading from the DO METER 8.23 mg/L

Sample Test

Standard Oxygen Solution	Unit Under Calibration Reading	Correction	Coverage Factor (k)	Uncertainty of Measurement (\pm)
0.00 mg/L	0.00 mg/L	0.000 mg/L	2.00	0.13 mg/L

Temperature Electrode

Dimension of Probe;

Length : 140 mn.
Diameter : 21 mn.
Immersion Depth 80 mn.

STD. Reading (°C)	UUC. Reading (°C)	Correction of UUC (°C)	Coverage Factor (k)	Uncertainty of Measurement (\pm °C)
25.01	25.0	0.01	2.00	0.15

The End of Certificate

บริษัท ชัยนิเมท จำกัด (SCIMET CO., LTD.)

1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 095 552 4939



รับรองสำเนาถูกต้อง
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

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.

