

ภาคผนวก ง.

เอกสารผลการสอบเทียบเครื่องมือตรวจวัด

ประจำเดือนมกราคม พ.ศ. ๒๕๖๕

TSP High Volume Sampler Calibration

Verification Report No.

C6501-TSP_02

☒ PM ☐ Onsite

Site: บ้านพัก อบต.โพธิ์ชัย จ.กาฬ

UTM: 47P N1514475 E654208

Sampler: ETSP#32

Recorder: ECRDS01533507

Date: 4 Jan 22

Technical: Surakit D.

Approval: Sarawat K.

CONDITIONS

Barometric Press. (hPa): 1010.0

Temperature (deg C): 31.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.6

Temperature (deg K): 304.0

Corrected Avg. Press. (mm Hg): 759.6

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 2067

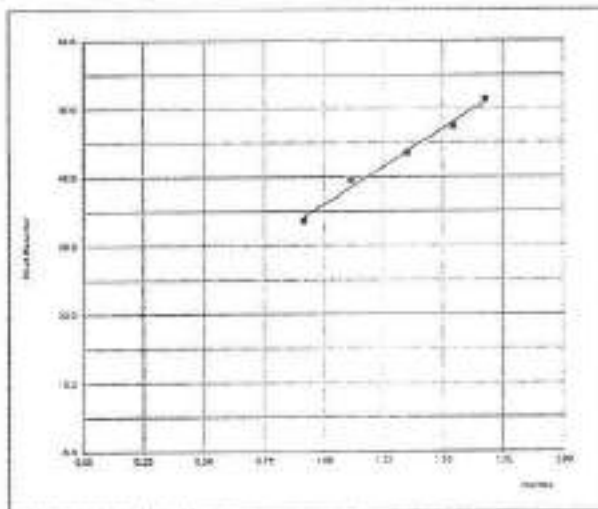
Qstd Slope: 2.05054

Qstd Intercept: -0.00430

Date Certified: 11 Jan 21

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 20.9081 Intercept = 12.0067 Cor. coeff. = 0.9945 # of Observations: 5 Range of Chart at 1.1 - 1.7 m3/min: 37 to 48
1	12.55	1.710	80.0	49.42	
2	11.14	1.611	46.0	45.47	
3	8.58	1.412	42.0	41.52	
4	5.09	1.090	38.0	35.59	
5	3.40	0.901	32.0	31.63	



Calibrated by:

(Surakit Damcholvichit)
4 January 2022

Approved by:

(Sarawat Keawarnual)
4 January 2022



Environmental Engineering Laboratory
EnviLab Co., Ltd. 42/25 หมู่ 4 ต.บ้านใหม่ อ.เมือง จ.นนทบุรี 11000
Tel: 02-508-8188 Fax: 02-508-1111 E-mail: info@envilab.com



PM10 High Volume Sampler Calibration

Verification Report No.

DE501 - PM 01

☒ PM ☐ Onsite
 Site: บริษัท เอนวิโวลแล็บ จำกัด
 UTM: 47P N1514475 E654269
 Sampler: EFPM43
 Recorder: ECRD5016353500
 Date: 6 Jan 22
 Technician: Surakit D.
 Approval: Sarawat K.

CONDITIONS

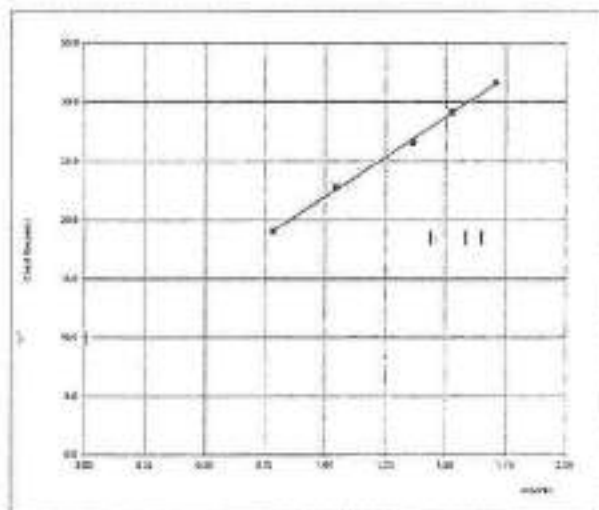
Barometric Press. (hPa): 1010.0
 Temperature (deg C): 30.0
 Average Press. (hPa): 1013.0
 Average Temp. (deg C): 30.0
 Corrected Pressure (mm Hg): 757.6
 Temperature (deg K): 303.0
 Corrected Avg. Press. (mm Hg): 759.8
 Average Temp. (deg K): 303.0

CALIBRATION OFFICE

Brand: Tech Environmental, Inc
 Model: TE-5026A
 Serial#: 2067
 Slope: 1.26401
 Intercept: -0.00269
 Date Certified: 11 Jan 21

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	12.00	1.708	50.0	31.82	Slope = 13.5867
2	9.55	1.524	45.0	29.09	Intercept = 8.3210
3	7.62	1.362	42.0	26.56	Corr. coeff. = 0.9994
4	4.51	1.048	36.0	22.77	SFR = 1.133
5	2.54	0.787	30.0	18.97	SSP = 37.52
					# of Observations: 5
					Range of Chart: 36
					at SFR $\pm 10\%$: 39



Calibrated by: [Signature]
 (Surakit Damcholvichit)
 6 January 2022

Approved by: [Signature]
 (Sarawat Keawwinnual)
 6 January 2022



รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

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

305 หมู่ 9 ถนน 7 กิโลเมตร อ.บึงสามพัน จ.พิจิตร 35000
Tel: 02-302-3960-2 Fax: 02-602-3960-3 E-mail: neediss@neediss.com



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6501006

Page:1/1

Calibrated Date: 4-Jan-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO_43C	Manufacturer THERMO S/N: ESOTE43C102362
--	--

Calibration System

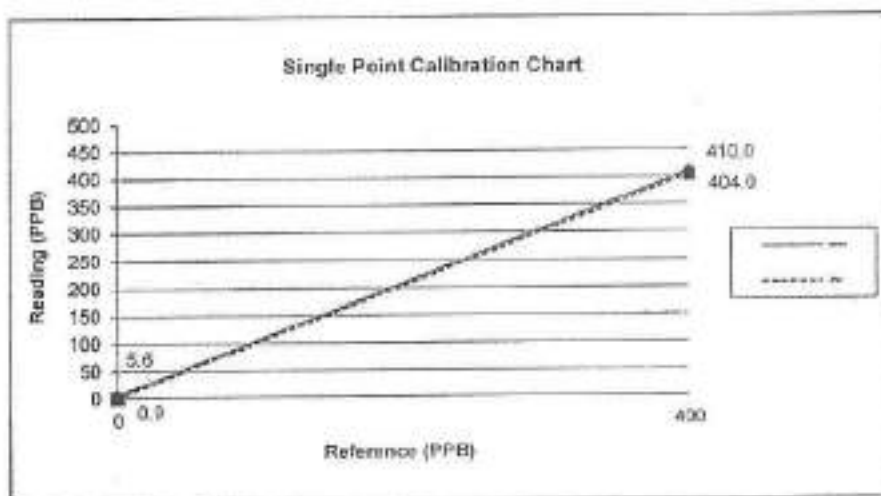
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792	NO Conc 44.68 PPM
ZERO AIR Generator ZAG7001 S/N: 644	SO ₂ Conc 45.34 PPM
	CO Conc 4500 PPM
	Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 23.9 °C

Humidity: 49 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	5.6	5.6	400.0	410	2.5
After	0.0	0.9	0.9	400.0	404	1.0



This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com

We know the best thing to save environment



Envislab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 4-01-2022

S/N : ESOTE43C102362

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 ~ -850 (V)	-650	-653
LAMP VOLTAGE 950 ~ 1,200 (V)	990	985
LAMP INTENSITY 20000 ~ 50000 Hz	32568	32577
INTER TEMP 15 ~ 45 DEG C	37	37
CHAMBER TEMP 47 ~ 51 C	49	49
COOLER TEMP -5 ~ (-2) DEG C	-2.5	-2.5
PRESSURE 400 ~ 1000.0 mm Hg	764	765
FLOW 0.350 ~ 0.650 LPM	0.42	0.4

Calibrate By : Sirrat Poonlak

Approve By : Sarawat Keawsriual

Sirrat Poonlak

Sarawat Keawsriual

Date: 4-Jan-22

Date: 4-Jan-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com

We know the best thing to save environment



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

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

535 SOOTERD Y BANGKOK 10160 535 SOOTERD Y BANGKOK 10160
Tel: 02-001-0000 0 Fax: 02-001-0000 Email: info@neediss.com



NOx Analyzer Verification Test Report

Calibration Report No.: 8501003

Page:1/2

Calibrated Date: 4-Jan-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42C768364
--	--

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19, 2024 EBD140762

Environment: Temperature 23.7 °C

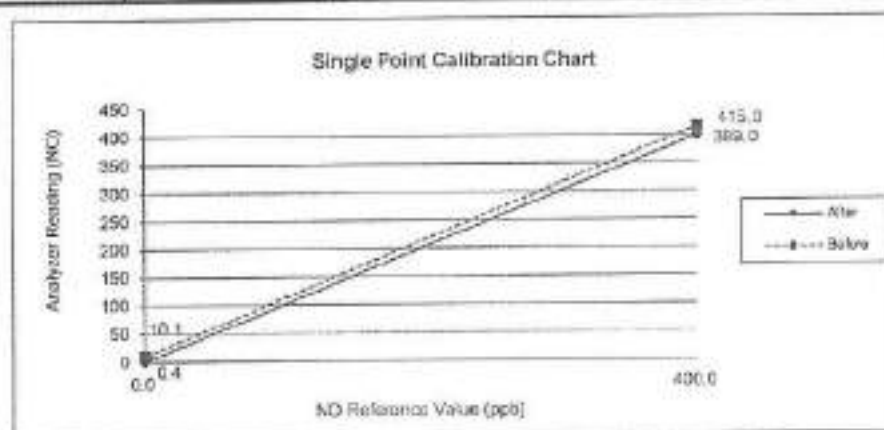
Humidity: 50 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	10.1	0.0	10.1	415	400.0	1.8
NO ₂	3.1	0.0	3.1	3.0	0.0	0.4
NOx	13.2	0.0	13.2	418	400.0	2.2

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.4	0.0	0.4	399	400.0	-0.1
NO ₂	0.5	0.0	0.5	6.0	0.0	0.7
NOx	0.9	0.0	0.9	405	400.0	0.6



This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

**neediss**

บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.
111/111 หมู่ 2 ต.บ้านใหม่ อ.เมือง จ.นนทบุรี 11000
Tel: 02-010-1111 Fax: 02-010-1112 Email: info@neediss.com



MODEL : NOx ANALYZER Model 42C THERMO

DATE : 4-01-2022

S/N : ENOTE42C768384

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - +850 (V)	-675	-678
LAMP VOLTAGE 950 - 1,200 (V)		
INTER TEMP 15 - 45 DEG C	43	43
CHAMBER TEMP 47 + 51 C	49	50
COOLER TEMP -5 - (-2) DEG C	-2	-2
PRESSURE 400 - 1000.0 mm Hg	350	380
SAMPLE FLOW 0.350 - 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.035 - 0.075 LPM	0.05	0.05
No/Nox BKG	12/9.0	12/9.1
No/Nox Slope	1.0/0.8	0.9/0.8

Calibrate By: Sirint PoonlekApprove By: Sarawat Keawstirunul

Sirint Poonlek

Sarawat Keawstirunul

Date: 4-Jan-22

Date: 4-Jan-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

**www.neediss.com**

Envilab Co., Ltd.

The best thing to say is "I'm here!"

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



บริษัท เอ็นวีแอล จำกัด (มหาชน) 54054071
Envilab Co., Ltd. 54054071 Tel: Bangkok 7 Bangkok Bangkok Bangkok 10250
Tel: 02-802-3577-6 Fax: 02-802-3779 E-mail: info@evltesting.com



Verification Test Report

Report No.:

0501 -SLM 01

☒ PM ☐ Onsite UTM : 47 P 1514462 N 054255 E

Calibrated Date: 5 January 2022

Site : บริษัท เอ็นวีแอล จำกัด

Equipment: Sound Level Meter

Manufacturer: NEEDISS

Model: NDSM 309

Serial : 3098004

Environment: Temperature 31 °C Humidity 67 %RH

Reference Standard: Sound Calibrator Class 1 Model 4230,Brue&Kjaer

Serial No. 1351075

Date of Calibration : Feb.18, 2021

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.8	93.5	-0.3	93.8

Calibrated By:

(Surakit Darncholwicht)

Date:

5 January 2022

Approve By:

(Sarawat Keawsrinal)

Date:

5 January 2022

This report shall not be reproduced except in full, without the written approval of Envilab Co., Ltd.

www.evltesting.com

Environmental responsibility with accuracy improvement



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



TSP High Volume Sampler Calibration

Verification Report No.

D8501 - TSP 01

<input checked="" type="checkbox"/> PM	<input type="checkbox"/> Onsite
Site: <u>วัดสุทัศน์ วัดพระเชตุพนวิมลมังคลารามราชวรมหาวิหาร</u>	
UTM: <u>47P N1514475 E854259</u>	
Sampler: <u>ETSP#3</u>	
Recorder: <u>ECRT1500904870</u>	
Date: <u>6 Jan 22</u>	
Technical: <u>Surakit D.</u>	
Approval: <u>Sarawut K.</u>	

CONDITIONS

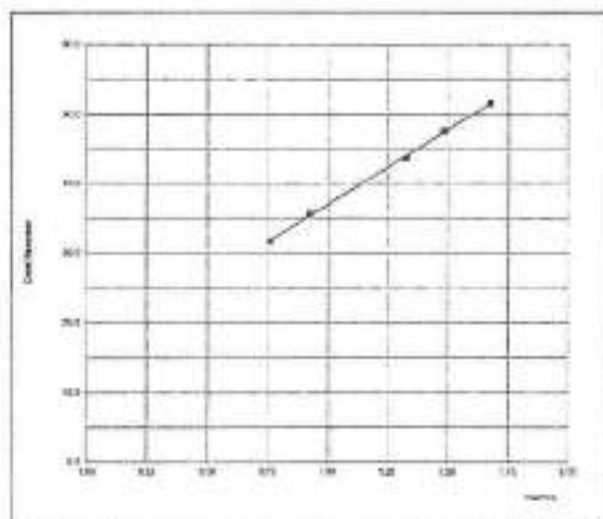
Barometric Press. (hPa): 1010.0	Corrected Pressure (mm Hg): 757.6
Temperature (deg C): 30.0	Temperature (deg K): 303.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Orifice Slope: 2.05054
Model: TE-5025A	Orifice Intercept: -0.00430
Serial#: 2067	Date Certified: 11 Jan 21

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Q _{std} (m ³ /min)	I (chan)	IC (corrected)	LINEAR REGRESSION
1	12.01	1.675	52.0	51.46	Slope = 21.4227
2	9.45	1.486	48.0	47.53	Intercept = 15.5389
3	7.51	1.325	44.0	43.57	Corr. coeff. = 0.9995
4	5.64	0.923	36.0	35.64	# of Observations: 5
5	2.47	0.761	32.0	31.66	Range of Chart: 40
					at 1.1 - 1.7 m ³ /min: 52



Calibrated by: (Signature)
(Surakit Damcholvichit)
6 January 2022

Approved by: (Signature)
(Sarawut Keavsrinual)
6 January 2022

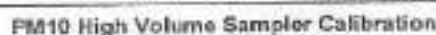
This report shall not be reproduced except in full, without the written approval of Envislab Co., Ltd.

www.evltesting.com



Envislab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



☐ PM ☐ Onsite
 Site: บริษัท เจริญไทยชัย จำกัด
 UTM: 47P N:514475 E:654269
 Sampler: EPM#24
 Recorder: ECRDS016226679
 Date: 7 Jan 22
 Technical: Surakit D.
 Approval: Sarawut K.

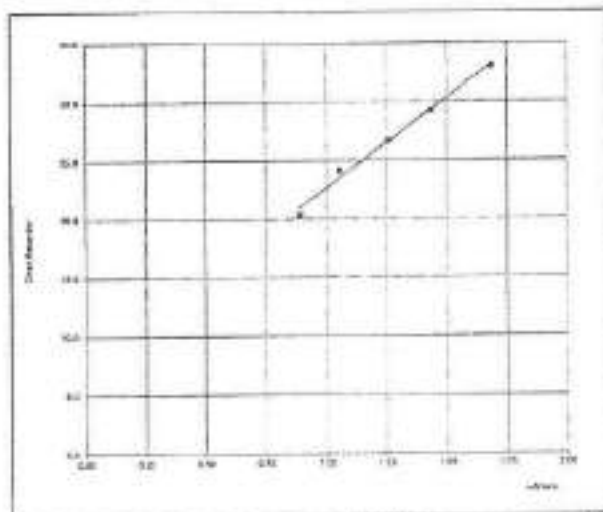
Barometric Press. (hPa): 1009.4
Temperature (deg C): 28.0
Average Press. (hPa): 1013.0
Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.1
Temperature (deg K): 301.0
Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg K): 303.0

Brand: Tisch Environmental, Inc.
Model: TE-5025A
Serial#: 2087

Slope:	1.28401
Intercept:	-0.00265
Date Certified:	11 Jan 21

CALIBRATIONS					LINEAR REGRESSION	
Plate or Test #	H ₂ O (in)	Q ₈ (m ³ /min)	I (chart)	IC (corrected)		
1	11.19	1.645	50.0	31.53		Slope = 11.8183
2	8.50	1.441	44.0	27.74		Intercept = 11.5473
3	6.37	1.241	42.0	26.48		Corr. coeff. = 0.9900
4	3.67	0.968	38.0	23.98		SFR = 1.127
5	1.23	0.547	28.0	17.65		SSP = 39.61
						# of Observations: 5
						Range of Chart at SFR ±10% 38
						41



(Surakit Damchokwichtit)
7 January 2022

(Sarawut Keewinul)
7 January 2022

This report shall not be disseminated outside the U.S. without the written approval of Dynetics Corporation.

www.evtestina.com

Experimental group randomly with Adjusted by means of rank 1



รับรองสำเนาถูกต้อง
มีจัดการเข้าควบคุมดูแล



neediss

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

105 SOMBOONTHAI BUILDING 10TH FLOOR, SUKHUMVIT ROAD, SUKHUMVIT 11, KLONGTOEY, BANGKOK 10110
TEL: 02-2611-1101, 02-2611-1102, 02-2611-1103, 02-2611-1104, 02-2611-1105, 02-2611-1106, 02-2611-1107, 02-2611-1108, 02-2611-1109, 02-2611-1110



MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 4-01-2022

S/N : ESOTE43C089865

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -850 (V)	-650	-653
LAMP VOLTAGE 950 - 1,200 (V)	990	985
LAMP INTENSITY 20000 - 50000 Hz	32568	32577
INTER TEMP 15 - 45 DEG C	37	37
CHAMBER TEMP 47 - 51 C	49	49
COOLER TEMP -5 - (-2) DEG C	-2.5	-2.5
PRESSURE 400 - 1000.0 mm Hg	764	765
FLOW 0.350 - 0.650 LPM	0.42	0.4

Calibrate By : Sirint Poolrak

Approve By : Sarawut Keawsrinual

Sirint Poolrak

Sarawut Keawsrinual

Date: 4-Jan-22

Date: 4-Jan-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com

We know the best thing to solve environment



Envilab Co., Ltd.

Dr. Sirint

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

บริษัท เน็ดิส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.
229/1011 หมู่ 7 ซอยเทศบาล 45 ถนนสาย 10160 ตำบล 56 บางกะปิ กรุงเทพมหานคร 10710
Tel : 02-261-2116-2117 Fax : 02-261-24719 E-mail: info@neediss.com



NOx Analyzer Verification Test Report

Calibration Report No.: 6501001

Page:1/2

Calibrated Date: 4-Jan-21

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer: THERMO S/N: EN0TE42C412226
--	---

Calibration System

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

Environment: Temperature 23.8 °C

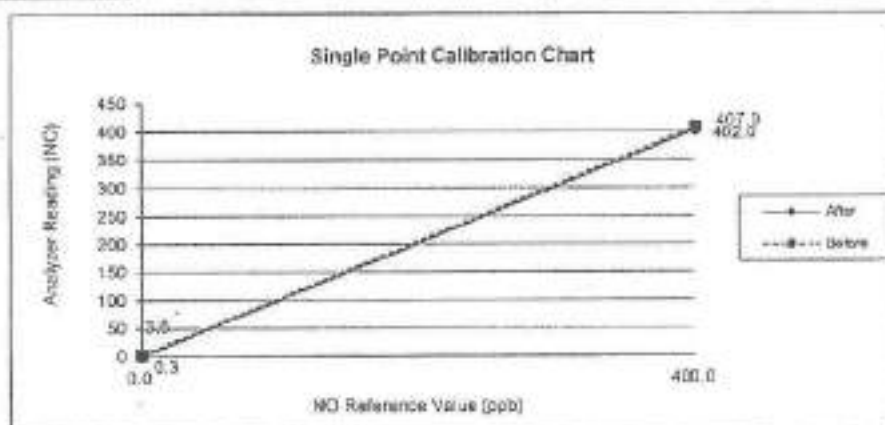
Humidity: 50 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	3.6	0.0	3.6	407	400.0	0.9
NO ₂	2.9	0.0	2.9	3.0	0.0	0.4
NOx	6.5	0.0	6.5	410	400.0	1.2

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.3	0.0	0.3	402	400.0	0.2
NO ₂	0.5	0.0	0.5	3.0	0.0	0.4
NOx	0.8	0.0	0.8	405	400.0	0.6



This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



the best thing to save environment

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ *



neediss

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

506 หมู่ 11 ตำบล 7 อำเภอเมือง จังหวัดเชียงใหม่ 50100 506 หมู่ 11 ตำบล 7 อำเภอเมือง จังหวัดเชียงใหม่ 50100
Tel: 053-843711 Fax: 053-843712 Email: info@neediss.com



MODEL : NOx ANALYZER Model 42C THERMO
S/N : ENOTE42C412226

DATE 4-01-2022

Page:2/2

Test Function Value	Before	After
Range 500 (PPH)	500	500
PMT VOLTS -450 - -850 (V)	-675	-678
LAMP VOLTAGE 950 - 1200 (V)		
INTER TEMP 15 - 45 DEG C	43	43
CHAMBER TEMP 47 - 51 C	49	50
COOLER TEMP -5 - (-2) DEG C	-2	-3
PRESSURE 400 - 1000.0 mm Hg	350	380
SAMPLE FLOW 0.350 - 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.035 - 0.075 LPM	0.05	0.05
No/Nox EKG	12/9.0	12/9.1
No/Nox Sleep	1.0/0.8	0.9/0.8

Calibrate By : Sirirat Poonlax

Sirirat Poonlax

Date: 4-Jan-21

Approve By : Sariwat Keawsrinual

Sariwat Keawsrinual

Date: 4-Jan-21

This report not be reproduced except in full without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



We know the best thing to save environment



Envirob Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Verification Test Report

Report No.:

6501 -SLM 05

☒ PM ☐ Onsite UTM: 47 P 1514462 N 854258 E

Calibrated Date: 5 January 2022

Site : บริษัท เล็บไวแล็ม จำกัด

Equipment: Sound Level Meter

Manufacturer: NEEDISS

Model: NDSM 309

Serial : 565011

Environment: Temperature 31 °C Humidity 67 %RH

Reference Standard: Sound Calibrator Class 1 Model 4230, Brüel & Kjær

Serial No. 1351075

Date of Calibration : Feb. 16, 2021

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.8	94.0	0.2	93.8

Calibrated By

(Surakit Darncholwichit)

Date: _____

5 January 2022

Approve By:

(Sarawut Keawsrinua)

Date: _____

5 January 2022

This report shall not be reproduced except in full without the written approval of EnviroLab Co., Ltd.

! www.evltesting.com

Environmental Accuracy with accuracy measurement
 OF 100% New Orleans



EnviLab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

**neediss**บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.538/108 หมู่ 7/1 แขวงบางนาแค เขตภาษีเจริญ กรุงเทพมหานคร 10160 538 Sol Bangkhoe 7 Bangkhoe Bangkok Bangkok
Tel. 02-802-3980-2 Fax. 02-802-3988 E: info@neediss.com

Verification Report of Ambient Air Sampling



PM



Onsite UTM :

Report No :

6412001

Instrument :

PM-2.5 Sampler SINGLE

Validation Date :

6-Jan-22

Manufacturer :

Tisch Environmental

Model :

TE-Wilbur 2.5

Serial/ID No. :

EP2TIWILBU0451

Environment :

Humidity(5RH) :

79

Temperature (oC) :

28

Pressure (mmHg) :

760.5

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	29.0	29.0
Filter	-10.0	0.0	20.0	45.0	28.8	29.0

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	16.67 LPM	0 LPM

Engineer :

Tanin Huadcharoen

Approve By:

Sarawut Keawwinnual

Issue Date:

6-Jan-22

Date:

6-Jan-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

**www.neediss.com**

We know the best thing to save environment



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ



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

535 ซอยบางนา 7 แขวงบางนา เขตบางนา กรุงเทพมหานคร 10160 535 Soi Bangnae 7 Bangnae Bangkok Bangkok
 Tel. 02-802-3980-2 Fax. 02-802-3988 E:info@neediss.com



Verification Report of Ambient Air Sampling

☒ PM

☐ Onsite UTM :

Report No :

6412018

Instrument :

PM-2.5 Sample Single

Validation Date:

5-Jan-22

Manufacturer :

Rupprecht, Patashnick

Model :

200-H

Serial/ID No. :

EP2RP200099710

Environment :

Humidity(%RH) : 79

Temperature (°C) : 28

Pressure (mmHg) : 760.5

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	28.9	29.0

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	16.67 LPM	0 LPM

Engineer :

Tanin  **neediss**
 Tanin Huadcharoen
 Neediss Supply Instrument Co., Ltd.

Approve By:

Sarawut

Sarawut Keawsrinual

Issue Date:

5-Jan-22

Date:

5-Jan-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com

We know the best thing to save environment



รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ พ



Certificate of Calibration

Calibration Certification Information

Cal. Date: January 11, 2021 Roots-meter S/N: 438320 Ta: 293 °K
 Operator: Jim Tisch Pa: 757.9 mm Hg
 Calibration Model #: TE-5025A Calibrator S/N: 2067

Run	Vol. Inlt (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4470	3.3	2.00
2	3	4	1	1.0260	6.4	4.00
3	5	6	1	0.9120	8.0	5.00
4	7	8	1	0.8660	8.9	5.50
5	9	10	1	0.7170	12.9	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)
1.0099	0.6979	1.4243	0.9956	0.6881	0.8793
1.0057	0.9803	2.0143	0.9916	0.9664	1.2435
1.0036	1.1004	2.2520	0.9894	1.0849	1.3903
1.0024	1.1575	2.3619	0.9883	1.1412	1.4581
0.9970	1.3906	2.8486	0.9830	1.3710	1.7586
QSTD	m=	2.05054	QA	m=	1.28401
	b=	-0.00430		b=	-0.00265
	r=	0.99994		r=	0.99994

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

Standard Conditions

Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH:	calibrator manometer reading (in H2O)
ΔP:	roots-meter 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



รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Certificate No. : 64-200011-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
 536 Soi Bangkhao 7, Bangkhao, Bangkok 10160

Equipment : Electronic Balance
 Manufacturer : Sartorius Model : SECURA224-JS
 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 : (22.2 to 22.9) °C
 Relative Humidity : (55.9 to 62.2) %
 Air Pressure : (1014.0 to 1015.0) mbar

Date of Received : 05 February 2021

Date of Calibration : 05 February 2021

Date of Issue : 08 February 2021

Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
 Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02204101	17 Nov 2021	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.



Certificate of Calibration

Certificate No. : 64-200011-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of Indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.01	0.0001	0.00011
0.1	0.0001	0.00011
1	0.0000	0.00011
2	0.0001	0.00011
5	0.0000	0.00011
10	0.0000	0.00011
20	-0.0001	0.00012
50	-0.0001	0.00014
100	-0.0001	0.00020
200	-0.0002	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 $k = 2.00$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

A B C D E
0.0001 0.0000 0.0000 0.0000 0.0000 g



Repeatability

Load test : 200 g

Stdev. : 0.00005 g

-o00-

Handwritten signature



Certificate of Calibration

Certificate No. : 64-410010-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Digital Thermo-Hygrometer

Manufacturer : ebro

Model : EBT 20-TH1

Range Temperature : -30 °C to 60 °C

Resolution : 0.1 °C

Range Humidity : 0 %R.H. to 100 %R.H.

Resolution : 0.1 %R.H.

Serial No. : 62227425

ID No. : N/A

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

Relative Humidity : (50 ± 15) %

Date of Received : 05 February 2021

Date of Calibration : 11 February to 13 February 2021

Date of Issue : 13 February 2021

Calibrated by : Chortip Samchusri

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4013 by compared with standard probe sensor humidity/temperature into humidity/temperature chamber.

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

Digital Indicator with Standard Probe Temp&Hum

ID No.

Cert. No.

Due Date

Traceability

400034 & 400036 SG-H-00041/64

12 Jul 2021

Success Gateway Co., Ltd., Accredited by TIS Calibration No.0268

Approved by:

(Bunjerd Masri)

Supervisor

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-P0031-03



W. Chai

รับรองสำเนาถูกต้อง

Envilab Co., Ltd.

ผู้จัดการฝ่ายควบคุมคุณภาพ *

Certificate of Calibration

Certificate No. : 64-410010-1

Page : 2 of 2

UUC Condition As-Received : Good

Result of Calibration : Without Adjustment

Function : Temperature measurement

Reference Humidity @ 50 %R.H.

Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
10.04	9.8	0.2	0.46
25.00	25.0	0.0	0.46
30.02	30.0	0.0	0.46

Result of Calibration : Without Adjustment

Function : Humidity measurement

Reference Temperature @ 25 °C

Standard Humidity (%R.H.)	UUC Reading (%R.H.)	Correction (%R.H.)	Uncertainty (± %R.H.)
39.99	47.7	-7.7	2.2
50.03	56.2	-6.1	2.2
59.99	66.0	-6.0	2.3

Remark

UUC : Unit Under Calibration

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$,

providing a level of confidence of approximately 95%

- ๓0๐ -





THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-64/0312

MTC No. EEL BP. 57/0264

CALIBRATION CERTIFICATE

Submitted by : Envilab Co., Ltd.
Address : 540, 540/1 Soi Bangkhoe 7, Bangkhoe, Bangkhoe, Bangkok 10160 Thailand.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
 : Soi 1 C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Level Calibrator
Manufacturer : Bruel&Kjaer
Model : 4230
Serial No. : 1351075

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$
Relative Humidity : $(50 \pm 15) \%$
Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
 2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
 3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
 4. Digital Multimeter Agilent 34401A S/N MY44005560.
 5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
 6. Audio Analyzer Keithley 2015-P S/N 4106495.
 7. Condenser Microphone Bruel&Kjaer 4180 S/N 2889871.

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

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

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

Date of Receipt : 10 Feb. 2021

Date of Calibration : 18 Feb. 2021

1 / 2

The results relate only to the items tested or calibrated

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/BLMTC.002 Rev.3

Head Office
 35 Mu 3 Tambon Klong Ha, Amphoe Khlong Luang,
 Changwat Pathumthani 12120, Thailand
 Tel. (66) 0 2577 9000
 Fax. (66) 0 2571 9009
 E-mail : numpag@tistr.or.th Website: www.tistr.or.th

Office/Laboratory
 Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
 Amphoe Muang, Changwat Samutprakan 10280, Thailand
 Tel. (66) 0 2323 1673-80 ext. 115, 116
 Fax. (66) 0 2323 9165
 E-mail : info@tistr.or.th

Office
 196 Phahonyothin Road, Chatuchak, Bangkok 10900,
 Thailand
 Tel. (66) 0 2579 1121-30 ext. 5219, 5221, 5217
 Fax. (66) 0 2579 8592
 E-mail : suanalee@tistr.or.th



รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ *



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-64/0312

MTC No. EEL, BP. 57/0264

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

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	93.78	-0.22	± 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	998.3	-1.7	± 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	0.68	± 0.50	$\pm 3.0\%$

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

Calibrated by:


(Mr. Tawikiat Iamsamran)

Approved by:


(Mr. Pongthai Kiatyapa)
TISTR

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 18 Feb. 2021

Date of Issue : 19 Feb. 2021

Ref : 2011264021000592001

2 / 2

End of Certificate

The results relate only to the items tested or calibrated.

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.BLMTC.002 Rev.3

Head Office

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

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1372 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chaochak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 0592
E-mail : sume@tistr.or.th



Envia Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

CERTIFICATE OF ANALYSIS **Grade of Product: EPA Protocol**

Part Number:	ED4NI99E15A00V3	Reference Number:	160-402021734-1
Cylinder Number:	EB0140762	Cylinder Volume:	144.4 Cubic Feet
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12021	Valve Outlet:	660
Gas Code:	CO,NO,NOX,SO2,BALN	Certification Date:	Feb 19, 2021

Expiration Date: Feb 19, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 6.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	45.00 PPM	44.68 PPM	G1	+/- 1.4% NIST Traceable	02/12/2021, 02/19/2021
NITRIC OXIDE	45.00 PPM	44.62 PPM	G1	+/- 1.4% NIST Traceable	02/12/2021, 02/19/2021
SULFUR DIOXIDE	45.00 PPM	45.34 PPM	G1	+/- 1.1% NIST Traceable	02/12/2021, 02/19/2021
CARBON MONOXIDE	4500 PPM	4500 PPM	G1	+/- 1.0% NIST Traceable	02/19/2021
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	200611-04	CC707968	49.82 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Feb 02, 2025
PRM	12385	D685025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
GMS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	0141709	KAL003193	49.67 PPM SULFUR DIOXIDE/NITROGEN	+/- 1.0%	Jun 20, 2022
NTRM	08012341	KAL004715	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

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

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 N1KD579	NDIR	Jan 27, 2021
Nicolet IS50 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet IS50 FTIR AUP2010245 NO2	FTIR	Jan 21, 2021
Nicolet IS50 FTIR AUP2010245 SO2	FTIR	Jan 21, 2021

Triad Data Available Upon Request

NOTES:

Gross Weight: 28.4 Kg
Net Weight: 4.5 Kg
PC# 5221000405



Michael A. Perkins
Approved for Release



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Calibration Certificate

Part Number: 721A2601
Description: Micromate with DIN Geophone
Serial Number: UM18210
Calibration Date: **MAR 24 2021**
Calibration Reference Equipment: 714J7402

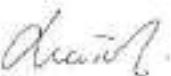
Instantel certifies that the above product was calibrated in accordance with the applicable Instantel procedures. These procedures are part of a quality system that is designed to assure that the product listed above meets or exceeds Instantel specifications.

Instantel further certifies that the measurement instruments used during the calibration of this product are traceable to the National Institute of Standards and Technology; or National Research Council of Canada. Evidence of traceability is on file at Instantel and is available upon request.

The environment in which this product was calibrated is maintained within the operating specifications of the instrument.

Please note that the sensor check function is intended to check that the sensors are connected to the unit, installed in the proper orientation and sufficiently level to operate properly. This function should not be confused with a formal calibration, which requires the sensors be checked against a reference that is traceable to a known standard. Instantel recommends that products be returned to Instantel or an authorized service and calibration facility for annual calibration.

Calibrated By: _____



Xiaoming Yang

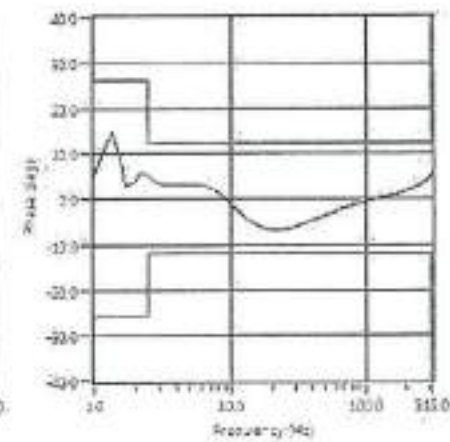
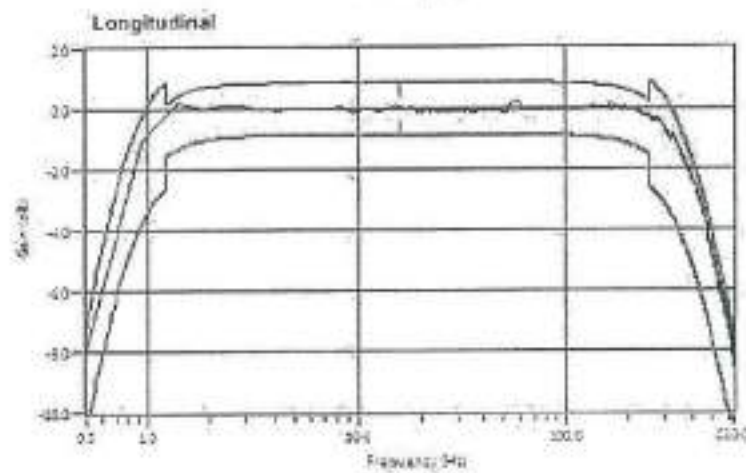
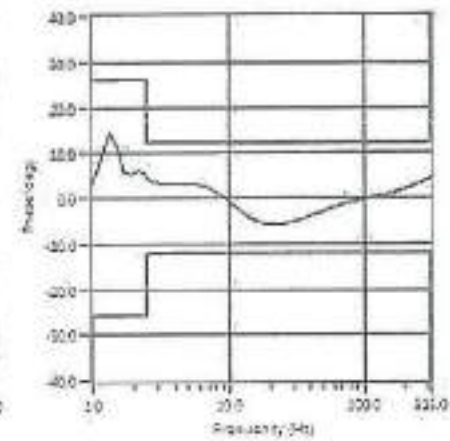
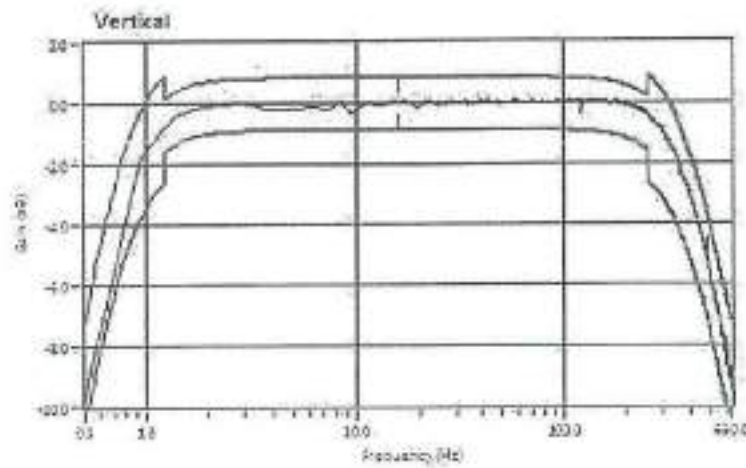
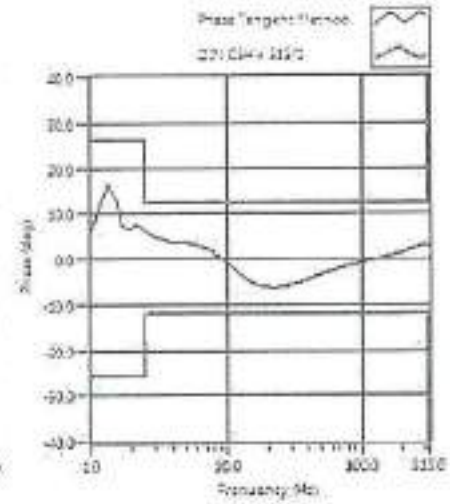
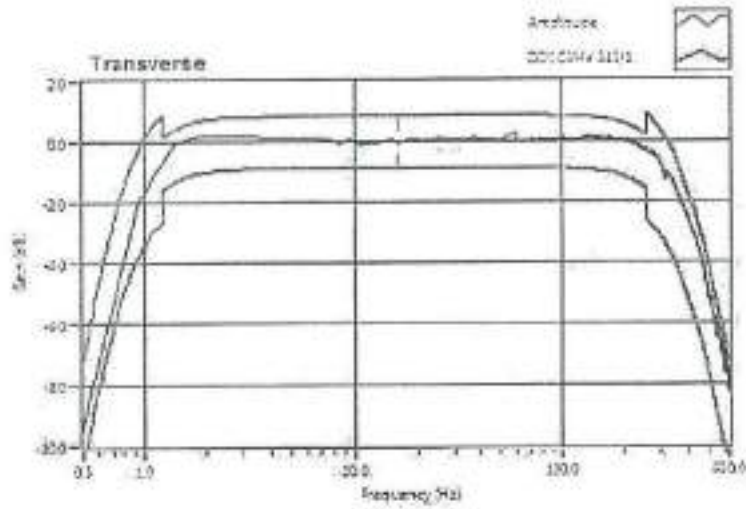


309 Legget Drive, Ottawa, Ontario, K2K 3A3, [613] 592-4642




รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Frequency Response of UM18210



Enviab Co., Ltd.

Signature

บริษัท สำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

CAL

Calibratech Co., Ltd.

7/105-7 Moo 2, Sukhaphachon 3 Rd., Banggood, Pakkred, Northburi 11120

Tel: (02) 964-6211 Fax: (02) 964-3153, e-mail: calibratech.co@gmail.com, calibratech.co@calibratech.co



NSC-TISI-TIS 17925
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-200049-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
540, 540/1 Soi Bangkhue7, Bangkhue, Bangkok 10160

Equipment : Electronic Balance
Manufacturer : Sartorius Model : SECURA125-1S
Serial No. : 0034606552 ID No. : ELABBALANCEN05
Capacity : 120 g Resolution : 0.00001 g

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

Ambient Temperature : (23.1 to 24.0) °C

Relative Humidity : (56.7 to 61.9) %

Air Pressure : 1013.0 mbar

Date of Received : 02 March 2021

Date of Calibration : 02 March 2021

Date of Issue : 06 March 2021

Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02204101	17 Nov 2021	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Pranshong)

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-F0031/01



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Certificate No. : 64-200049-1

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)
0.1	0.00000	0.000017
0.5	-0.00001	0.000022
1	0.00001	0.000026
2	0.00000	0.000034
5	-0.00001	0.000043
10	0.00000	0.000053
20	-0.00002	0.000071
50	-0.00003	0.00011
100	-0.00005	0.00020
120	-0.00006	0.00038

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

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

Eccentric error

Load test : 20 g

A B C D E

0.00003 0.00003 -0.00001 0.00001 0.00000 g



Repeatability

Load test : 100 g

Stdev. : 0.000014 g

- o O o -

Handwritten signature



CAL

Calibratech Co., Ltd.

1-106-7 Moo 2, Sukhaphichan 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120

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



NSC-TISI-TIS 17025
CALIBRATION 0039

Certificate of Calibration

Certificate No. : 64-410010-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkhao7, Bangkhao, Bangkok 10160

Equipment : Digital Thermo-Hygrometer

Manufacturer : ebro

Model : EBI 20-TH1

Range Temperature : -30 °C to 60 °C

Resolution : 0.1 °C

Range Humidity : 0 %R.H. to 100 %R.H.

Resolution : 0.1 %R.H.

Serial No. : 62227425

ID No. : N/A

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

Relative Humidity : (50 ± 15) %

Date of Received : 05 February 2021

Date of Calibration : 11 February to 13 February 2021

Date of Issue : 13 February 2021

Calibrated by : Chontip Sanchusi

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4013 by compared with standard probe sensor humidity/temperature into humidity/temperature chamber.

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

Digital Indicator with Standard Probe Temp&Hum

ID No.

Cert. No.

Due Date

Traceability

400034 & 400036 SG-H-00041/64

12 Jul 2021

Success Gateway Co., Ltd., Accredited by TISI Calibration No.0268

Approved by

(Burjerd Masri)

Supervisor

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-P0031-01



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Certificate No. : 64-410010-1

Page : 2 of 2

UUC Condition As-Received : Good

Result of Calibration : Without Adjustment

Function : Temperature measurement

Reference Humidity @ 50 %R.H.

Standard Temperature ($^{\circ}\text{C}$)	UUC Reading ($^{\circ}\text{C}$)	Correction ($^{\circ}\text{C}$)	Uncertainty (\pm $^{\circ}\text{C}$)
10.04	9.8	0.2	0.46
25.00	25.0	0.0	0.46
30.02	30.0	0.0	0.46

Result of Calibration : Without Adjustment

Function : Humidity measurement

Reference Temperature @ 25 $^{\circ}\text{C}$

Standard Humidity (%R.H.)	UUC Reading (%R.H.)	Correction (%R.H.)	Uncertainty (\pm %R.H.)
39.99	47.7	-7.7	2.2
50.03	56.2	-6.1	2.2
59.99	66.0	-6.0	2.3

Remark

UUC : Unit Under Calibration

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

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

- o O o -



Certificate of Calibration

Certificate No. : 64-420055-1 **Page : 1 of 2**

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

Equipment : pH Meter (Pocket)
 pH meter
Manufacturer : Eutech **Model :** pHTestr 30
Range : -1.00 to 15.00 pH **Resolution :** 0.01 pH
Serial No. : 2856418 **ID No. :** ELABPHTEST3016

Environment : On site calibration was carried out at the Laboratory, Envilab Co.,Ltd.
Ambient Temperature : (24.5 to 25.0) °C
Relative Humidity : (50 to 54) %

Date of Received : 24 March 2021
Date of Calibration : 24 March 2021
Date of Issue : 24 March 2021
Calibrated by : Bunjerd Masti

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
4.004	61208711	684575	01 Sep 2021	CPA chem
6.985	61191143	684576	01 Sep 2021	CPA chem
9.963	61208865	684577	01 Sep 2021	CPA chem

Approved by :

(Bunjerd Masti)

Supervisor

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-P003-F-02



รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Certificate No. : 64-420055-1

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 (\pm pH)
4, 7, 10	4.004	4.00	0.01	0.011
	6.985	7.00	-0.01	0.020
	9.963	10.00	-0.04	0.053

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

-oOo-

B





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.: 21TW57

Page.: 1 of 2

Certificate of Testing

Equipment :	DO Meter
Manufacturer :	Hanna
Model :	HI 9146
Serial No. :	G0007931
ID No. :	EDOH1914607931
Received Date :	16 March 2021
Test Date :	19 March 2021
Reference :	2103-0669DN-1
Submitted by :	Envilab Co.,Ltd (Head office) 540, 540/1 Soi Bangkhae 7, Bangkhae, Bangkhae, 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
Calibrated by :	Walalak Sinihean
Approved by :	 Approved Signatory
(✓) Malee Butkruea	
() Sathip Meangmai	
() Warakorn Lertsatitkul	
Issue Date :	23 March 2021

0257191



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Cert.No.: 21TW57

Page.: 2 of 2

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: KC1A01TAF

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.00	8.17	0.00

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

-o0o-

Milee

a 1047872



Envilab Co., Ltd.

OK
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Certificate No. : 64-400569-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Air Chamber (Refrigerator)

Manufacturer : M-LAB

Model : BIC-140

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 1011

ID No. : ELABBODC140N03

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

Ambient Temperature : (23.0 to 23.8) °C

Relative Humidity : (55 to 60) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 12 November 2021

Date of Calibration : 12 November 2021

Date of Issue : 18 November 2021

Calibrated by : Bunjerd Masri

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No.

Cert. No.

Due Date

Traceability

400046 & 400023 64-400443-1

29 Mar 2022

National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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-PC03103



รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Certificate No. : 64-400569-1

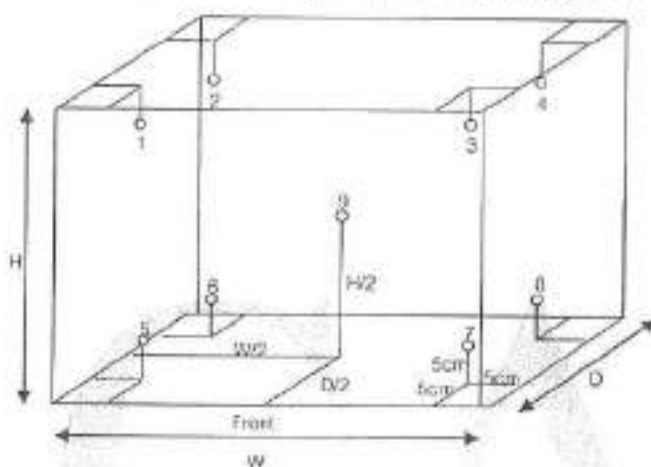
Page : 2 of 2

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	
4.0	4.0	4.0	3.3	3.2	3.4	3.4	3.9	3.9	4.0	3.4	4.2	0.5T

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
4.0	4.0	4.0	1.0	0.1	1.0

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%

- ๐/๐ -

[Signature]





CALIBRATION CERTIFICATE

Date of Issue Feb 13, 2021

Cert No. 210323

Site Calibration

Order No. 21020066

Customer Envlab Co., Ltd.

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

Place of Calibration MICRO ROOM (B302)

Description Incubator

Model IF75

Serial No. D319.0086

ID.No. -

Date of Receipt Feb 12, 2021

Date of Calibration Feb 12, 2021

Environment

Temperature	(Min)	25.1	°C	(Max)	26.1	°C
Relative Humidity	(Min)	67.2	%RH	(Max)	69.3	%RH

Calibration Method

WI-17 : The reference thermometer was placed into the chamber and measurement was performed based on AS-2853.
The temperature scale in use at this laboratory is the International Temperature Scale of 1990.

Standard

1) Data Acquisition with Sensor Model 34972A, S/N: MY49007789, Certificate No. QR20-2119, Calibrated by Quality Reborn Co., Ltd., ONAC Calibration No. 0292.

This certificate is traceable to SI unit.

Page 1 of 3

D. Piri

This certificate is issued in accordance with the conditions of Thermology Laboratory. The traceability is recognized national standard and the unit of measurement realised at corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of laboratory.



D. Piri
รับรองว่าเราถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



CALIBRATION CERTIFICATE

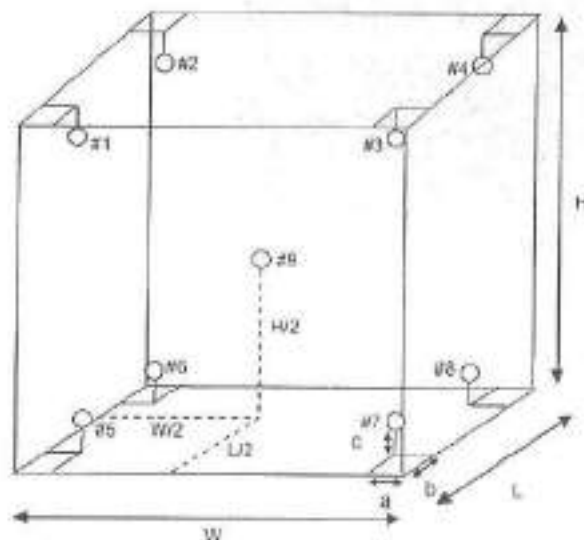
Date of Issue Feb 13, 2021

Cert No. 21/0323

Site Calibration

Order No. 21020065

Results (without adjustment)



Position of reference thermometers were placed

Note.

- 1). Dimension (W x L x H) is 40 x 35 x 56 cm.
- 2). Stability - greatest one half of difference between max peak and min peak of each reference probe measured temperature obtained during the calibration interval.
- 3). Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions. The reference sensor should preferably be located at the geometric center of the chamber.

D. Mi



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



CALIBRATION CERTIFICATE

Date of Issue Feb 13, 2021

Cert No. 21/0323

Site Calibration

Order No. 21020068

Results (without adjustment)

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability ±(°C)	Uniformity (°C)	Uncertainty ±(°C)
44.5	44.5	Position 1	44.536	0.048	0.448	0.31
		Position 2	44.593			
		Position 3	44.601			
		Position 4	44.570			
		Position 5	44.532			
		Position 6	44.386			
		Position 7	44.131			
		Position 8	44.523			
		Position 9	44.536			

The stability and uniformity was taken into account in the measurement uncertainty stated.

The above results are valid exclusively for calibration samples as mentioned in the report.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with ONAC requirements.

APPROVED SIGNATORY :

(MR. DAMRONG MULSING)

Page 3 of 3



Environmental Co., Ltd.

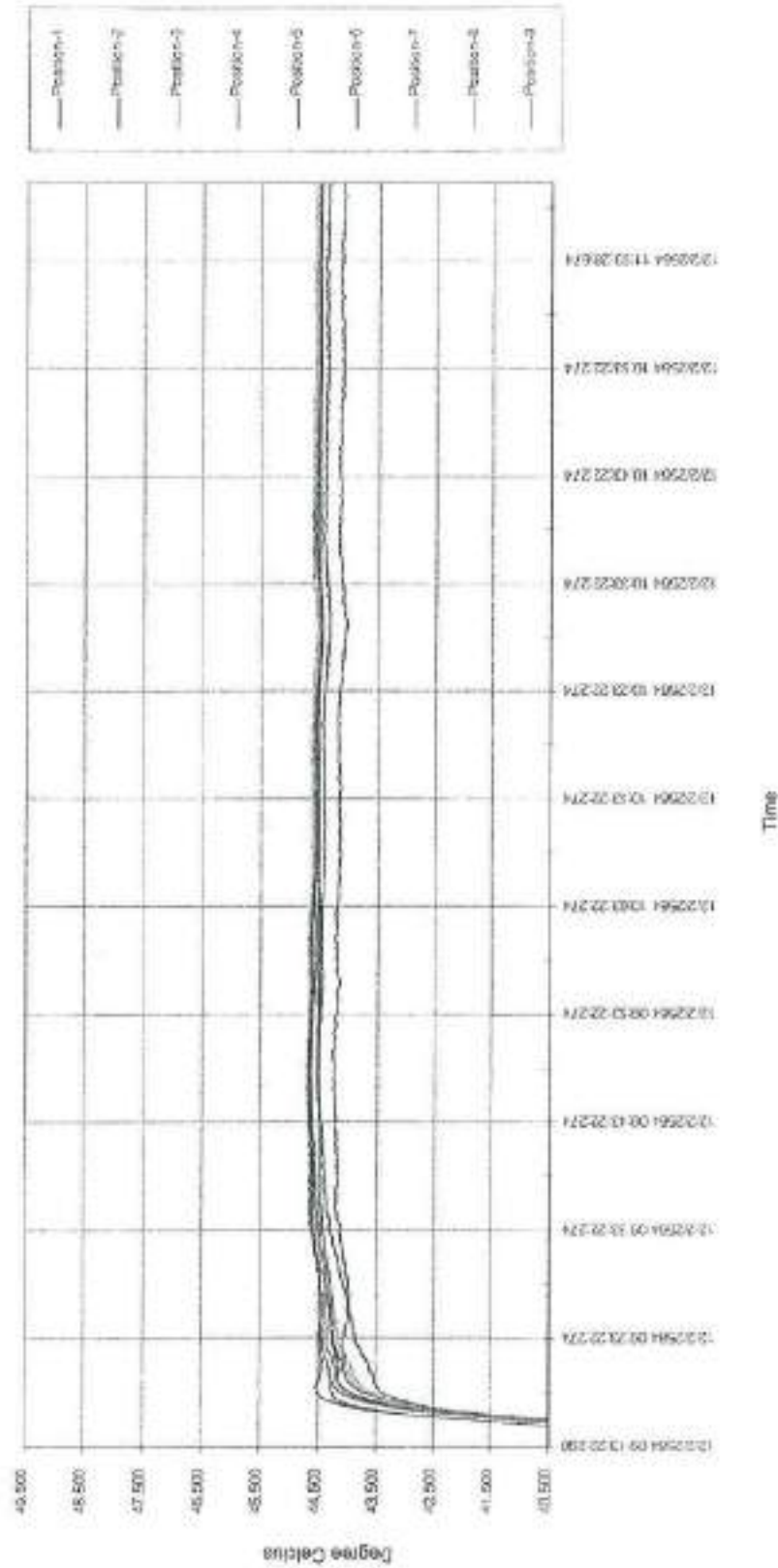
รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ 4

Cart No. 210323

Incubator

Model IF75 S/N D316.0066 ID.No. -



EnviLab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

CAL

Calibratech Co., Ltd.

3/109-7 Moo 1, Sukhprachuen 3 Rd., Bangpoo, Pakkong, Nonthaburi 11120

Tel (02) 864-6211 Fax (02) 864-5155 e-mail : calibratech.cal@yahoo.com, calibratech.cal@gmail.com



NSG-TIS1-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-400163-2

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. : N/A

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

Ambient Temperature : (30.0 to 31.5) °C

Relative Humidity : (50 to 55) %

Line Voltage : (224.2 to 225.2) V

Date of Received : 24 March 2021

Date of Calibration : 24 March 2021

Date of Issue : 25 March 2021

Calibrated by : Pempon 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 & 400032

63-400450-1

30 Mar 2021

National Institute of Metrology Thailand (NIMT)

Approved by :

(Benjerd Masri)

Supervisor

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-F0011-01



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ *

Certificate of Calibration

Certificate No. : 64-400163-2

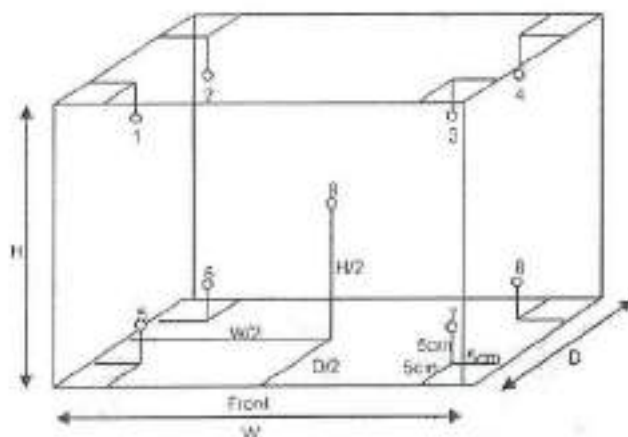
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.56 m

Capacity = 0.07 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	
104.0	103.5	103.5	104.0	104.3	104.3	104.2	104.2	103.9	103.7	104.2	104.1	0.69
110.0	109.5	109.5	110.0	110.4	110.4	110.2	110.2	109.9	109.6	110.2	110.1	0.69
180.0	179.0	179.0	179.0	180.3	180.2	180.2	180.3	180.0	179.0	180.4	180.3	0.95

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	103.5	103.5	0.5	0.1	0.8
110.0	109.5	109.5	0.7	0.1	1.0
180.0	179.0	179.0	1.5	0.2	1.7

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%

- o o o -

Signature



CAL

Calibratech Co., Ltd.

7/105-7 Moo 2, Sukhaphruek Road 3 Rd., Bangpoo, Pukiet, Nonthaburi 11120

Tel (02) 964-6211 Fax (02) 964-3155, e-mail: calibratech.co@yahoo.com, calibratech.co@hotmail.com



Certificate of Calibration

Certificate No. : 64-400049-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Sai 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 : (26.0 to 26.5) °C

Relative Humidity : (45 to 50) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 05 February 2021

Date of Calibration : 05 February 2021

Date of Issue : 06 February 2021

Calibrated by : Permpon Chanpa

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
400029 & 400031	63-400049-1	28 Mar 2021	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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 Envilab Co., Ltd.



CAL-F0031-01



Envilab Co., Ltd.

Dr. Masri

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

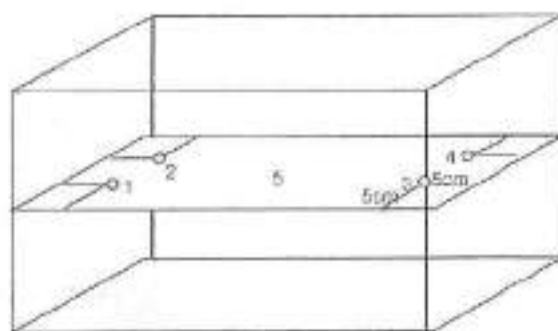
Certificate No. : 64-400049-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @					Uncertainty (± °C)	Measured Uniformity (°C)	Measured Stability (°C)
			Sensor No.							
			1	2	3	4	5			
95.0	95.0	95.0	95.35	95.44	95.53	95.38	95.46	0.20	0.19	0.09

Bemerk: The uncertainty is not combine uniformity of the water bath

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

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

- o O o -

Signature



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhprachuen 3 Rd., Bangna, Pakkret, Northburi 11120

Tel: (02) 964-6211 Fax: (02) 964-3155 e-mail: calibratech.co@gmail.com, calibratech.co@chamail.com



NSC-TIS-71517025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-300152-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Cylinder

Manufacturer : PYREX

Class : A

Capacity : 50 ml

Graduation : 1 ml

ID No. : C-WW-002/21

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

Relative Humidity : (50 ± 15) %

Air Pressure : 1012.9 mbar.

Date of Received : 02 March 2021

Date of Calibration : 12 March 2021

Date of Issue : 12 March 2021

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	63-200378-1	02 Jun 2021	National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Toivadee)

Supervisor

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-P0031-03



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Certificate No. : 64-300152-2

Page : 2 of 2

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

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
30	29.93
50	50.01

Uncertainty of measurement with in \pm 0.054 ml

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

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

- o O o -

D.



On the

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

CAL

Calibratech Co., Ltd.

3/106-7 Moo 2, Sukhprachan 3 Rd., Bangpoo, Pakkret, Nonthaburi 11120

Tel.(02) 954-6211 Fax.(02) 954-5155, e-mail: calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



NSC-TISI-TIS17025
CALIBRATION ISO 9000

Certificate of Calibration

Certificate No. : 64-300152-6

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Cylinder

Manufacturer : Witog

Class : A

Capacity : 1000 ml

Graduation : 10 ml

ID No. : C-WW-029/18

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

Relative Humidity : (50 ± 15) %

Air Pressure : 1012.9 mbar

Date of Received : 02 March 2021

Date of Calibration : 12 March 2021

Date of Issue : 12 March 2021

Calibrated by : Arcerst 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	63-200378-1	02 Jun 2021	National Institute of Metrology (Thailand) (NIMT)

Approved by:

(Wipa Tavidon)

Supervisor

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-0001-00



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangruat, Polkret, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-1155 e-mail : calibratech.cal@yodoo.com, calibratech.cal@gmail.com

Certificate of Calibration

Certificate No. : 64-300152-6

Page : 2 of 2

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

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
500	502.85
1000	1001.80

Uncertainty of measurement with in \pm 0.17 ml

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

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

- 000 -

D.



CAL-F0031-03



Envelab Co., Ltd.

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

ประจำเดือนมีนาคม พ.ศ. 2565



TSP High Volume Sampler Calibration

Verification Report No.

A6503 -TSP 02

☒ PM ☐ Onsite

Site: บริษัท เอ็นไวรอนเม้นท์ จำกัด

UTM: 47P N1514475 E654289

Sampler: ETSP#06

Recorder: ECRANG15315224

Date: 4 Mar 22

Technical: Surakit D.

Approval: Sarawut K.

CONDITIONS

Barometric Press. (hPa): 1009.7

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.3

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#: 1326

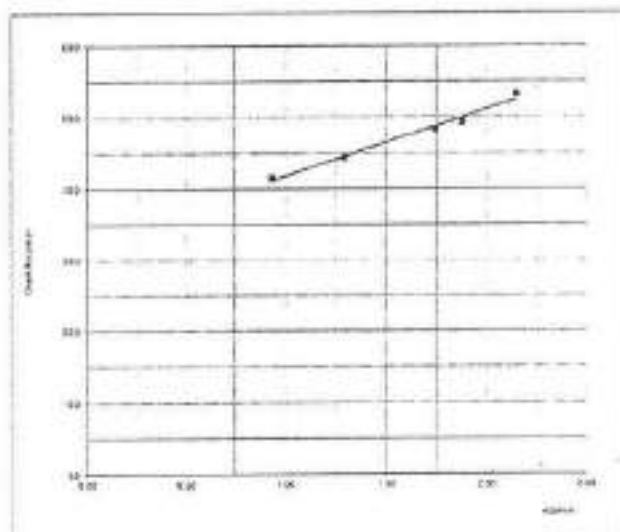
Gold Slope: 1.63957

Gold Intercept: -0.01202

Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Gold (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	12.71	2.153	54.0	53.28	
2	9.72	1.884	50.0	49.34	<p>Slope = 9.3795 Intercept = 32.3791 Corr. coeff = 0.9926</p> <p># of Observations: 5</p> <p>Range of Chart at 1.1 - 1.7 m3/min: 44</p>
3	6.35	1.524	47.0	46.36	
4	4.52	1.267	45.0	44.40	
5	2.35	0.930	42.0	41.44	
					48



Calibrated by :

(Surakit Damcholechit)

4 March 2022

Approved by :

(Sarawut Ketwanthul)

4 March 2022

This report shall not be reproduced except in full, without the written consent of EVL Co., Ltd.

www.evltesting.com

REV: 2.00 01/05/20



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

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

105 หมู่ 10 ตำบลบ้านใหม่ อำเภอบางพลี จังหวัดสมุทรปราการ 10510 535 541 Bangkok 10510 Bangkok Bangkok Bangkok
Tel: 02-010-3188, 02-010-3189, 02-010-3190 Fax: 02-010-3191 Email: info@neediss.com



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6503001

Page:1/1

Calibrated Date: 3-Mar-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO2 Analyzer Model: THERMO_43C	Manufacturer THERMO S/N: ESOTE43C102362
--	--

Calibration System

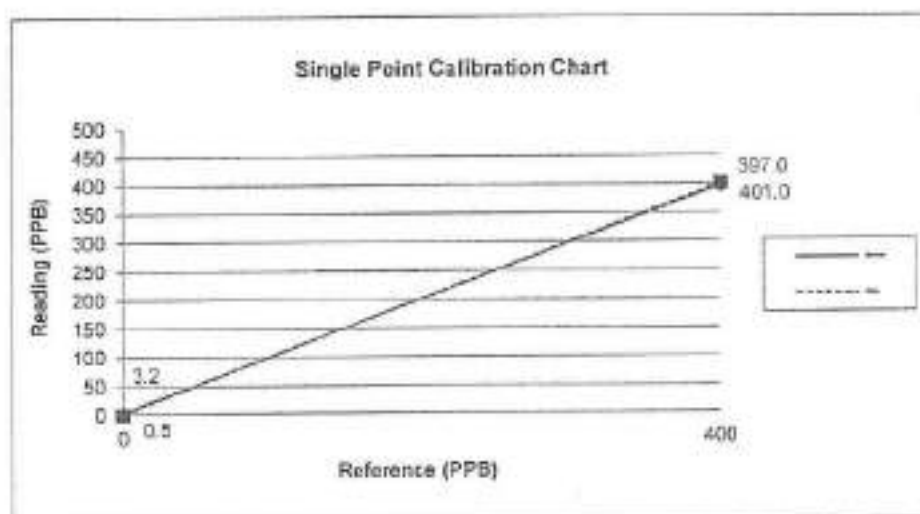
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 25.5 °C

Humidity: 55 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	3.2	3.2	400.0	397	-0.8
After	0.0	0.5	0.5	400.0	401	0.3



EnviLab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com

We know the best thing to save environment

ENVILAB-11521



neediss

บริษัท เน็ดิส จำกัด (มหาชน) อิมพอร์ตและจำหน่าย
Neediss Supply Instrument Co., Ltd.
241 ถนนสุขุมวิท 31 (Klongton Nuea) เขตวัฒนา กรุงเทพฯ 10110 ประเทศไทย
Tel: 02-2611-0145 Fax: 02-2611-0146 Email: info@neediss.com



NOx Analyzer Verification Test Report

Calibration Report No.: 6503002

Page:1/2

Calibrated Date: 3-Mar-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42C704365
--	--

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.63 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 26.7 °C

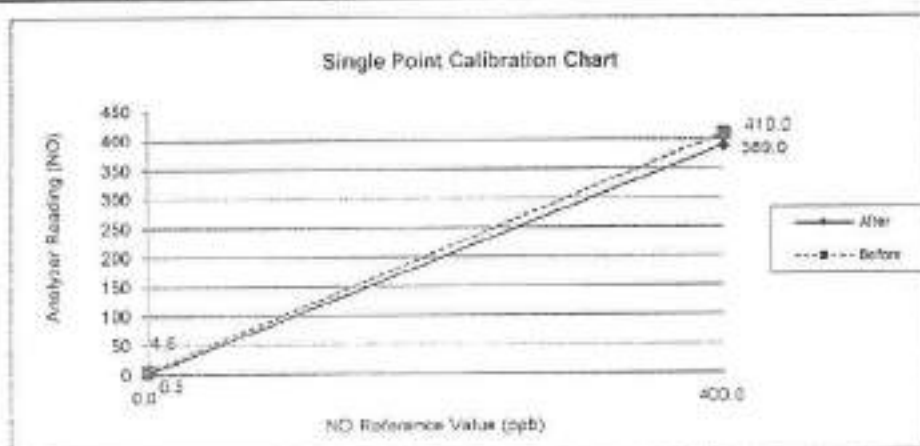
Humidity: 48 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	4.8	0.0	4.8	410	400.0	1.2
NO ₂	4.8	0.0	4.8	5.0	0.0	0.6
NOx	9.6	0.0	9.6	415	400.0	1.8

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	389	400.0	-1.4
NO ₂	0.5	0.0	0.5	13.0	0.0	1.6
NOx	1.0	0.0	1.0	402	400.0	0.2



Envirob Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

This report not be reproduced except info without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com



neediss

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

305 หมู่ 13 ตำบล 7 อ.เมือง จ.นนทบุรี 11000 โทร : 02-015-8888888 E:neediss@neediss.com
Fax : 02-8888 8888 E:neediss@neediss.com



MODEL : NOx ANALYZER Model 42C THERMO

DATE :3-03-2022

S/N : ENOTE42C704365

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -850 (V)	-675	-678
LAMP VOLTAGE 950 - 1,200 (V)		
INTER TEMP 15 - 45 DEG C	44	43
CHAMBER TEMP 47 - 51 C	50	50
COOLER TEMP -5 - (-2) DEG C	-3	-2
PRESSURE 400 - 1000.0 mm Hg	350	380
SAMPLE FLOW 0.350 - 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.035 - 0.075 LPM	0.05	0.05
No/Nox BKG	12/9.0	12/9.1
No/Nox Slope	1.0/0.8	0.9/0.8

Calibrate By :

Sirrat Poonlak

Approve By :

K.

Sirrat Poonlak

Sarpwut Kaewsrinual

Date:

3-Mar-22

Date:

3-Mar-22



This report not be reproduced except in full without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com

รับรองสำเนาถูกต้อง

ผู้รับรอง : *Chai*



Environmental cooperation with Accuracy measurements
EE-MNT-27 Rev 00510083



TSP High Volume Sampler Calibration

Verification Report No.

E6503 TSP 02

☒ PM ☐ Onsite

Site: กรุงเทพมหานคร เขตหลักสี่

UTM: 47P N1514475 E654269

Sampler: NTSPW11

Recorder: ECRANG15315224

Date: 4 Mar 22

Technical: Surakit D.

Approval: Sarawut K.

CONDITIONS

Barometric Press. (hPa): 1010.0

Temperature (deg C): 31.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.6

Temperature (deg K): 304.0

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

1.63857

Qstd Intercept

-0.01202

Date Certified

18 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)
1	17.31	2.123	56.0	55.38
2	10.56	1.567	54.0	53.38
3	6.48	1.542	48.0	47.45
4	4.41	1.273	46.0	45.47
5	2.32	0.926	40.0	39.54

LINEAR REGRESSION

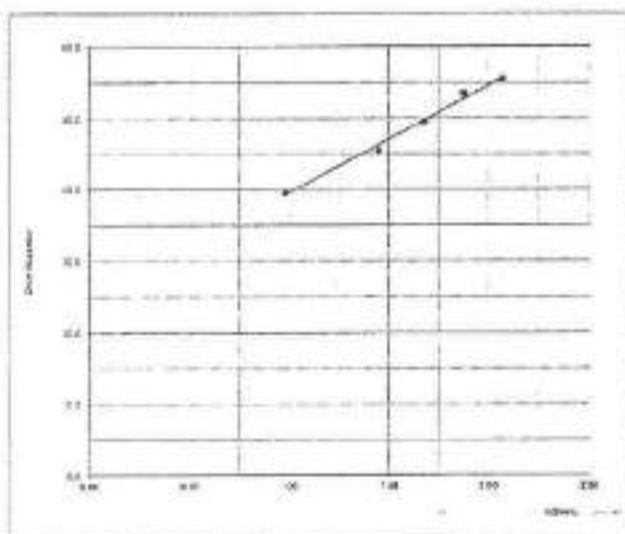
Slope = 12.8500

Intercept = 28.1148

Corr. coeff = 0.9955

of Observations: 5

Range of Chart: 43
at 1.1 - 1.7 m³/min: 50



Calibrated by:

(Surakit Darncholwiche)
4 March 2022

Approved by:

(Sarawut Keewannul)
4 March 2022

This report shall not be reproduced except in full, without the written approval of Ecolab Co., Ltd.

www.evltesting.com

EVN1-0254-03-01-0003



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



PM10 High Volume Sampler Calibration

Verification Report No.

D6503 -PM 02

☐ PM ☐ Onsite

Site: บริษัท เวิลด์ไวร์เลส จำกัด

UTM: 47P N1614475 E554260

Sampler: NPM004

Recorder: ECRDS01618126

Date: 4 Mar 22

Technical Support U.

Approval: Sarawut K.

CONDITIONS

Barometric Press. (hPa): 1006.6

Temperature (deg C): 32.0

Average Press. (MPa) 1015.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg) 757.3

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg) 759.8

Average Temp. (deg K) 303.0

CALIBRATION ORIFICE

Brand: Tech Environmental, Inc.

Model: TE-5028A

Serial#: 1320

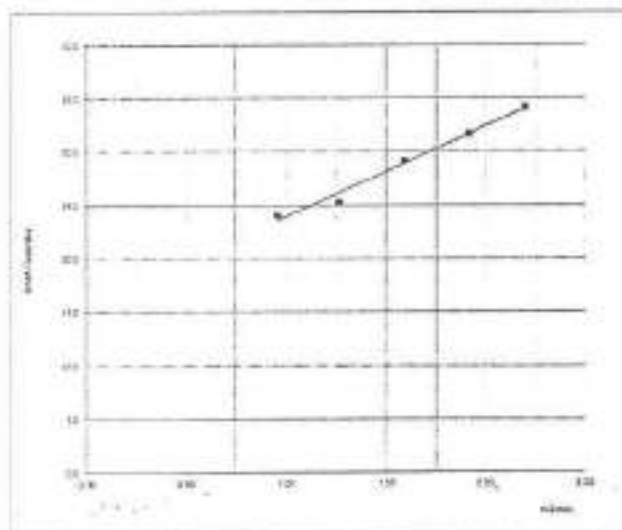
Slope	1.02667
-------	---------

Intercept	-0.00753
-----------	----------

Date Certified 19 Jan 22

CALIBRATIONS

CALIBRATIONS					LINEAR REGRESSION	
Plate or Test #	H ₂ O (n)	Qa (m3/min)	I (chart)	IC (corrected)		
1	12.34	2.179	54.0	34.27		Slope = 8.6512
2	9.32	1.894	50.0	31.73		Intercept = 15.6272
3	8.74	1.612	48.0	30.46		Corr. coeff = 0.9924
4	4.32	1.292	42.0	26.65		SFR = 1.141
5	2.53	1.010	38.0	24.12		SSP = 40.18
					# of Observations:	5
					Range of Chart	39
					at SFR $\pm 10\%$	41




Calibrated by

(Sakit Darnchobvich)
4 March 2022

Approved by:

(Sarawut Keawsorn)
4 March 2022

This report shall not be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the written approval of © HANCO CO. LTD.

 www.extesting.com

Journal of Management Education 34(10)br/>October 2010

© 2006 Blackwell Publishing Ltd *Journal of Internal Medicine* 260: 395–404



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

บริษัท เน็ดิส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.
505/505 หมู่ 4 ต.คลองเตยใหญ่ อ.เมือง จ.สมุทรปราการ 10600
Tel: 02-010-4444 Fax: 02-010-4444 Email: info@neediss.com



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6503006

Page:1/1

Calibrated Date: 3-Mar-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO_43C	Manufacturer: THERMO S/N: ESOTE43C071944
--	---

Calibration System

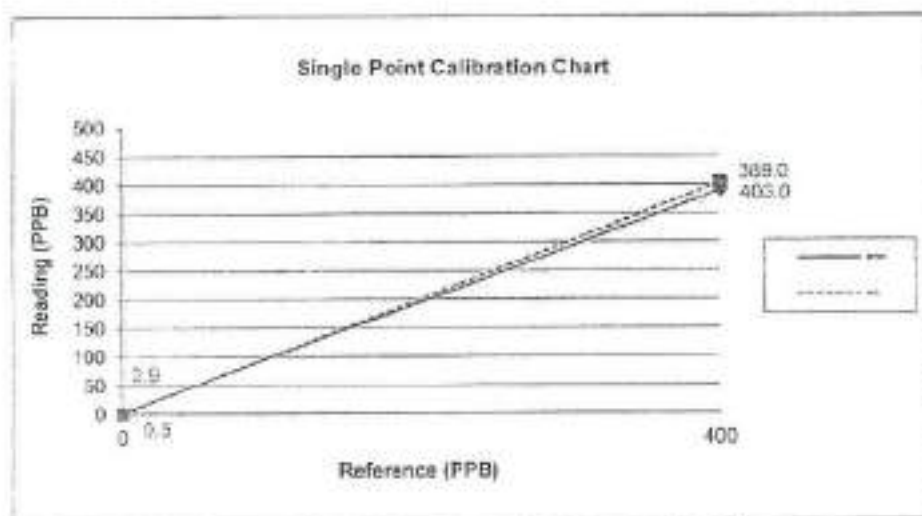
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792	NO Conc: 44.68 PPM SO ₂ Conc: 45.34 PPM CO Conc: 4500 PPM
ZERO AIR Generator ZAG7001 S/N: 644	Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 26.5 °C

Humidity: 50 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	2.9	2.9	400.0	389	-2.8
After	0.0	0.5	0.5	400.0	403	0.8



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



neediss

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

506 THONGPHU 3 INDUSTRIAL PARKSANGHAT CHAIYACHULONJIT Rd. Bangkhuaeng 21 Bangkhuaeng Bangkok 10140
Tel: 02-821-8902 Fax: 02-821-8903 E-mail: info@neediss.com



MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 3-03-2022

S/N : ESOTE43C071944

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - +850 (V)	-650	-653
LAMP VOLTAGE 950 - 1,200 (V)	990	985
LAMP INTENSITY 20000 - 50000 Hz	32568	32577
INTER TEMP 15 - 45 DEG C	37	37
CHAMBER TEMP 47 - 51 C	49	49
COOLER TEMP -5 - (-2) DEG C	-2.5	-2.5
PRESSURE 400 - 1000.0 mm Hg	764	765
FLOW 0.350 - 0.650 LPM	0.42	0.4

Calibrate By : Sirrat Poonlak

Approve By : Sarawut Keawsrinual

Sirrat Poonlak

Sarawut Keawsrinual

Date: 3-Mar-22

Date: 3-Mar-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



the best thing to save environment

รับรองจำหน่ายถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

บริษัท เน็ดิส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.
215/288 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110
Tel: 02-602-1188 Fax: 02-602-1189 Email: neediss@neediss.co.th



NOx Analyzer Verification Test Report

Calibration Report No.: 6503003
Calibrated Date: 3-Mar-22

Page:1/2

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42C768364
--	--

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA NGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 26.7 °C

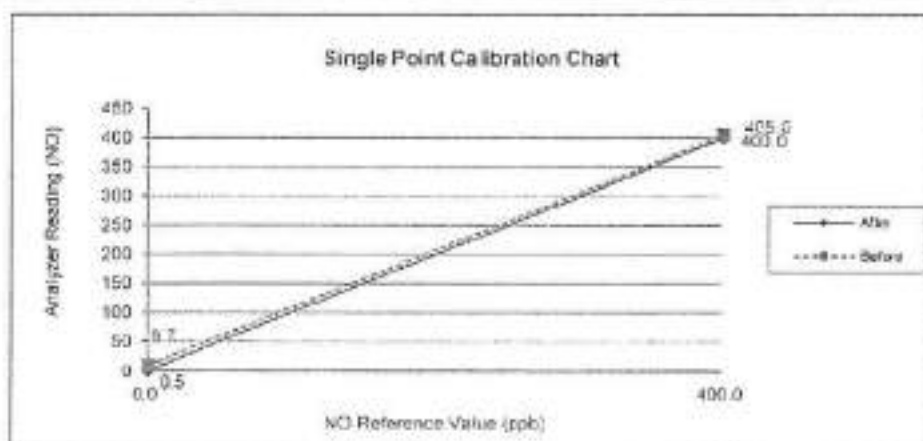
Humidity 48 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	9.7	0.0	9.7	405	400.0	0.6
NO ₂	3.4	0.0	3.4	4.0	0.0	0.5
NOx	13.1	0.0	13.1	409	400.0	1.1

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	0.2	0.0	0.2	1.0	0.0	0.1
NOx	0.7	0.0	0.7	401	400.0	0.1



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com



neediss

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

505 WHEELS RD 7 EXTENSION, VERMONT, U.S.A. 05491-1000 / Bangkok / Bangkok Bangkok Bangkok
Tel : 02-000-0000 Fax : 02-000-0000 E-mail : info@neediss.com



MODEL : NOx ANALYZER Model 42C THERMO

DATE : 3-03-2022

S/N : ENOTE42C768384

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS +450 - +850 (V)	-675	-675
LAMP VOLTAGE 950 - 1,200 (V)		
INTER TEMP 15 - 43 DEG C	43	43
CHAMBER TEMP 47 - 51 C	49	50
COOLER TEMP ^a -5 - (-2) DEG C	-2	-2
PRESSURE 400 - 1000.0 mm Hg	350	380
SAMPLE FLOW 0.350 - 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.035 - 0.075 LPM	0.05	0.05
No/Nox BKG	12/9.0	12/9.1
No/Nox Slope	1.0/0.8	0.9/0.8

Calibrate By : Sirir Poonlak

Sirir Poonlak

Date: 3-Mar-22

Approve By : Sarawat Keawsrinual

Sarawat Keawsrinual

Date: 3-Mar-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

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

538 ซอยบางแค 7 แขวงบางแค เขตบางแค กรุงเทพมหานคร 10160 535 Soi Bangkadee 7 Bangkok Bangkok Bangkok
Tel. 02-802-3980-2 Fax. 02-802-3988 E: info@neediss.com



Verification Report of Ambient Air Sampling



PM



Onsite UTM:

Report No :

6504005

Instrument :

PM-2.5 Sampler SINGLE

Validation Date:

1-Apr-22

Manufacturer :

Tisch Environmental

Model :

TE-Wilbur 2.5

Serial/ID No. :

EP2TIWILBU0478

Environment :

Humidity(%RH) :

S4

Temperature (°C) :

27.9

Pressure (mmHg) :

744

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	27.9	27.9
Filter	-10.0	0.0	20.0	45.0	27.9	27.9

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	16.67 LPM	0 LPM

Engineer :

Phanuwat Suanbubpha

Phanuwat Suanbubpha

Approve By:

Sarawut Keawwinnai

Sarawut Keawwinnai

Issu Date:

1-Apr-22

Date:

1-Apr-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



Mesalabs Co., Ltd.

the best thing to save environment

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

**neediss**บริษัท นีดิส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.538 ซอยบางพลี 7 แขวงบางพลี เขตบางพลี กรุงเทพมหานคร 10180 538 Soi Bangkhoe 7 Bangkhoe Bangkok
Tel. 02-802-3980-2 Fax. 02-802-3988 E:info@neediss.com

Verification Report of Ambient Air Sampling



PM



Onsite UTM

Report No :

6504015

Instrument : PM-2.5 Sample Single
 Manufacturer : Rupprecht, Patashnick
 Model : 200-H
 Serial/ID No. : EP2RP200029702
 Environment :

Validation Date:

1-Apr-22

Humidity(%RH) : 51 Temperature (°C) : 27 Pressure (mmHg) : 756

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	26.8	27.0

Flow Control :

Calibration mode : AMB Flow Device

Flow set : 16.67 LPM

Avg. Pressure at Ref. : 745 mmHg

Flow Measure (Avg.)	Flow Calibrator(Avg.10)	Flow Difference
16.67 LPM	16.66 LPM	0.01 LPM

Engineer :

Phanuwat Suaribubpha

Issu Date:

1-Apr-22

Approve By:

Sarawut Keawsrinual

Date:

1-Apr-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

**www.neediss.com**

the best thing to add to environment

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Calibration Certification Information

Cal. Date: January 19, 2022 Rootmeter S/N: 438320 To: 294 °K
Operator: Jim Tisch Pa: 749.05 mm Hg
Calibration Model #: TE-5028A Calibrator S/N: 1328

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3190	3.7	1.50
2	3	4	1	1.0220	6.2	2.50
3	5	6	1	0.9290	7.5	3.00
4	7	8	1	0.8590	8.7	3.50
5	9	10	1	0.6530	14.8	6.00

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)
0.9941	0.7536	1.2241	0.9951	0.7544	0.7673
0.9907	0.9694	1.5803	0.9917	0.9704	0.9906
0.9890	1.0646	1.7312	0.9900	1.0656	1.0851
0.9874	1.1495	1.8699	0.9884	1.1506	1.1721
0.9793	1.4996	2.4483	0.9802	1.5011	1.5346
QSTD	m=	1.63957	QA	m=	1.02667
	b=	-0.01202		b=	-0.00753
	r=	0.99999		r=	0.99999

Calculations

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

For subsequent flow rate calculations:

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

Standard Conditions

Tstd: 298.15 °K

Pstd: 760 mm Hg

Key

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

RECALIBRATION

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



CAL

Calibratech Co.,Ltd.

7/195-7 Moo 2, Sukhaphachan 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120

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



NIST-TLS-185.1/025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-200022-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
540, 540/1 Soi Bangkhue 7, Bangkhue, 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 : (23.7 to 23.8) °C
Relative Humidity : (57.1 to 58.0) %
Air Pressure : 1012.0 mbar

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 09 February 2022

Calibrated by : Akarudath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02213103	18 Nov 2022	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



รับรองสำเนาถูกต้อง

Envilab Co.,Ltd.

ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co., Ltd.

7/105-7 Moo 2, Sukhprachasan 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 65-200022-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.01	0.0001	0.00011
0.1	0.0001	0.00011
1	0.0000	0.00011
2	0.0001	0.00011
5	0.0000	0.00012
10	0.0001	0.00012
20	-0.0001	0.00013
50	0.0000	0.00014
100	-0.0002	0.00020
200	-0.0004	0.00038

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

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

Eccentric error

Load test : 50 g

A B C D E
-0.0001 -0.0002 -0.0002 -0.0001 0.0000 g



Repeatability

Load test : 200 g

Sidev. : 0.00005 g

- 000 -

Handwritten signature



Certificate of Calibration

Certificate No. : 65-200022-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Electronic Balance

Manufacturer : Sartorius

Model : SECURA3102-1S

Serial No. : 0034409695

ID No. : ELABBALANCE03

Capacity : 3100 g

Resolution : 0.01 g

Environment :

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

Ambient Temperature : (23.7 to 24.2) °C

Relative Humidity : (57.6 to 57.8) %

Air Pressure : 1013.0 mbar

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 09 February 2022

Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref: LAB 14
Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
F181-F1821	65-210064-1	31-Jul-2022	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

Calibratech Co., Ltd.

7/105-7 Moo 2, Sukhprachon 3 Rd., Bangpood, Paddred, Northburi 11120

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

Certificate of Calibration

Certificate No. : 65-200022-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
10	0.00	0.0082
20	0.00	0.0082
50	0.00	0.0082
100	0.00	0.0082
200	0.00	0.0083
500	-0.01	0.0085
1000	-0.01	0.0093
1500	-0.01	0.011
2000	-0.01	0.012
3000	-0.01	0.023

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

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

Eccentric error

Load test : 1000 g

A	B	C	D	E	
0.00	0.01	0.02	0.00	0.00	g



Repeatability

Load test : 2000 g

Stdev. : 0.000 g

-0.00-



CAL

Calibratech Co., Ltd.

7/136-7 Moo 2, Sukhopyachan 3 Rd., Bangpoo, Pakkard, Nonthaburi 11120

Tel:(02) 964-6211 Fax:(02) 964-5155, e-mail : cal@caltech.co.th, cal@bttnn.com



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-200086-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Electronic Balance

Manufacturer : METTLER TOLEDO Model : XPR2

Serial No. : C011158261 ID No. : ELABBALANCEN07

Capacity : 2.1 g Resolution : 0.000001 g

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

Ambient Temperature : (23.2 to 23.4) °C

Relative Humidity : (55.3 to 55.6) %

Air Pressure : 1010.0 mbar

Date of Received : 25 March 2021

Date of Calibration : 25 March 2021

Date of Issue : 27 March 2021

Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref: LAB 14
Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02204101	17 Nov 2021	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



รับรองสำเนาถูกต้อง

ผู้ตรวจวัดและควบคุมคุณภาพ



CAL

Calibratech Co.,Ltd.

7/106-T. Mo. 2, Sukhprachasan 3 Rd., Bangnae, Pakkard, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 64-200086-1

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)
0.001	-0.000001	0.0000053
0.005	0.000000	0.0000054
0.01	-0.000001	0.0000071
0.02	-0.000001	0.0000089
0.05	-0.000001	0.000011
0.1	0.000001	0.000014
0.5	-0.000005	0.000022
1	0.000000	0.000026
1.5	-0.000005	0.000037
2	0.000000	0.000034

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

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

Eccentric error

Load test : 1 g

A B C D E

0.000000 0.000000 0.000000 0.000000 0.000000 g



Repeatability

Load test : 2 g

Stdev. : 0.0000005 g

-0.00-

Handwritten signature/initials.





THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-64/0406

MTC No. EEL BP. 68/0364

CALIBRATION CERTIFICATE

Submitted by : Envilab Co., Ltd.

Address : 540, 540/1 Soi Bangkhao 7, Bangkhao, Bangkhao, Bangkok 10160 Thailand.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Acoustic Calibrator

Manufacturer : Pulsar

Model : 105

Serial No. : 87098

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \%$

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.

2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.

3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.

4. Digital Multimeter Agilent 34401A S/N MY44005560.

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

6. Audio Analyzer Keithley 2015-P S/N 4106495.

7. Condenser Microphone Bruel&Kjaer 4180 S/N 2889871.

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

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

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

Date of Receipt : 10 Mar. 2021

Date of Calibration : 12 Mar. 2021

1 / 2

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.BLMTC.002 Rev.4

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

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

Office
156 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax (66) 0 2579 8822
E-mail : mtc@tistr.or.th



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Office
195 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel: 02-2679 1721-30 ext. 5218, 5225, 5217
Fax: 02-2579 8391 *Chitabul*
E-mail: chitabul@citylink.or.th
www.citylink.or.th
ร.บ.รองศาสตราจารย์
อ.อิตการฝ่ายควบคุมคุณภาพ



CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: AIR LIQUIDE (THAILAND)
LTD
Part Number: E05NI91E15A0003
Cylinder Number: EBD146406
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12022
Gas Code: CO,CO2,NO,NOX,S02,BALN
Reference Number: 160-402305646-1
Cylinder Volume: 148.7 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 680
Certification Date: Jan 03, 2022

Expiration Date: Jan 03, 2030

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800/R-12/031, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 6.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	100.2 PPM	G1	+/- 0.5% NIST Traceable	12/27/2021, 01/03/2022
CARBON MONOXIDE	100.0 PPM	98.02 PPM	G1	+/- 0.5% NIST Traceable	12/27/2021
NITRIC OXIDE	100.0 PPM	100.1 PPM	G1	+/- 1.0% NIST Traceable	12/27/2021, 01/03/2022
SULFUR DIOXIDE	100.0 PPM	100.2 PPM	G1	+/- 1.0% NIST Traceable	12/27/2021, 01/03/2022
CARBON DIOXIDE	8.000 %	7.962 %	G1	+/- 0.5% NIST Traceable	12/27/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	09010241	KAL604894	98.46 PPM CARBON MONOXIDE/NITROGEN	+/- 0.5%	Oct 16, 2024
NTRM	200510-50	CC733475	98.61 PPM NITRIC OXIDE/NITROGEN	+/- 0.6%	Oct 06, 2026
GMIS	124206689119	CC322685	4.294 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Sep 03, 2024
NTRM	11010419	KAL604313	99.6 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Jul 28, 2023
NTRM	08010638	KD19200	13.94 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 30, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iS50 FTIR AUP2010245 CO2	FTIR	Dec 02, 2021
SIEMENS ULTRAMAT6E N1-C8-180	NDIR	Dec 09, 2021
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Dec 16, 2021
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Dec 29, 2021
Nicolet iS50 FTIR AUP2010245 SO2	FTIR	Dec 23, 2021

Triad Data Available Upon Request

NOTES: Gross Weight: 28.1 Kg, Net Weight: 5.1 Kg.

UF 0X5CX



[Signature]
Approved for Release



รับรองสำเนาถูกต้อง
ผู้ทำการค้าควบคุมคุณภาพ

Calibration Certificate

Part Number: 721A2601
Description: Micromate with DIN Geophone
Serial Number: UM18211
Calibration Date: **MAR 24 2021**
Calibration Reference Equipment: 714J7402

Instantel certifies that the above product was calibrated in accordance with the applicable Instantel procedures. These procedures are part of a quality system that is designed to assure that the product listed above meets or exceeds Instantel specifications.

Instantel further certifies that the measurement instruments used during the calibration of this product are traceable to the National Institute of Standards and Technology; or National Research Council of Canada. Evidence of traceability is on file at Instantel and is available upon request.

The environment in which this product was calibrated is maintained within the operating specifications of the instrument.

Please note that the sensor check function is intended to check that the sensors are connected to the unit, installed in the proper orientation and sufficiently level to operate properly. This function should not be confused with a formal calibration, which requires the sensors be checked against a reference that is traceable to a known standard. Instantel recommends that products be returned to Instantel or an authorized service and calibration facility for annual calibration.

Calibrated By: _____



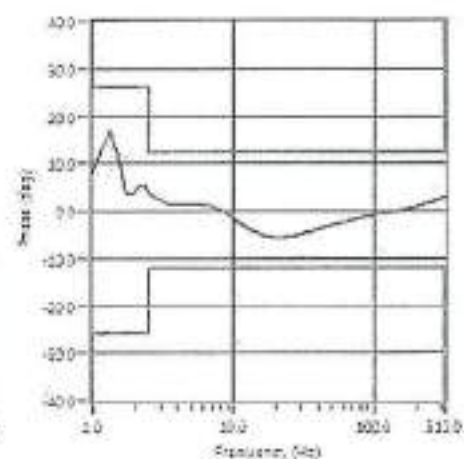
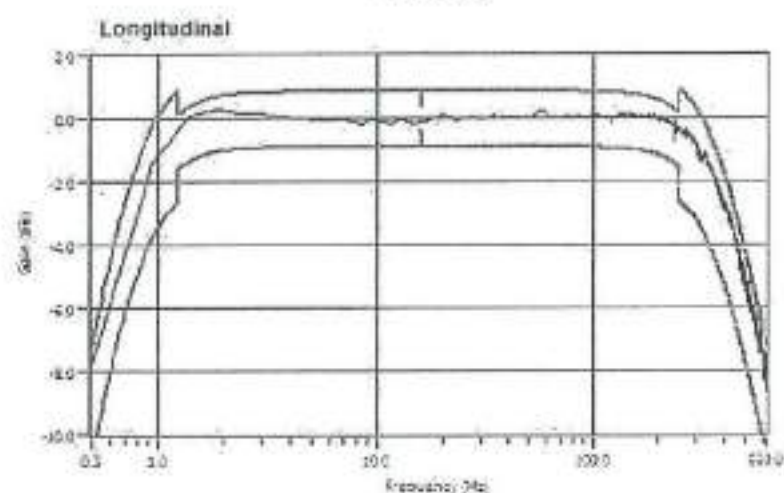
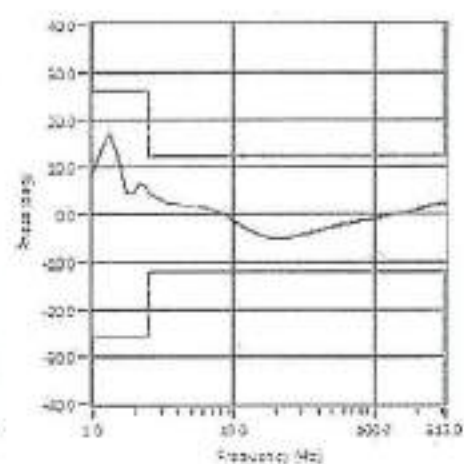
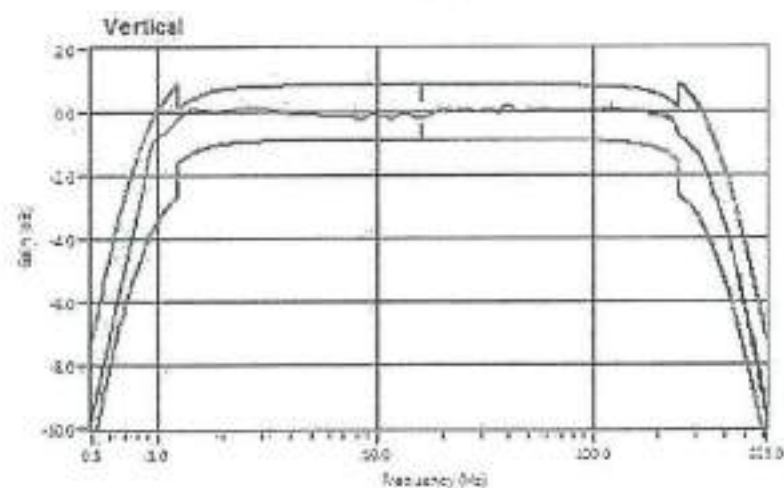
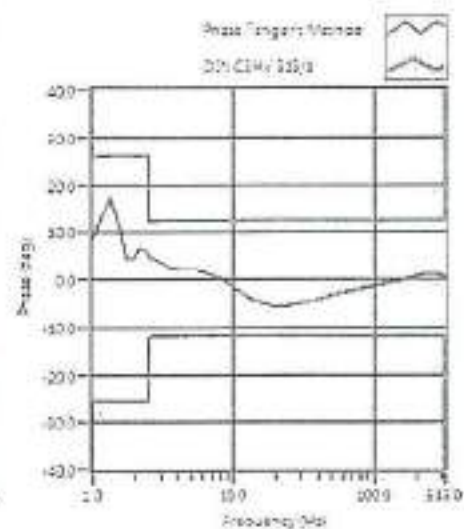
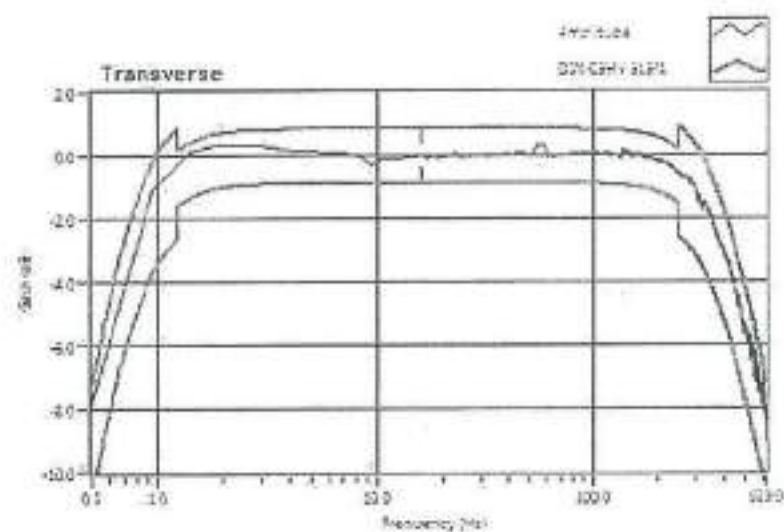
Xiaoming Yang



309 Legget Drive, Ottawa, Ontario, K2K 3A3, (613) 592-4642



Frequency Response of UM18211



Priblab Co., Ltd.


W. J. J.
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ ฯ

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Laksale Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10760
+662 723 0362
MT-TH.ServiceSupport@mt.com



Accuracy Calibration Certificate

Customer

Company: EnviLab Co., Ltd.
Address: 540, 540/1 Soi Bang Khao 7, Bang Khao
City: Bang Khao Contact: Ngamthip Sampranwong
Zip / Postal: 10160
State / Province: Bangkok
Order Number: 

Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: XSR205CU Asset Number: N/A
Serial No.: B911363567 Terminal Model: SRAT
Building: N/A Terminal Serial No.: B911363567
Floor: 3 Terminal Asset No.: N/A
Room: B304

Range	Max. Capacity	Readability (d)
1	51 g	0.00001 g
2	220 g	0.0001 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.

As Found	Temperature		Humidity	
	Start: 22.2 °C	End: 22.6 °C	Start: 59.3 %	End: 59.7 %

As Found Calibration Date: 02-Mar-2022 Calibration:
As Left Calibration Date: N/A
Issue Date: 03-Mar-2022

Approved Signatory:

Naruephon C

Naruephon Charpratsertk



- ☒ Kessakorn Tassachaisakul
☐ Santi Jitnyom
☐ Surachet Sukkate



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

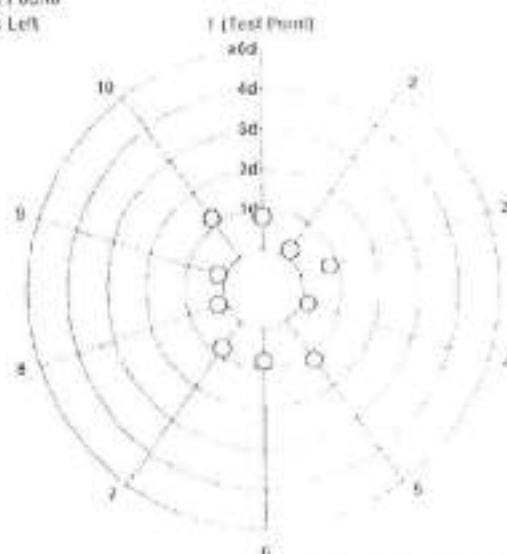
Measurement Results

Repeatability

Test Load: 70 g

	As Found	As Left
1	70.00001 g	N/A
2	70.00002 g	N/A
3	70.00001 g	N/A
4	70.00002 g	N/A
5	70.00003 g	N/A
6	70.00001 g	N/A
7	70.00001 g	N/A
8	70.00002 g	N/A
9	70.00002 g	N/A
10	70.00003 g	N/A
Standard Deviation	0.000006 g	N/A

○ As Found
◆ As Left



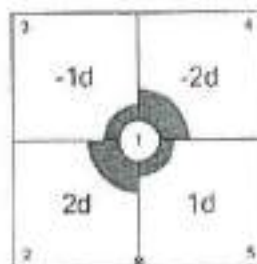
The "d" in the graph represents the readability of the range/interval in which the test was performed.

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

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	100.0000 g	N/A
2	100.0002 g	N/A
3	99.9999 g	N/A
4	99.9998 g	N/A
5	100.0001 g	N/A
Maximum Deviation	0.0002 g	N/A



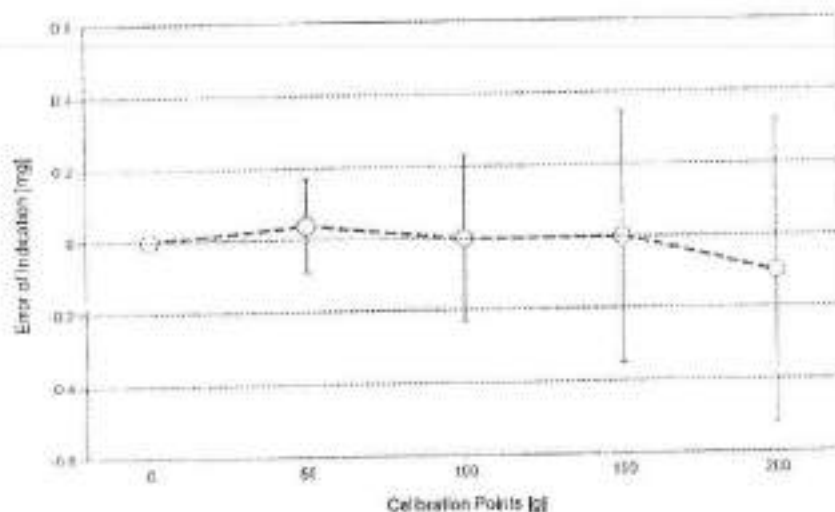
As Found

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	0.00000 g	0.00000 g	0.00000 g	0.017 mg	2
2	0.10000 g	0.10000 g	0.00000 g	0.023 mg	2
3	0.50000 g	0.50001 g	0.00001 g	0.028 mg	2
4	0.99999 g	0.99999 g	0.00000 g	0.032 mg	2
5	1.99999 g	2.00000 g	0.00001 g	0.040 mg	2
6	5.00001 g	5.00001 g	0.00000 g	0.046 mg	2
7	10.00001 g	10.00002 g	0.00001 g	0.062 mg	2
8	49.99998 g	50.00002 g	0.00004 g	0.13 mg	2
9	100.0000 g	100.0000 g	0.0000 g	0.23 mg	2
10	150.0000 g	150.0000 g	0.0000 g	0.35 mg	2
11	199.9999 g	199.9998 g	-0.0001 g	0.42 mg	2



○ 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.:	WS22	Date of Issue:	06-Jan-2022
Certificate Number:	177036	Calibration Due Date:	05-Jul-2023

Weight Set 2: OIML E2

Weight Set No.:	WS76	Date of Issue:	31-Jan-2022
Certificate Number:	C205470237	Calibration Due Date:	12-Jul-2023

Thermo Hygrometer

Equipment No.:	IN193	Date of Issue:	14-Jun-2021
Certificate Number:	21H1221	Calibration Due Date:	01-Jun-2022

Remarks

FACT adjustment functionality activated

Equipment condition: Good

Next calibration according to customer's procedure

End of Accredited Section

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



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: $1.5 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: $3 K$

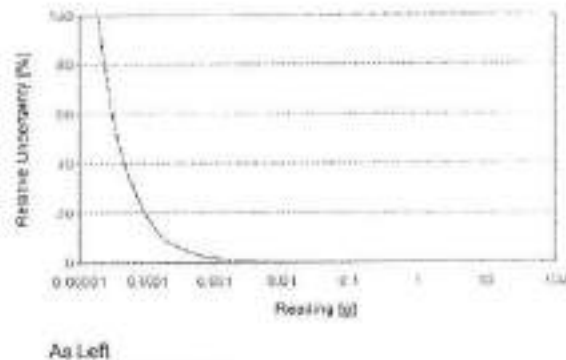
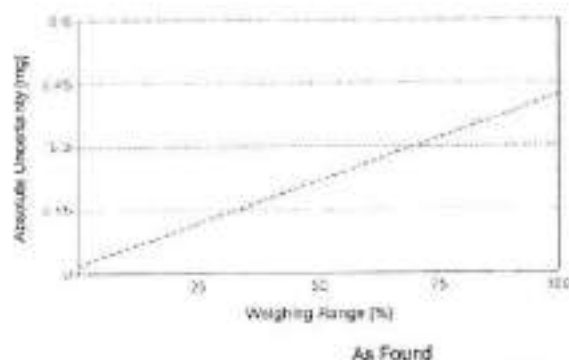
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.00001 g	81 g	$U_1 = 0.018 \text{ mg} + 0.00457 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	220 g	$U_2 = 0.10 \text{ mg} + 0.00402 \text{ mg/g} \cdot R$	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	
0.00220 g	0.018 mg	0.82%	N/A	N/A
0.02200 g	0.018 mg	0.082%	N/A	N/A
0.22000 g	0.019 mg	0.0087%	N/A	N/A
2.20000 g	0.029 mg	0.0013%	N/A	N/A
220.0000 g	1.1 mg	0.00052%	N/A	N/A



The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.



S K SALES AND SERVICE CO.,LTD.
194/56, 194/57 Thakham Rd. Samsen Dam
Bang Khun Thien, Bangkok 10150
Tel : 02-412-2144 Fax : 02-412-2155



Certificate of Calibration

Reference No. : 4182/2202-017 Certificate No. : L2203-290
Customer : Envilab Co., Ltd. (Head Office) Page 1 of 2
: 540, 540/1 Soi Bangkhao 7, Bangkhao,
: Bangkhao Bangkok 10160
Equipment : Digital Thermo-Hygrometer
Manufacturer : Testo
Model : 608-H1
Serial No. : 83353607
ID No. : -
Received Date : 7 March 2022
Calibrated Date : 9 March 2022
Issued Date : 15 March 2022

Environment	Start Calibration	Stop Calibration
Ambient Temperature (°C)	24.7	25.5
Relative Humidity (% RH)	51	52

Calibrated by : Mr. Nattawut Reengdech

Calibration Method

In-house method : by comparison with standard hygrometer for humidity measurement function
and comparison with standard thermometer for temperature measurement function into humidity/temperature chamber

Condition of this result of calibration

1. Reference standard instrument

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Hygrometer	HL-NT2-D	61468575	QR21-0851	13 May 22
2) Digital Thermometer With Probe	GT11	08000089	PSL-T 0072/65	14 November 2022

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

3. This certificate can be traceable to International System of Unit :

- Through Thailand Institute of Scientific And Technological Research (TISTR)
- Through Quality Reborn Co.,Ltd.

Approved by :

☐ Mr. Suphachai Saksri

☐ Mr. Phayak Toolit

☒ Miss Tanisaporn Peltong

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

This certificate may not be reproduced other than in full except with the prior written approval of S K Sales and Service Co., Ltd.



รับรองสำเนาถูกต้อง

ผู้ตรวจการฝ่ายควบคุมคุณภาพ

Result of Calibration

Function : Humidity Measurement Reference Temperature at 25 °C

STD Reading (% RH)	UUC Reading (% RH)	UUC Error (% RH)	Measurement Uncertainty (±% RH)
50.00	49.0	-1.00	2.3

Function : Temperature Measurement

STD Reading (°C)	UUC Reading (°C)	UUC Error (°C)	Measurement Uncertainty (±°C)
25.012	25.0	-0.012	0.35

Resolution : 0.1 (°C) , 0.1 % RH

STD= Standard

UUC= Unit Under Calibration

** End of Calibration Report. **



รับรองว่าผลการวัด
ถูกต้องและเชื่อถือได้

Ep.

Certificate of Calibration

Certificate No. : 64-420055-1 Page : 1 of 2

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

Equipment : pH Meter (Pocket)
pH meter
Manufacturer : Entech Model : pHTestr 30
Range : -1.00 to 15.00 pH Resolution : 0.01 pH
Serial No. : 2856418 ID No : ELABPHTEST3016

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

Ambient Temperature : (24.5 to 25.0) °C

Relative Humidity : (50 to 54) %

Date of Received : 24 March 2021

Date of Calibration : 24 March 2021

Date of Issue : 24 March 2021

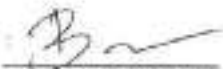
Calibrated by : Bunjerd Masri

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
4.004	61208711	684575	01 Sep 2021	CPA chem
6.985	61191143	684576	01 Sep 2021	CPA chem
9.963	61208865	684577	01 Sep 2021	CPA chem

Approved by : 
(Bunjerd Masri)
Supervisor

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 consent of the Calibratech Co.,Ltd.



Certificate of Calibration

Certificate No. : 64-420055-1

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 (\pm pH)
4, 7, 10	4.004	4.00	0.01	0.011
	6.985	7.00	-0.01	0.020
	9.963	10.00	-0.04	0.053

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

- 0.05 -

B





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.: 21TW57

Page.: 1 of 2

Certificate of Testing

Equipment :	DO Meter
Manufacturer :	Hanna
Model :	HI 9146
Serial No. :	G0007931
ID No. :	EDOHI914607931
Received Date :	16 March 2021
Test Date :	19 March 2021
Reference :	2103-0669DN-1
Submitted by :	Envilab Co.,Ltd (Head office) 540, 540/1 Soi Bangkhae 7, Bangkhae, Bangkhoe, 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
Calibrated by :	Walalak Sirithean
Approved by :	 Approved Signatory
<input checked="" type="checkbox"/> Malee Butkruea <input type="checkbox"/> Salthip Meangmai <input type="checkbox"/> Warakorn Lemgatrakul	
Issue Date :	23 March 2021





B 0257191

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Cert.No.: 21TW57

Page.: 2 of 2

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: KC1A01TAF

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.00	8.17	0.00

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

-o0o-

Maki



Maki a 1047872

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhaphrasan 3 Rd., Bangpoo, Pakkret, Nonthaburi 11120

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



Certificate of Calibration

Certificate No. : 64-400527-3

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. : 100613-0

ID No. : ELABREFRIG140L

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

Ambient Temperature : (24.5 to 25.0) °C

Relative Humidity : (55 to 58) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 15 October 2021

Date of Calibration : 15 October 2021

Date of Issue : 16 October 2021

Calibrated by : Bunjerd Masri

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No.	Cert. No.	Due Date	Traceability
400046 & 400023	64-400443-1	29 Mar 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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.



รับรองสำเนาถูกต้อง



CAL-P003F03

Envilab Co., Ltd.

ผู้จัดการฝ่ายควบคุมคุณภาพ

CAL

Calibratech Co.,Ltd.

7/106-1 Moo 2, Sukhaphakdiwan 3 Rd., Bangpoo, Pakkard, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 64-400527-3

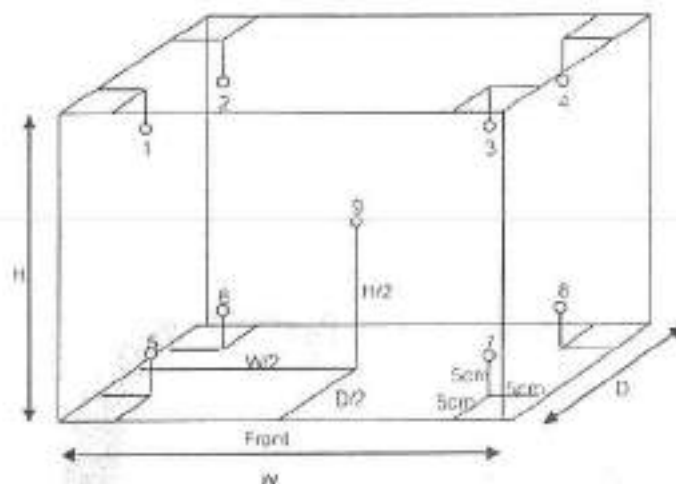
Page : 2 of 2

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	19.9	19.8	19.8	19.9	19.9	19.9	20.0	19.8	20.1	0.53

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.0	20.0	0.3	0.1	0.4

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%

0/00-

Br



Dr. Uthai



รับรองสำเนาถูกต้อง
ผู้ตรวจด้วยคอมพิวเตอร์

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachuen 3 Rd., Bangpood, Paddred, Nonthaburi 11120

Tel.029564-6211 Fax.029564-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com



Certificate of Calibration

Certificate No. : 64-400569-1

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Air Chamber (Refrigerator)

Manufacturer : M-LAB

Model : BIC-140

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 1011

ID No. : ELABBODC140N03

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

Ambient Temperature : (23.0 to 23.8) °C

Relative Humidity : (55 to 60) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 12 November 2021

Date of Calibration : 12 November 2021

Date of Issue : 18 November 2021

Calibrated by : Bunjerd Masri

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No.	Cert. No.	Due Date	Traceability
400046 & 400023	64-400443-1	29 Mar 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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



รับรองสำเนาถูกต้อง

ผู้รับรองสามารถนำข้อมูลไปใช้ได้



Certificate of Calibration

Certificate No. : 64-400569-1

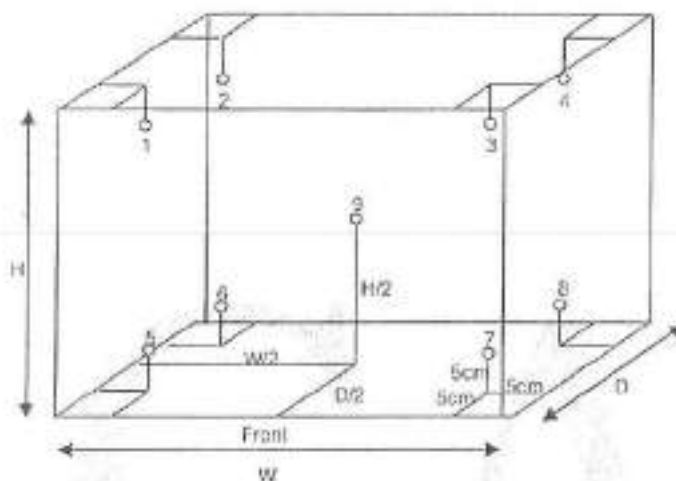
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was testing air ventilation at position D (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	
4.0	4.0	4.0	3.3	3.2	3.4	3.4	3.9	3.9	4.0	3.4	4.2	0.57

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
4.0	4.0	4.0	1.0	0.1	1.0

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%.

- 000 -



รับรองสำเนาถูกต้อง

ผู้จัดทำรายควบคุมคุณภาพฯ



CAL

Calibratech Co., Ltd.

7/105-7 Moo 2, Sukumpuchasae 3 Rd., Bangruai, Pakkret, 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. : 64-400163-2 **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. : N/A

Environment : On site calibration was carried out at the Laboratory, Envilab Co., Ltd.
Ambient Temperature : (30.0 to 31.5) °C
Relative Humidity : (50 to 55) %
Line Voltage : (224.2 to 225.2) V

Date of Received : 24 March 2021
Date of Calibration : 24 March 2021
Date of Issue : 25 March 2021
Calibrated by : Pernpon Changpu
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 & 400032	63-400450-1	30 Mar 2021	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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-F0031-01



รับรองสำเนาถูกต้อง
Envilab Co., Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 64-400163-2

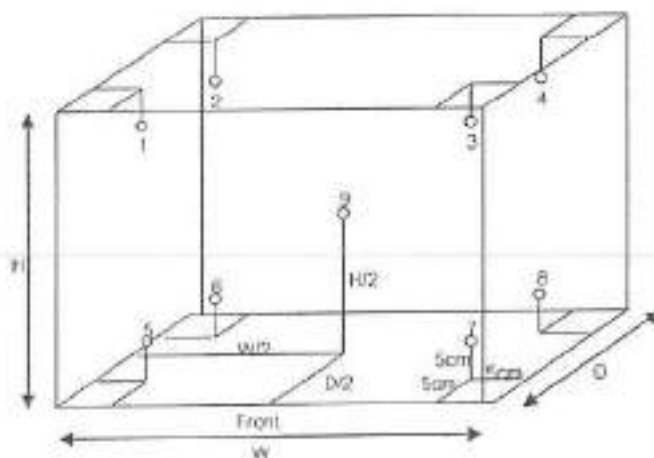
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.56 m

Capacity = 0.07 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	
104.0	103.5	103.5	104.0	104.3	104.3	104.2	104.2	103.9	103.7	104.2	104.1	0.69
110.0	109.5	109.5	110.0	110.4	110.4	110.2	110.2	109.9	109.6	110.2	110.1	0.69
180.0	179.0	179.0	179.0	180.3	180.2	180.2	180.3	180.0	179.0	180.4	180.3	0.95

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	103.5	103.5	0.5	0.1	0.8
110.0	109.5	109.5	0.7	0.1	1.0
180.0	179.0	179.0	1.5	0.2	1.7

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%.

- 000 -

Signature



CAL

Calibratech Co., Ltd.

3/106-7 Moo 2, Sukhprachuen 2 Rd., Bangpood, Pakized, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5135, e-mail : calibratech.cal@yaho.com, calibratech.cal@hotmail.com



Certificate of Calibration

Certificate No. : 65-400053-1

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 : (22.7 to 23.5) °C

Relative Humidity : (45 to 50) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 07 February 2022

Calibrated by : Permpon Changu

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

400029 & 400031 64-400588-1

24 May 2022

National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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-F0031-01



รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co.,Ltd.

3/106-7 Moo 2, Sukdoprasathan 3 Rd., Bangpoo, Pakkiet, Nonthaburi 11120

Tel.(02) 964-0211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@bobrat.com

Certificate of Calibration

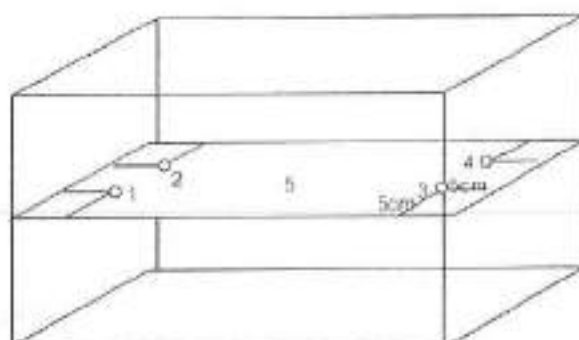
Certificate No. : 65-400053-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @					Uncertainty (± °C)	Measured Uniformity (°C)	Measured Stability (°C)
			Sensor No.							
			1	2	3	4	5			
95.0	95.0	95.0	95.35	95.43	95.51	95.66	95.56	0.19	0.27	0.06

Remark The uncertainty is not combine uniformity of the water bath

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

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

- oDe -

B ✓



CAL

Calibratech Co.,Ltd.

9/106-7 Moo 2, Sukhaphrasan 3 Rd., Banggood, Pakkret, Nonthaburi 11120

Tel:021-964-6211 Fax:021-964-5133, e-mail: calibratech.co.th@yahoo.com, calibratech.co.th@gmail.com



NIST-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-300152-2

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Cylinder

Manufacturer : PYREX

Class : A

Capacity : 50 ml

Graduation : 1 ml

ID No. : C-WW-002/21

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

Relative Humidity : (50 ± 15) %

Air Pressure : 1012.9 mbar.

Date of Received : 02 March 2021

Date of Calibration : 12 March 2021

Date of Issue : 12 March 2021

Calibrated by : Arcerat Sornbun

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	63-200378-1	02 Jun 2021	National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipat Tuvadee)

Supervisor

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-10031-03



รับรองสำเนาถูกต้อง



Calibratech Co.,Ltd.

ผู้จัดการฝ่ายควบคุมคุณภาพ

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukkprachum 3 Rd., Bangpoo, Pakkret, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 64-300152-2

Page : 2 of 2

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

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
30	29.93
50	50.01

Uncertainty of measurement with in \pm 0.054 ml

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

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

- o O o -

D.



Signature

รับรองสำเนาถูกต้อง
ผู้ตรวจการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co., Ltd.

2106-7 Moo 2, Sukkaprachasri 3 Rd., Bangpoo, Pakkong, Nonthaburi 11120

Tel (02) 864 6211 Fax (02) 864 6155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



Certificate of Calibration

Certificate No. : 64-300152-6

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Cylinder

Manufacturer : Witeg

Class : A

Capacity : 1000 ml

Graduation : 10 ml

ID No. : C-WW-029/18

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

Relative Humidity : (50 ± 15) %

Air Pressure : 1012.9 mbar

Date of Received : 02 March 2021

Date of Calibration : 12 March 2021

Date of Issue : 12 March 2021

Calibrated by : Arcerat 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	63-200378-1	02 Jun 2021	National Institute of Metrology (Thailand) (NIMT)

Approved by:

(Wipa Tovadee)

Supervisor

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 Calibratech Co., Ltd.



บริษัท แคลบราเทค จำกัด

ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhpraditsan 3 Rd., Bangpud, Pakkard, Nonthaburi 11120

Tel.(02) 994-6211 Fax.(02) 994-5155, e-mail : calibratech.co.th@yahoo.com, calibratech.co.th@gmail.com

Certificate of Calibration

Certificate No. : 64-300152-6

Page : 2 of 2

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

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
500	502.85
1000	1001.86

Uncertainty of measurement with in \pm 0.17 ml

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

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

- o O o -

D.



Calibratech Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

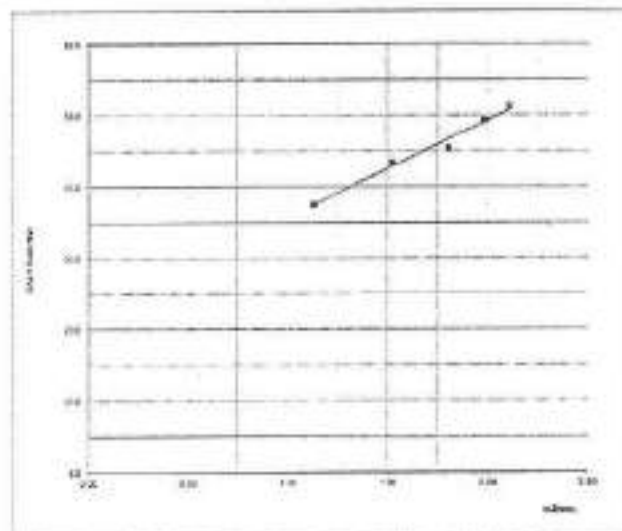


ประจำเดือนเมษายน พ.ศ. 2565

Verification Report No.
D6504-TSP-02

CONDITIONS	
Barometric Press. (hPa): 1011.0	Corrected Pressure (mm Hg): 758.3
Temperature (deg C): 33.0	Temperature (deg K): 306.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATIONS					LINEAR REGRESSION	
Plate or Test #	H ₂ O (n)	Ostd (m ³ /min)	I (chart)	IC (corrected)		
1	11.18	2.018	52.0	51.26	Slope =	15.1683
2	9.63	1.873	48.0	47.32	Intercept =	19.8563
3	6.24	1.509	44.0	43.37	Corr. coeff =	0.9908
4	4.97	1.348	40.0	39.43		
5	2.75	1.004	36.0	35.49	# of Observations:	5
					Range of Chart	38
					at 1.1 - 1.7 m ³ /min.	46



Calibrated by: Surakiat Damchohichit
(Surakiat Damchohichit)
2 April 2022

Approved by: 
(Sarwan Khatiwala)
2 April 2022

This report shall not be reproduced except in full, without the written approval of Envest Co., Ltd.

www.pyrosetting.com

© 2004 Blackwell Publishing Ltd, *Journal of Internal Medicine* 255: 103–110



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Environmental Monitoring and Control Co., Ltd.
100/100-101, Thungyai Road, Bangkok 10110, Thailand
Tel: 02-012-0123456789 Fax: 02-012-0123456789



PM10 High Volume Sampler Calibration

Verification Report No.

A6504-PM 02

<input checked="" type="checkbox"/> PM	<input type="checkbox"/> Onsite
Site: รัชชูปถมา เขตภาษีอากร	
UTM: 47P N1514475 E654269	
Sampler: NPM#13	
Recorder: ECRD01618124	
Date: 2 Apr 22	
Technical: Surakul D.	
Approval: Sarawut K.	

CONDITIONS

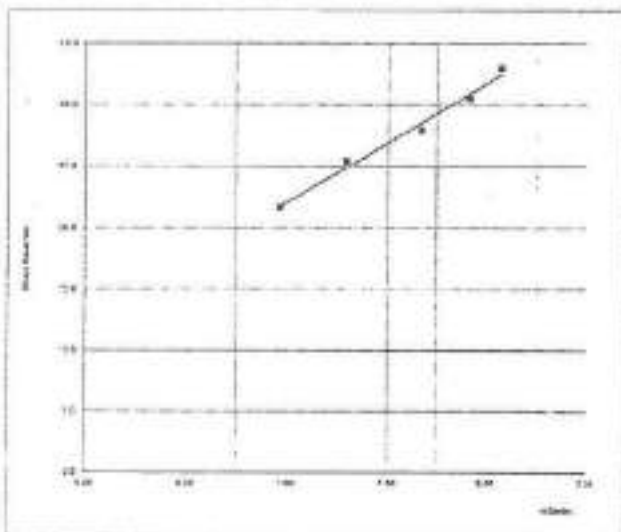
Barometric Press. (hPa): 1011.0	Corrected Pressure (mm Hg): 758.3
Temperature (deg C): 33.0	Temperature (deg K): 306.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc	Slope: 1.02667
Model: TE-5028A	Intercept: -0.00753
Serial#: 1320	Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	12.05	2.156	48.0	30.49	Slope = 0.9080
2	9.52	1.916	44.0	27.95	Intercept = 11.2258
3	6.14	1.541	40.0	25.41	Corr. coeff. = 0.9971
4	4.39	1.304	36.0	22.87	SFR = 1.143
5	2.81	1.045	32.0	20.33	SSP = 33.71
					# of Observations: 5
					Range of Chart: 33
					at SFR ±10%: 35



Calibrated by: (Surakul Damcholvichit)
2 April 2022

Approved by: (Sarawut Keawwinnul)
2 April 2022

This report shall not be reproduced or used in full, without the written approval of Envilab Co., Ltd.

www.envilabtesting.com

PM10 HVA Rev 01 / 01/2022 (Rev. 1.0.00)

PM10 HVA Rev 01 / 01/2022 (Rev. 1.0.00)



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

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

135/10021 หมู่ 1 ต.บางพลีใหญ่ อ.บางพลีใหญ่ จ.สมุทรปราการ 10710 - 595 50 Bangkok 10710 Bangkok, Thailand
Tel: 02-320-3488, 02-320-3489, 02-320-3490 Fax: 02-320-3491 Email: info@neediss.com



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6504009

Page:1/1

Calibrated Date: 1-Apr-22

☒ PM ☐ Onsite

Instruments Information

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

Calibration System

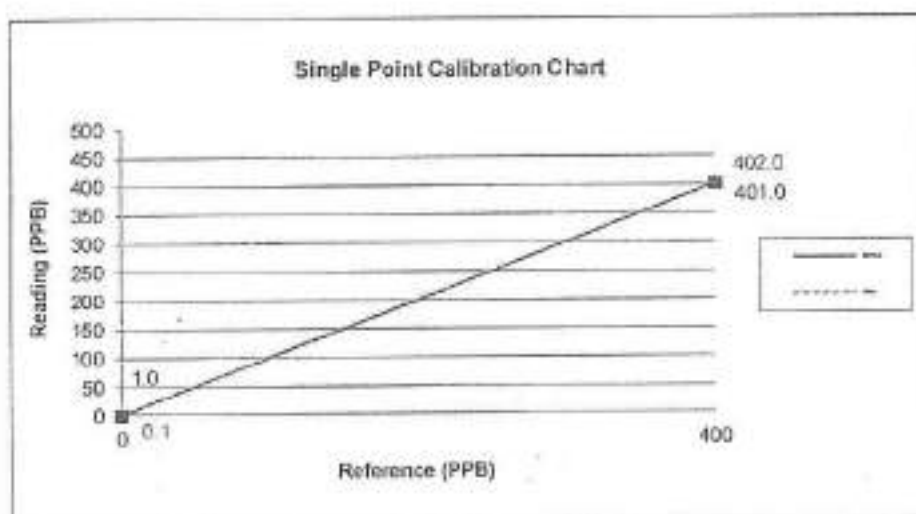
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792	NO Conc 44.68 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM
ZERO AIR Generator ZAG7001 S/N: 644	Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 27.9 °C

Humidity: 50 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	1.0	1.0	400.0	402	0.5
After	0.0	0.1	0.1	400.0	401	0.3



This report will be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

**neediss**

บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.
536 หมู่ 7 ตำบลบ้านใหม่ อำเภอบางพลี จังหวัดสมุทรปราการ 10710 โทร 02-802-37611 โทร 02-802-37611 โทร 02-802-37611
Fax 02-802-37611 E-mail: info@neediss.com



MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 1-04-2022

S/N : ESOTE43C103362

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -850 (V)	-650	-653
LAMP VOLTAGE 950 - 1,200 (V)	990	985
LAMP INTENSITY 20000 - 50000 Hz	32568	32577
INTER TEMP 15 - 45 DEG C	37	37
CHAMBER TEMP -47 - 51 C	49	49
COOLER TEMP -5 - (-2) DEG C	-2.5	-2.5
PRESSURE 400 - 1000.0 mm Hg	764	765
FLOW 0.350 - 0.650 LPM	0.42	0.4

Calibrate By : Sirirat PoonlakhApprove By : Tanin Huadcharoen

Sirirat Poonlakh

Tanin Huadcharoen

Date: 1-Apr-22

Date: 1-Apr-22

**neediss**

Neediss Supply Instrument Co., Ltd.

This report can be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

**www.neediss.com**

the Best thing to solve environment

รับรองสำเนาถูกต้อง
www.neediss.com



neediss

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

535 หมู่ 10/กม 7 ตำบลท่าเสา อำเภอเมือง จังหวัดพิษณุโลก 55000 535 หมู่ 10/กม 7 ตำบลท่าเสา อำเภอเมือง จังหวัดพิษณุโลก 55000
Tel: 08-100-10000 Fax: 08-100-10000 Email: info@neediss.com



NOx Analyzer Verification Test Report

Calibration Report No.: 6504008

Page: 1/2

Calibrated Date: 1-Apr-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42C571356
--	--

Calibration System

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

Environment: Temperature: 26.2 °C

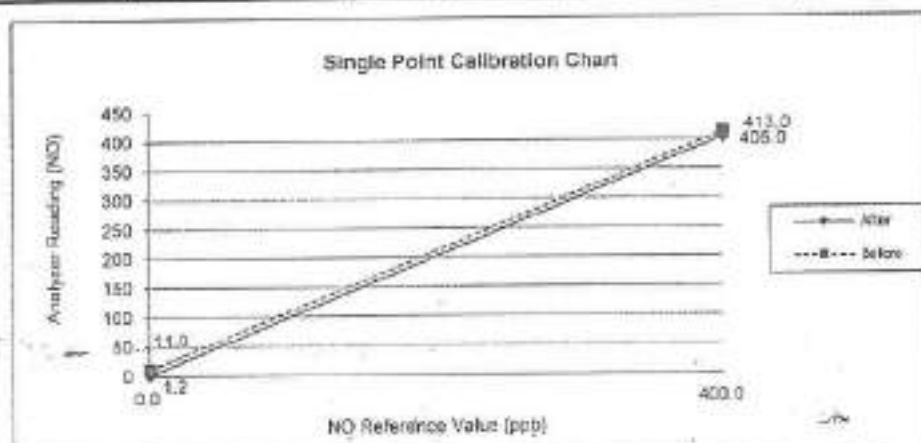
Humidity: 51 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	11.0	0.0	11.0	413	400.0	1.6
NO ₂	4.1	0.0	4.1	5.0	0.0	0.6
NOx	15.1	0.0	15.1	418	400.0	2.2

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	1.2	0.0	1.2	405	400.0	0.6
NO ₂	0.4	0.0	0.4	4.0	0.0	0.5
NOx	1.6	0.0	1.6	409	400.0	1.1



This report can be reproduced except in full without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

**neediss**บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.525 หมู่ 10 ตำบล 7 อำเภอเมือง จังหวัดเชียงใหม่ 50100 525 หมู่ 10 ตำบล 7 อำเภอเมือง จังหวัดเชียงใหม่ 50100
Tel: 052-8622-3780-2 Fax: 052-8622-1558 E-mail: neediss@neediss.com

MODEL : NOx ANALYZER Model 42C THERMO

DATE : 1-04-2022

S/N : ENOTE42C671366

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -850 (V)	-675	-678
LAMP VOLTAGE 950 - 1,200 (V)		
INTER TEMP 15 - 45 DEG C	43	43
CHAMBER TEMP 47 - 51 C	49	50
COOLER TEMP -5 - (-2) DEG C	-2	-2
PRESSURE 400 - 1000.0 mm Hg	350	380
SAMPLE FLOW 0.350 - 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.035 - 0.075 LPM	0.05	0.05
No/Nox BKG	12/9.0	12/9.1
No/Nox Slope	1.0/0.8	0.9/0.8

Calibrate By : Sirirat PoonlakApprove By : Tanin Huadcharoen

Sirirat Poonlak

Tanin Huadcharoen

Date: 1-Apr-22

Date: 1-Apr-22

**neediss**

Neediss Supply Instrument Co.,Ltd.

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com

Envilab Co.,Ltd.

ได้รับรองว่า
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



บริษัท เอ็นวีแอล จำกัด (มหาชน)
Environmental Test Lab. Ltd. (Public)
101/101-2007-2017-8 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10310



Verification Test Report

Report No.:

6401 -SLM 01

☒ PM

☐ Onsite UTM:

47P N 1514462 E 654258

Calibrated Date: 1 April 2022

Site : บริษัทเอ็นวีแอล จำกัด

Equipment: Sound Level Meter

Manufacturer: NEEDISS

Model: NDSM 309

Serial : 8001

Environment: Temperature 25 °C Humidity 58 %RH

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

Serial No.1351075

Date of Calibration : March.21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	94.00	0.34	93.66

Calibrated By:

(Surakit Darncholwichit)

Date:

1 April 2022

Approve By:

(Sarawut Keawsrinual)

Date:

1 April 2022

This report shall not be reproduced except in full, without the written approval of EnviroLab Co., Ltd.





Environmental Testing Laboratory and Environmental Engineering Co., Ltd. (EVL) is a leading provider of environmental testing services in Thailand. We have a long history of providing high-quality testing services to our clients. We are now offering a new service, TSP High Volume Sampler Calibration, to help our clients maintain accurate and reliable TSP measurements.



1

TSP High Volume Sampler Calibration

Verification Report No.

ES504-TSP_01

<input checked="" type="checkbox"/> PM	<input type="checkbox"/> Onsite
Site: บริษัท เบริวเวอรี่ จำกัด	
UTM: 47P N1514475 E654265	
Sampler: ETSP#03	
Recorder: ECRANG15315224	
Date: 1 Apr 22	
Technical: Surakit D.	
Approval: Sarawut K.	

CONDITIONS

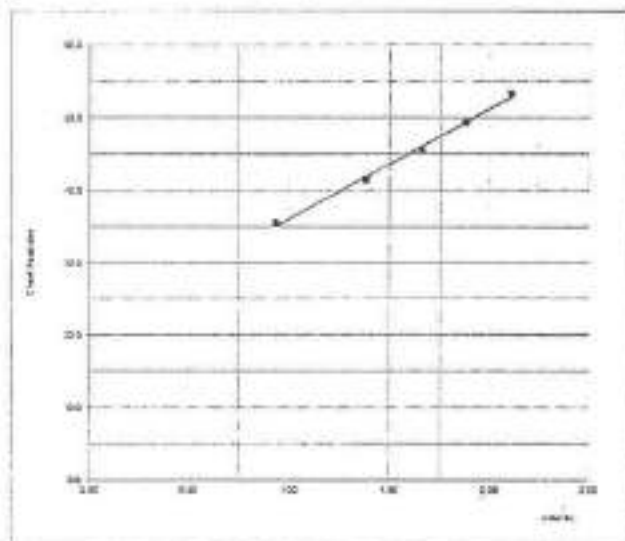
Barometric Press. (hPa): 1009.8	Corrected Pressure (mm Hg): 757.4
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc.	Qstd Slope: 1.63957
Model: TE-5020A	Qstd Intercept: -0.01202
Serial#: 1328	Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	12.19	2.109	54.0	53.29	
2	9.63	1.875	50.0	49.34	Slope = 15.0796 Intercept = 21.0056 Corr. coeff. = 0.9974 # of Observations: 5 Range of Chart: 39 at 1.1 - 1.7 m ³ /min: 47
3	7.52	1.658	46.0	45.39	
4	5.21	1.381	42.0	41.44	
5	2.36	0.932	38.0	35.52	



Calibrated by: [Signature]
(Surakit Dorncholvichit)
1 April 2022

Approved by: [Signature]
(Sarawut Keawwattana)
1 April 2022

This report shall not be reproduced except in full, without the written approval of Evulab Co., Ltd.

www.evltesting.com

Environmental Testing Laboratory and Environmental Engineering Co., Ltd. (EVL) is a leading provider of environmental testing services in Thailand. We have a long history of providing high-quality testing services to our clients. We are now offering a new service, TSP High Volume Sampler Calibration, to help our clients maintain accurate and reliable TSP measurements.

EVLT-01-01-2022-001



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



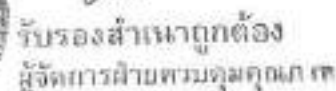
D6504 -PM 01

Approval: Sarawut K.

Average Temp. (deg K) 303.0

Date Certified: 19 Jan 22

42 或 SFR = 10%





neediss

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

589 ซอยสุขุมวิท 74 แขวงคลองเตยเหนือ เขตวัฒนา กรุงเทพฯ 10110 535 Soi Sukhumvit 74 Bangkok Bangkok Bangkok
Tel: 02-3437-3980 Fax: 02-3437-3981 E-mail: info@neediss.com



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6504006

Page:1/1

Calibrated Date: 1-Apr-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO_43C	Manufacturer THERMO S/N: ESOTE43C071944
--	--

Calibration System

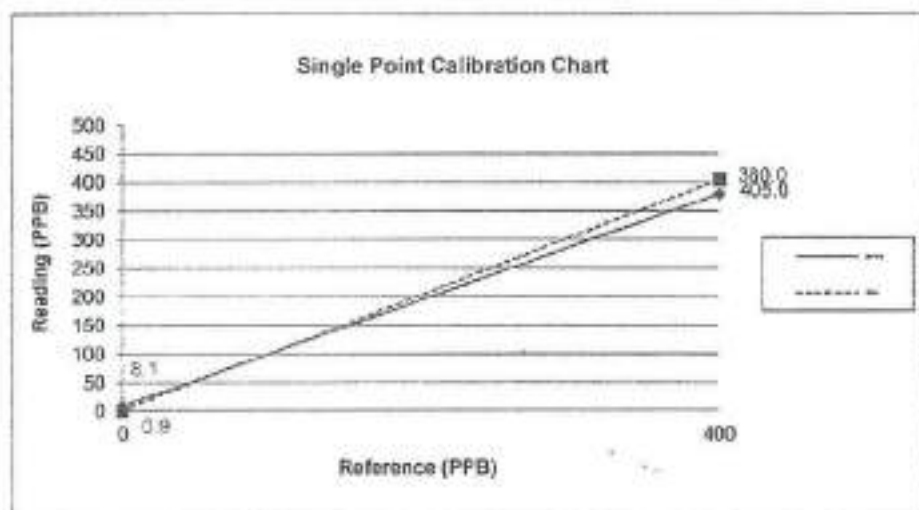
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 28.1 °C

Humidity: 47 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	8.1	8.1	400.0	380	-5.0
After	0.0	0.9	0.9	400.0	405	1.3



This report not be reproduced except in full without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com



รับรองคุณภาพถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



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

506/10011 ถนน 7 4374107140 แขวงจตุจักร กรุงเทพฯ 10110 E-Box Bangkok / Bangkok Bangkok
Tel: 02-0120-0966-0967 Fax: 02-0120-0967 E-mail: info@neediss.com



MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 1-04-2022

S/N : ESOTE43C071944

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - +850 (V)	-650	-653
LAMP VOLTAGE 950 - 1,200 (V)	990	985
LAMP INTENSITY 20000 - 50000 Hz	32568	32577
INTER TEMP 15 - 45 DEG C	37	37
CHAMBER TEMP 47 - 51 C	49	49
COOLER TEMP -5 - (-2) DEG C	-2.5	-2.5
PRESSURE 400 - 1000.0 mm Hg	764	765
FLOW 0.350 - 0.650 LPM	0.42	0.4

Calibrate By : Sirirat Poonlak

Approve By : Tanin Huadcharoen

Sirirat Poonlak

Tanin Huadcharoen

Date: 1-Apr-22

Date: 1-Apr-22



neediss

Neediss Supply Instrument Co., Ltd.

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com

We know the best thing to save environment



Enviab Co., Ltd.

รับรองสำเนาถูกต้อง
จัดการผ่านระบบคอมพิวเตอร์

**neediss**บริษัท นีดีส ซัพพลาย อินสตรูमेंท์ จำกัด
Neediss Supply Instrument Co., Ltd.535 ถนนพหลโยธิน 7 แขวงปทุมวัน เขตปทุมวัน 10100 535/05 Bangkok 7 Bangkok Bangkok Bangkok
Tel: 02-2605-3333 Fax: 02-2605-3333 E-mail: info@neediss.com**NOx Analyzer Verification Test Report**

Calibration Report No.: 6504007

Page: 1/2

Calibrated Date: 1-Apr-22

☒ PM ☐ Onsite**Instruments Information**

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

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 844	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature 26.3 °C

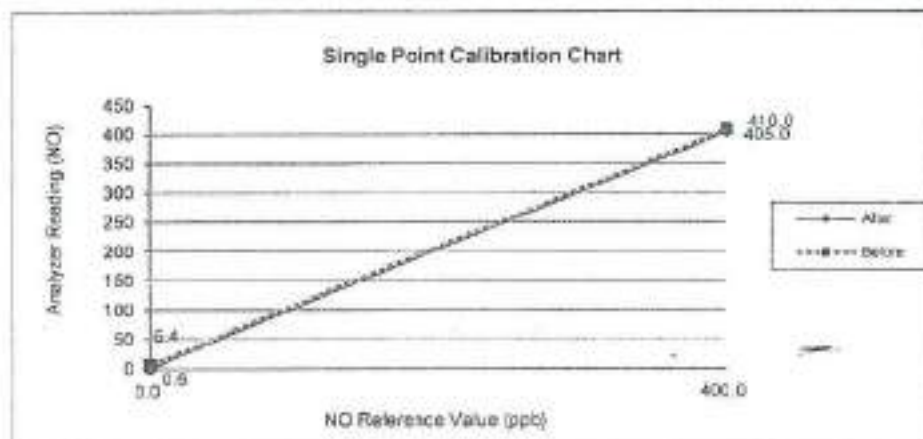
Humidity 52 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	6.4	0.0	6.4	410	400.0	1.2
NO ₂	1.9	0.0	1.9	3.0	0.0	0.4
NOx	8.3	0.0	8.3	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	0.6	0.0	0.6	405	400.0	0.6
NO ₂	0.6	0.0	0.6	3.0	0.0	0.4
NOx	1.2	0.0	1.2	408	400.0	1.0

รับรองสำเนาถูกต้อง
Envisab Co., Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com

we know the best thing to save environment



neediss

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

500 หมู่ 10 ตำบลบ้านใหม่ อำเภอมวกเหล็ก จังหวัดสระบุรี 17100
500 หมู่ 10 ตำบลบ้านใหม่ อำเภอมวกเหล็ก จังหวัดสระบุรี 17100



MODEL : NOx ANALYZER Model 42C THERMO

DATE : 1-04-2022

S/N : ENOTE42C497375

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -850 (V)	-675	-678
LAMP VOLTAGE 950 - 1,200 (V)		
INTER TEMP 15 - 45 DEG C	43	43
CHAMBER TEMP 47 - 51 C	49	50
COOLER TEMP -5 - (-2) DEG C	-2	-2
PRESSURE 400 - 1000.0 mm Hg	350	380
SAMPLE FLOW 0.350 - 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.035 - 0.075 LPM	0.05	0.05
NOx/NOx BKG	12/9.0	12/9.1
NOx/NOx Slope	1.0/0.8	0.9/0.8

Calibrate By : Sirirat Poonlak

Approve By : Tanin Huadcharoen

Sirirat Poonlak

Tanin Huadcharoen

Date: 1-Apr-22

Date: 1-Apr-22



neediss

Neediss Supply Instrument Co.,Ltd.

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



รับรองสำเนาถูกต้อง
ผู้จัดทำรายงานควบคุมคุณภาพ



EVLAB CO., LTD. 151/4462 หมู่ 6 ต.บ้านใหม่ อ.เมือง จ.นนทบุรี 11000
Tel : 02-012-50773-8 Fax : 02-012-50773-9 Email : info@evlab.co.th



Verification Test Report

Report No.:

5401 -SLM 07

☒ PM

☐ Onsite UTM :

47P N 1514462 E 654256

Calibrated Date: 1 April 2022

Site : บริษัทเส้นใยเคเบิล จำกัด

Equipment: Sound Level Meter

Manufacturer: NEEDISS

Model: NDSM 309

Serial : 5012

Environment: Temperature 25 °C Humidity 58 %RH

Reference Standard: Acoustic Calibrator Class 1 Model 4230, Bruel&Kjaer
Serial No.1351075
Date of Calibration : March.21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	94.00	0.34	93.66

Calibrated By:

(Surakit Darnchochit)

Date:

1 April 2022

Approve By:

(Sarawut Keawsrinual)

1 April 2022

This report shall not be reproduced except in full, without the written approval of EVLAB CO., LTD.



www.evlabtesting.com

EVLAB CO., LTD.

รับรองสำเนาถูกต้อง
ผู้จัดทำฝ่ายควบคุมคุณภาพ

Ensuring total responsibility with accuracy measurement
FE-MNT-27 Rev.00 01/08/63

**neediss**บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.536 ซอยบางนา 7 แขวงบางนา เขตบางนา กรุงเทพมหานคร 10260 536 Soi Bangnae 7 Bangnae Bangkok
Tel. 02-602-3960-2 Fax. 02-602-3968 E: info@neediss.com

Verification Report of Ambient Air Sampling



PM



Onsite UTM :

Report No :

6504006

Instrument :

PM-2.5 Sampler SINGLE

Validation Date:

1-Apr-22

Manufacturer :

Tisch Environmental

Model :

TE-Wilbur 2.5

Serial/ID No. :

EP2TIWILBU0479

Environment :

Humidity(%RH): 53

Temperature (°C) : 27.9

Pressure (mmHg) : 748

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	27.9	27.9
Filter	-10.0	0.0	20.0	45.0	27.8	27.9

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	16.67 LPM	0 LPM

Engineer :

Phanuwat Suanbubpha

Approve By:

Sarawut Keawsirirul

Issu Date:

1-Apr-22

Date:

1-Apr-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

**www.neediss.com**

We know the best thing to save environment

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

**neediss**บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.535 ซอยบางพลี 7 แขวงบางพลี เขตบางพลี กรุงเทพฯ 10160 535 Soi Bangplie 7 Bangplie Bangplie Bangkok
Tel. 02-802-3980-2, Fax. 02-802-3988, E:info@neediss.com

Verification Report of Ambient Air Sampling



PM



Onsite UTM :

Report No :

6504015

Instrument : PM-2.5 Sample Single
 Manufacturer : Rupprecht, Patashnick
 Model : 200-H
 Serial/ID No. : EP2RP200029702
 Environment :

Validation Date:

1-Apr-22

Humidity(%RH) : 51

Temperature (°C) : 27

Pressure (mmHg) : 756

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	26.8	27.0

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	16.66 LPM	0.01 LPM

Engineer :

Phanuwat Suanbubpha

Approve By:

Sarawut Keawsrinual

Issu Date:

1-Apr-22

Date:

1-Apr-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

**www.neediss.com**

We know the best thing to save environment



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Calibration Certification Information

Cal. Date: January 19, 2022 Roots-meter S/N: 438320 Ta: 294 °K
 Operator: Jim Tisch Pa: 749.05 mm Hg
 Calibration Model #: TE-502BA Calibrator S/N: 1328

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3190	3.7	1.50
2	3	4	1	1.0220	6.2	2.50
3	5	6	1	0.9290	7.5	3.00
4	7	8	1	0.8590	8.7	3.50
5	9	10	1	0.6530	14.8	6.00

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)
0.9941	0.7536	1.2241	0.9951	0.7544	0.7673
0.9907	0.9694	1.5803	0.9917	0.9704	0.9906
0.9890	1.0646	1.7312	0.9900	1.0656	1.0851
0.9874	1.1495	1.8699	0.9884	1.1506	1.1721
0.9793	1.4996	2.4483	0.9802	1.5011	1.5346
QSTD	m=	1.63957	QA	m=	1.02667
	b=	-0.01202		b=	-0.00753
	r=	0.99999		r=	0.99999

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

Standard Conditions

Tstd: 298.15 °K

Pstd: 760 mm Hg

Key

ΔH: calibrator manometer reading (in H2O)

ΔP: roots-meter manometer reading (mm Hg)

Ta: actual absolute temperature (°K)

Pa: actual barometric pressure (mm Hg)

b: intercept

m: slope

RECALIBRATION

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

CAL

Calibratech Co., Ltd.

7106-7 Moo 2, Sukhprachin 3 Rd., Bangproi, Pakkret, Nonthaburi 11120

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



NSG-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-200022-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540, 540/1 Soi Bangkhao 7, Bangkhao, 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 : (23.7 to 23.8) °C

Relative Humidity : (57.1 to 58.0) %

Air Pressure : 1012.0 mbar

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 09 February 2022

Calibrated by : Akaradith Thippichai

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

Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	CD2213103	18 Nov 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Sarachai Promhong)

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-P001-05

Envilab Co., Ltd.

รับรองสำเนาถูกต้อง

ผู้ตรวจการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sekhsaprasaan 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 65-200022-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.01	0.0001	0.00011
0.1	0.0001	0.00011
1	0.0000	0.00011
2	0.0001	0.00011
5	0.0000	0.00012
10	0.0001	0.00012
20	-0.0001	0.00013
50	0.0000	0.00014
100	-0.0002	0.00020
200	-0.0004	0.00033

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%.

Eccentric error

Load test : 50 g
A B C D E
-0.0001 -0.0002 -0.0002 -0.0001 0.0000 g



Repeatability

Load test : 200 g
Stdev. : 0.000025 g

- 000 -

Handwritten signature



Certificate of Calibration

Certificate No. : 65-200022-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Electronic Balance

Manufacturer : Sartorius

Model : SECURA3102-IS

Serial No. : 0034409695

ID No. : ELABBALANCEN03

Capacity : 3100 g

Resolution : 0.01 g

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

Ambient Temperature : (23.7 to 24.2) °C

Relative Humidity : (57.6 to 57.8) %

Air Pressure : 1012.0 mbar

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 09 February 2022

Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
F181-F1821	65-210044-1	31 Jul 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Pongthong)

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

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaphrasan 3 Rd., Banggood, Pakkred, Northburi 11120

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

Certificate of Calibration

Certificate No. : 65-200022-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
10	0.00	0.0082
20	0.00	0.0082
50	0.00	0.0082
100	0.00	0.0082
200	0.00	0.0083
500	-0.01	0.0085
1000	-0.01	0.0093
1500	-0.01	0.011
2000	-0.01	0.012
3000	-0.01	0.023

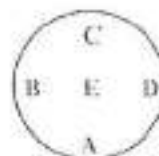
This result of calibration was found accurate as shown on date and place of calibration only.

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

Eccentric error

Load test : 1000 g

A	B	C	D	E	
0.00	0.01	0.02	0.00	0.00	g



Repeatability

Load test : 2000 g

Stdev. : 0.000 g

- 000 -



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co., Ltd.

7/104-7 Moo 2, Sukhprachasan 3 Rd., Bangpool, Pakkred, Nonthaburi 11120

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



Certificate of Calibration

Certificate No. : 64-200086-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Electronic Balance

Manufacturer : METTLER TOLEDO Model : XPR2

Serial No. : C011158261 ID No. : ELABBALANCEN07

Capacity : 2.1 g Resolution : 0.000001 g

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

Ambient Temperature : (23.2 to 23.4) °C

Relative Humidity : (55.3 to 55.6) %

Air Pressure : 1010.0 mbar

Date of Received : 25 March 2021

Date of Calibration : 25 March 2021

Date of Issue : 27 March 2021

Calibrated by : Akaradeth Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02204101	17 Nov 2021	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Promhong)

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-P003-01



รับรองสำเนาถูกต้อง

ผู้ตรวจผ่านงานควบคุม



CAL

Calibratech Co., Ltd.

77106-7 Moo 2, Sukhaphrachan 3 Rd., Bangsuai, Pakkasi, Northburi 11120

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

Certificate of Calibration

Certificate No. : 64-200086-1

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)
0.001	-0.000001	0.000053
0.005	0.000000	0.000054
0.01	-0.000001	0.000071
0.02	-0.000001	0.000089
0.05	-0.000001	0.00011
0.1	0.000001	0.00014
0.5	-0.000005	0.00022
1	0.000000	0.00026
1.5	-0.000005	0.00037
2	0.000000	0.00034

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

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

Eccentric error

Load test : 1 g

A B C D E g
0.000000 0.000000 0.000000 0.000000 0.000000 g



Repeatability

Load test : 2 g

Stdev. : 0.000005 g

- o0o -



วันที่รับรองสำเนาถูกต้อง
ผู้ตรวจการสำเนาควบคุมคุณภาพ





THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-64/0406

MTC No. EEL BP. 68/0364

CALIBRATION CERTIFICATE

Submitted by : Envilab Co., Ltd.

Address : 540, 540/1 Soi Bangkhao 7, Bangkhao, Bangkhao, Bangkok 10160 Thailand.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Acoustic Calibrator

Manufacturer : Pulsar

Model : 106

Serial No. : 87098

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \%$

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.

2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.

3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.

4. Digital Multimeter Agilent 34401A S/N MY44005560.

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

6. Audio Analyzer Keithley 2015-P S/N 4106495.

7. Condenser Microphone Bruel&Kjaer 4180 S/N 2889871.

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

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

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

Date of Receipt : 10 Mar. 2021

Date of Calibration : 12 Mar. 2021

1 / 2

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&L MTC.002 Rev.4

Head Office

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

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road, Bangpoo, 10280, Thailand
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2523 1672-80 ext. 115, 116
Fax (66) 0 2523 9165
E-mail : mtc@tistr.or.th

Office

126 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 2219, 5225, 5217
Fax (66) 0 2579 8502



ผู้จัดทำรายงานผลการสอบเทียบ
Envilab Co., Ltd. ผู้ให้บริการด้านความถูกต้อง



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-64/0406

MTC No. EEL. BP. 68/0364

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 HzAcoustic 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 2
1/2 inch Bruel&Kjaer 4180	94.13	0.13	± 0.10	± 0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1000.3	0.3	± 1.5	$\pm 2.0\%$

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	0.72	± 0.50	$\pm 4.0\%$

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

Calibrated by :

Tawit
(Mr.Tawikiat Jamsamran)

Approved by :

Mr. Jirawale Kueypa
(Mr.Jirawale Kueypa)
Acting Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 12 Mar. 2021

Date of Issue : 16 Mar. 2021

Ref : 201126403100119001

2 / 2

End of Certificate

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.BLMTC.002 Rev.4

Head Office

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

Office/Laboratory

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

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10600,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 3500
E-mail : sumai@tistr.or.th



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: AIR LIQUIDE (THAILAND)
LTD
Part Number: E05N191E15A0003 Reference Number: 160-402305646-1
Cylinder Number: EB0146408 Cylinder Volume: 145.7 CF
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG
PGVP Number: A12022 Valve Outlet: 660
Gas Code: CO,CO2,NO,NOX,SO2,BALN Certification Date: Jan 03, 2022

Expiration Date: Jan 03, 2030

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 6.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	100.2 PPM	G1	+/- 0.5% NIST Traceable	12/27/2021, 01/03/2022
CARBON MONOXIDE	100.0 PPM	98.02 PPM	G1	+/- 0.5% NIST Traceable	12/27/2021
NITRIC OXIDE	100.0 PPM	100.1 PPM	G1	+/- 1.0% NIST Traceable	12/27/2021, 01/03/2022
SULFUR DIOXIDE	100.0 PPM	100.2 PPM	G1	+/- 1.0% NIST Traceable	12/27/2021, 01/03/2022
CARBON DIOXIDE	8.000 %	7.962 %	G1	+/- 0.5% NIST Traceable	12/27/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	09010241	KAL004894	98.48 PPM CARBON MONOXIDE/NITROGEN	+/- 0.5%	Oct 16, 2024
NTRM	200610-56	CC733475	98.81 PPM NITRIC OXIDE/NITROGEN	+/- 0.6%	Oct 06, 2025
GMIS	124205889119	CC322885	4.284 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Sep 03, 2024
NTRM	11010419	KAL004813	99.6 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Jul 28, 2023
NTRM	08010536	K919200	13.94 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 30, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iS50 FTIR AUP2010245 CO2	FTIR	Dec 02, 2021
SIEMENS ULTRAMAT6E N1-C8-180	NDIR	Dec 09, 2021
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Dec 16, 2021
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Dec 20, 2021
Nicolet iS50 FTIR AUP2010245 SO2	FTIR	Dec 23, 2021

Triad Data Available Upon Request

NOTES: Gross Weight: 28.1 Kg. Net Weight: 5.1 Kg.

UF-0X50X



Melinda A. Parker
Approved for Release

Page 1 of 160-402305646-1



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Calibration Certificate

Part Number: 721A2601
Description: Micromate with DIN Geophone
Serial Number: UM18214
Calibration Date: **MAR 24 2021**
Calibration Reference Equipment: 714J7402

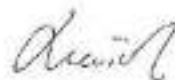
Instantel certifies that the above product was calibrated in accordance with the applicable Instantel procedures. These procedures are part of a quality system that is designed to assure that the product listed above meets or exceeds Instantel specifications.

Instantel further certifies that the measurement instruments used during the calibration of this product are traceable to the National Institute of Standards and Technology; or National Research Council of Canada. Evidence of traceability is on file at Instantel and is available upon request.

The environment in which this product was calibrated is maintained within the operating specifications of the instrument.

Please note that the sensor check function is intended to check that the sensors are connected to the unit, installed in the proper orientation and sufficiently level to operate properly. This function should not be confused with a formal calibration, which requires the sensors be checked against a reference that is traceable to a known standard. Instantel recommends that products be returned to Instantel or an authorized service and calibration facility for annual calibration.

Calibrated By:



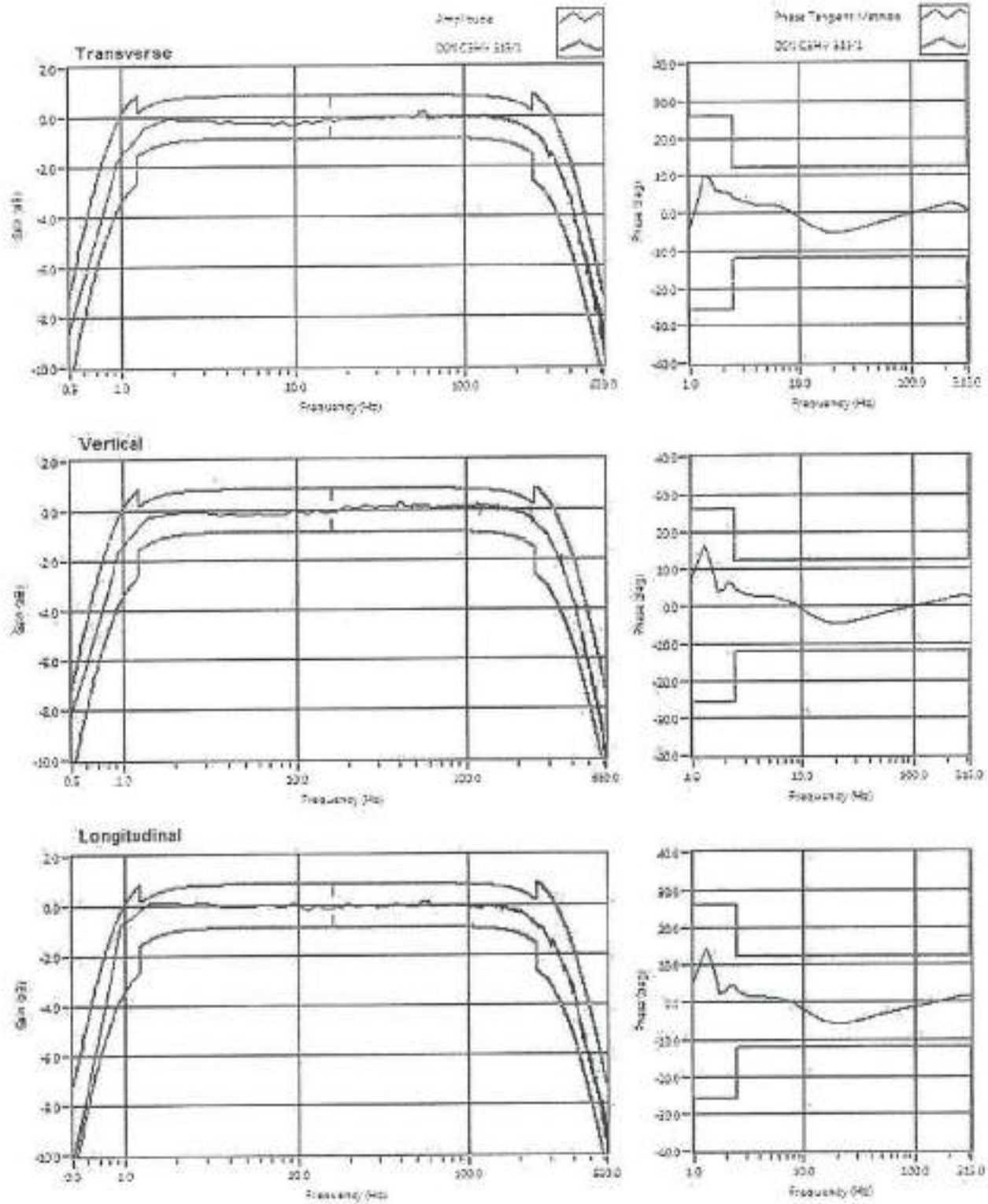
Xiaoming Yang



309 Legget Drive, Ottawa, Ontario, K2K 3A3, (613) 592-4642



Frequency Response of UM18214



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lachal Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10960
+662 723 0362
MT-TH.Support@mt.com



Accuracy Calibration Certificate

Customer

Company: EnviLab Co., Ltd.
Address: 540, 540/1 Soi Bang Khue 7, Bang Khue
City: Bang Khue Contact: Ngamthip Gampersuang
Zip / Postal: 10160
State / Province: Bangkok
Order Number: 

Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: XSR205DU Asset Number: N/A
Serial No.: 8911383567 Terminal Model: SRAT
Building: N/A Terminal Serial No.: 8911383567
Floor: 3 Terminal Asset No.: N/A
Room: B304

Range	Max. Capacity	Readability (d)
1	81 g	0.0001 g
2	220 g	0.001 g

Procedure

Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CPW002/20

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.

As Found	Temperature		Humidity	
	Start: 22.2 °C	End: 22.6 °C	Start: 58.3 %	End: 59.7 %

As Found Calibration Date: 02-Mar-2022 Calibrator:
As Left Calibration Date: N/A
Issue Date: 03-Mar-2022 Approved Signatory:

Naruephon C

Naruephon Chonprasertsak



- ☒ Kasekorn Tassanachaisakul
☐ Santi Jinyom
☐ Sorachet Sukkate



Measurement Results

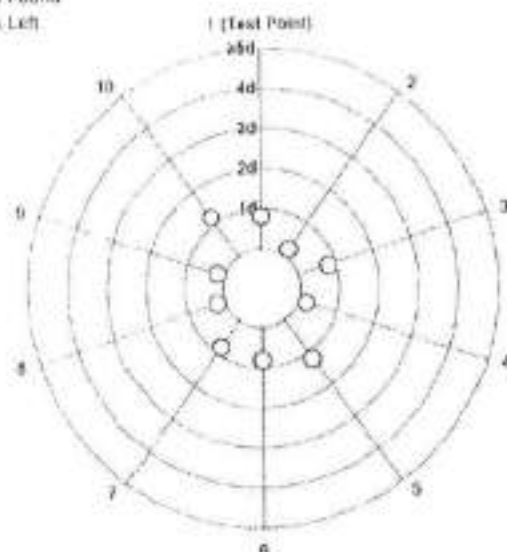
Repeatability

Test Load: 70 g

	As Found	As Left
1	70.00001 g	N/A
2	70.00002 g	N/A
3	70.00001 g	N/A
4	70.00002 g	N/A
5	70.00003 g	N/A
6	70.00001 g	N/A
7	70.00001 g	N/A
8	70.00002 g	N/A
9	70.00002 g	N/A
10	70.00003 g	N/A

Standard Deviation	0.000008 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.

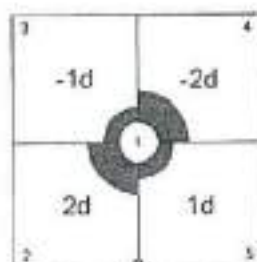
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	100.0000 g	N/A
2	100.0002 g	N/A
3	99.9999 g	N/A
4	99.9998 g	N/A
5	100.0001 g	N/A

Maximum Deviation	0.0002 g	N/A
-------------------	----------	-----



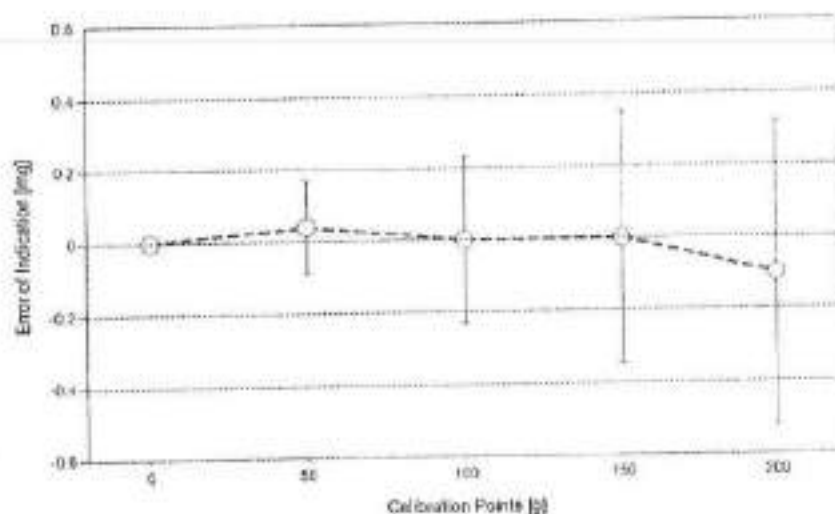
As Found

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	0.0000 g	0.0000 g	0.0000 g	0.017 mg	2
2	0.1000 g	0.1000 g	0.0000 g	0.023 mg	2
3	0.5000 g	0.50001 g	0.00001 g	0.028 mg	2
4	0.9999 g	0.99999 g	0.00000 g	0.032 mg	2
5	1.9999 g	2.00000 g	0.00001 g	0.040 mg	2
6	5.00001 g	5.00001 g	0.00000 g	0.048 mg	2
7	10.00001 g	10.00002 g	0.00001 g	0.062 mg	2
8	49.99999 g	50.00002 g	0.00004 g	0.13 mg	2
9	100.0000 g	100.0000 g	0.0000 g	0.23 mg	2
10	150.0000 g	150.0000 g	0.0000 g	0.35 mg	2
11	199.9999 g	199.9998 g	-0.0001 g	0.42 mg	2



○ 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.:	WS22	Date of Issue:	05-Jan-2022
Certificate Number:	177036	Calibration Due Date:	03-Jul-2023

Weight Set 2: OIML E2

Weight Set No.:	WS76	Date of Issue:	31-Jan-2022
Certificate Number:	C265470237	Calibration Due Date:	12-Jul-2023

Thermo Hygrometer

Equipment No.:	IN193	Date of Issue:	14-Jun-2021
Certificate Number:	21H1221	Calibration Due Date:	01-Jun-2022

Remarks

FACT adjustment functionality activated

Equipment condition: Good

Next calibration according to customer's procedure

End of Accredited Section

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



Signature
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

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: $1.5 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: 3 K

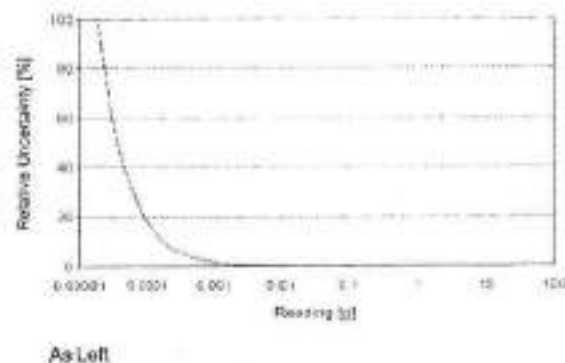
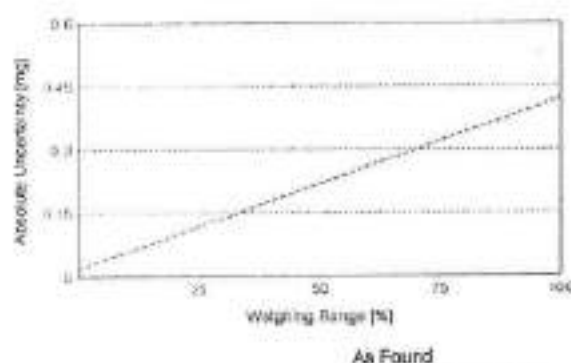
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.00001 g	81 g	$U_1 = 0.016 \text{ mg} + 0.00497 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	226 g	$U_2 = 0.06 \text{ mg} + 0.00492 \text{ mg/g} \cdot R$	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	
0.00220 g	0.018 mg	0.82%	N/A	N/A
0.02200 g	0.018 mg	0.082%	N/A	N/A
0.22000 g	0.019 mg	0.0087%	N/A	N/A
2.20000 g	0.028 mg	0.0013%	N/A	N/A
220.0000 g	1.1 mg	0.00052%	N/A	N/A



The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.



S. K. SALES AND SERVICE CO. LTD.
194/56, 194/57 Thakham Rd. Saman Don
Bang Khun Thian Bangkok 10150
Tel : 02-417-2144 Fax : 02-417-2155



Certificate of Calibration

Reference No. : 4162/2202-017 Certificate No. : L2203-290
Customer : Envilab Co., Ltd. (Head Office) Page 1 of 2
540, 540/1 Soi Bangkhue 7, Bangkhue,
Bangkhue Bangkok 10160
Equipment : Digital Thermo-Hygrometer
Manufacturer : Testo
Model : 608-H1
Serial No. : 83353607
ID No. : -
Received Date : 7 March 2022
Calibrated Date : 9 March 2022
Issued Date : 15 March 2022

Environment	Start Calibration	Stop Calibration
Ambient Temperature (°C)	24.7	25.5
Relative Humidity (% RH)	51	52

Calibrated by : Mr. Nattawut Reangdech

Calibration Method

In-house method : by comparison with standard hygrometer for humidity measurement function
and comparison with standard thermometer for temperature measurement function into humidity/temperature chamber

Condition of this result of calibration

1. Reference standard instrument

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Hygrometer	HL-NT2-D	61468576	QR21-0851	13 May 22
2) Digital Thermometer With Probe	GT11	08000089	PSL-T 0072/65	14 November 2022

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

3. This certificate can be traceable to International System of Unit :

- Through Thailand Institute of Scientific And Technological Research (TISTR)
- Through Quality Reborn Co., Ltd.

Approved by : 

☐ Mr. Suphachai Sakri

☐ Mr. Phayak Toolit

☒ Miss Tantareporn Petpong

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

This certificate may not be reproduced other than in full except with the prior written approval of the S. K. Sales and Service Company Limited.



รับรองสำเนาถูกต้อง

ผู้ตรวจการควบคุมคุณภาพ

Result of Calibration

Function : Humidity Measurement Reference Temperature at 25 °C

STD Reading (% RH)	UUC Reading (% RH)	UUC Error (% RH)	Measurement Uncertainty (\pm % RH)
50.00	49.0	-1.00	2.3

Function : Temperature Measurement

STD Reading (°C)	UUC Reading (°C)	UUC Error (°C)	Measurement Uncertainty (\pm °C)
25.012	25.0	-0.012	0.35

Resolution : 0.1 (°C) , 0.1 % RH

STD= Standard

UUC= Unit Under Calibration

** End of Calibration Report **

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Ep.

CAL

Calibratech Co., Ltd.

7/109-7 Moo 2, Sukkaphrasan 3 Rd., Bangpoed, Pakkred, Nonthaburi 11120

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



Certificate of Calibration

Certificate No. : 65-420020-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkhao7, Bangkhao, 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 : (23.5 to 24.8)°C

Relative Humidity : (50 to 55) %

Date of Received : 02 March 2022

Date of Calibration : 02 March 2022

Date of Issue : 05 March 2022

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	61235182	795894	14 Feb 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.985	61223875	769927	15 May 2022	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.008	61244986	795895	25 Feb 2023	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%

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

CAL-F003J-03

Envilab Co., Ltd.

รับรองสำเนาถูกต้อง

ผู้ตรวจการควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 65-420020-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

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

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (\pm pH)
4, 7, 10	4.008	4.005	0.003	0.0084
	6.985	7.001	-0.016	0.010
	10.008	10.009	-0.001	0.014

Remark

UUC : Unit Under Calibration

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

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

-o/o-



Calibratech Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ





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.: 22TW70

Page.: 1 of 2

Certificate of Testing

Equipment :	Dissolved Oxygen Meter
Manufacturer :	Hanna
Model :	HI 9147
Serial No. :	H0007030
ID No. :	ELABDOHI914701
Received Date :	15 March 2022
Test Date :	18 March 2022
Reference :	2203-0566DN-1
Submitted by :	Envilab Co.,Ltd (Head office) 540, 540/1 Soi Bangkhae 7, Bangkhae, Bangkhae, 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 Sirithoon

Approved by :

Approved Signatory

- (✓) Malee Butkruea
() Saithip Meangmai
() Warakorn Lemgatrakul

Issue Date :

22 March 2022



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

0284369



Cert.No.: 22TW70
Page.: 2 of 2

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: KC3N0638K

Titration Method (Azide Modification Method) (mg/L)	Dissolved Oxygen Meter Reading (mg/L)	Standard Deviation (mg/L)
8.04	8.1	0.045

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

-o0o-



Ok dtd
รับรองสำเนาถูกต้อง *Male*
ผู้จัดการฝ่ายควบคุมคุณภาพ

a 1100969

CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhprachuen 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120

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



MSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-400527-3

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. : 100613-0

ID No. : ELABREFRIG140I

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

Ambient Temperature : (24.5 to 25.0) °C

Relative Humidity : (55 to 58) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 15 October 2021

Date of Calibration : 15 October 2021

Date of Issue : 16 October 2021

Calibrated by : Bunjerd Masri

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No.

Cert. No.

Due Date

Traceability

400046 & 400023 64-400443-1

29 Mar 2022

National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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



บริษัท เอนวิลแลบ จำกัด
ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpoed, Pakkred, Northaburi 11120

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

Certificate of Calibration

Certificate No. : 64-400527-3

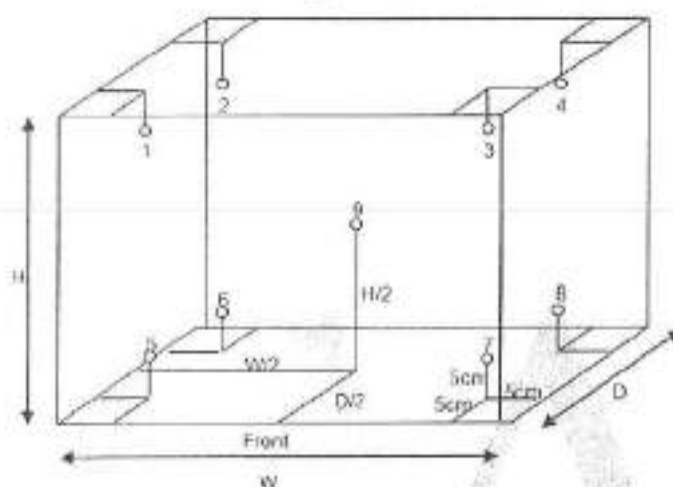
Page : 2 of 2

Result of Calibration : Without Adjustment

U/C 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	19.9	19.8	19.8	19.9	19.9	19.9	20.0	19.8	20.1	0.53

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.0	20.0	0.4	0.1	0.4

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 -

Br



EnviLab Co.,Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 64-400569-1

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Air Chamber (Refrigerator)

Manufacturer : M-LAB

Model : BIC-140

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 1011

ID No. : ELABBODC140N03

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

Ambient Temperature : (23.0 to 23.8) °C

Relative Humidity : (55 to 60) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 12 November 2021

Date of Calibration : 12 November 2021

Date of Issue : 18 November 2021

Calibrated by : Bunjerd Masri

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No.

Cert. No.

Due Date

Traceability

400046 & 400023 64-400443-1

29 Mar 2022

National Institute of Metrology Thailand (NIMT)

Approved by :



(Bunjerd Masri)

Supervisor

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

Calibratech Co.,Ltd.

7/105-7 Moo 2, Salachaphrasan 3 Rd, Bangpoo, Pikkred, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 64-400569-1

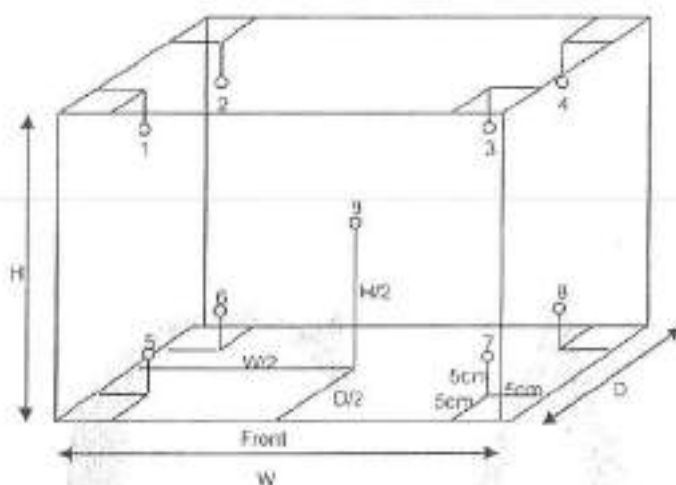
Page : 2 of 2

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	
4.0	4.0	4.0	3.3	3.2	3.4	3.4	3.9	3.9	4.0	3.4	4.2	0.37

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
4.0	4.0	4.0	1.0	0.1	1.0

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%.

- o l l o -



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co., Ltd.

7/106-7 Min 2, Sukhprachasan 3 Rd., Bangpoed, Pakkred, Nonthaburi 11120

Tel.021 964-6211 Fax.021 964-5135, e-mail : calibtech.cal@yahoo.com, calibtech.eni@hotmail.com



NSC-TIS-17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-400155-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540, 540/1 Soi Bangkhae 7, Bangkhae, 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. : EIABHAAOVEN0600

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

Ambient Temperature : (30.0 to 31.0) °C

Relative Humidity : (60 to 65) %

Line Voltage : (224.2 to 225.2) V

Date of Received : 24 March 2022

Date of Calibration : 24 March 2022

Date of Issue : 29 March 2022

Calibrated by : Permpoon 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 & 400032 64-400589-1

25 May 2022

National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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-F003-E-03



Envilab Co., Ltd.

W. Masri

รับรองสำเนาถูกต้อง

ผู้ตรวจการควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 65-400155-2

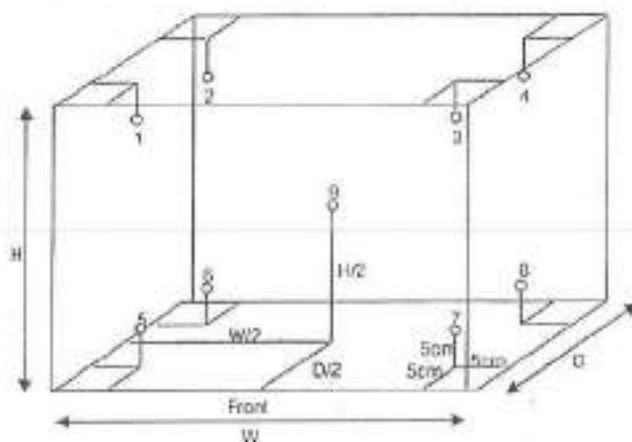
Page : 2 of 2

Result of Calibration : Without Adjustment

U/C Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 9 (close)



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.56 m

Capacity = 0.07 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		
104.0	103.5	103.5	103.9	104.2	104.2	104.2	104.1	104.9	103.7	104.2	104.3	0.69	
110.0	109.5	109.5	110.0	110.3	110.3	110.2	110.2	110.9	109.7	110.2	110.3	0.69	
180.0	179.6	179.0	179.1	180.0	180.0	180.1	180.1	179.3	179.0	180.1	180.3	0.95	

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	103.5	103.5	0.7	0.1	0.8
110.0	109.5	109.5	0.7	0.1	0.8
180.0	179.0	179.0	1.5	0.2	1.5

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%

- 000 -

B



CAL

Calibratech Co., Ltd.

1/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Northburi 11120

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



Certificate of Calibration

Certificate No. : 65-400053-1

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 : (22.7 to 23.5) °C

Relative Humidity : (45 to 50) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 07 February 2022

Calibrated by : Permpon Chanpu

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
400029 & 400031	64-400588-1	24 May 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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-F001-01



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhachan 3 Rd., Banggood, Pakkret, Northburi 11120

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

Certificate of Calibration

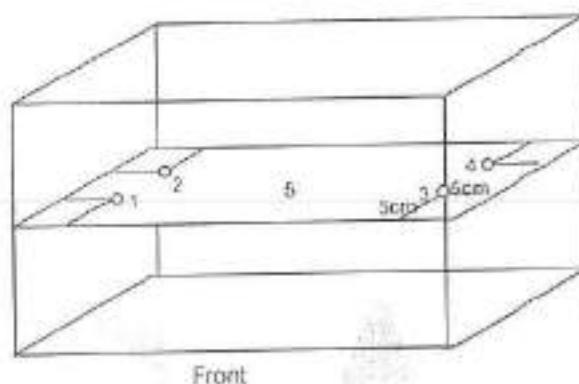
Certificate No. : 65-400053-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.					Uncertainty (± °C)	Measured Uniformity (°C)	Measured Stability (°C)
			1	2	3	4	5			
95.0	95.0	95.0	95.35	95.45	95.51	95.66	95.56	0.19	0.27	0.06

Remark The uncertainty is not combine uniformity of the water bath

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

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

- oOo -

B.



รวมรองสำเนาถูกต้อง
ผู้จัดทำโดยคุณคุณคุณคุณ



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhprachuen 3 Rd., Bangpoo, Pakkret, Nonthaburi 11120

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



NSC-TIS-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-300146-10

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Cylinder

Manufacturer : PYREX

Class : A

Capacity : 50 ml

Graduation : 1 ml

ID No. : C-WW-020/18

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

Relative Humidity : (50 ± 15) %

Air Pressure : 1002.0 mbar.

Date of Received : 09 March 2022

Date of Calibration : 21 March 2022

Date of Issue : 21 March 2022

Calibrated by : Anurat Soimbur

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	64-200354-1	02 Jun 2022	National Institute of Metrology (Thailand) (NIMT)

Approval by :

(Wipon Tonsuek)

Supervisor

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 Calibratech Co., Ltd.

CAL-F0031-03



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง

ผู้จัดทำเอกสารควบคุมคุณภาพ



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhavesasani 1 Rd., Bangpoo, Pikkad, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 65-300146-10

Page : 2 of 2

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

UDC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
30	29.79
50	49.73

Uncertainty of measurement with in \pm 0.054 ml

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

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

- oDo -

D.



The official

รับรองสำเนาถูกต้อง



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Banggood, Pakkret, Nonthaburi 11120

Tel. (02) 964-6211 Fax. (02) 964-5135, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-300147-4

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Cylinder

Manufacturer : ISOLAB

Class : A

Capacity : 1000 ml

Graduation : 10 ml

ID No. : C-WW-028/18

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

Relative Humidity : (50 ± 15) %

Air Pressure : 1002.0 mbar

Date of Received : 09 March 2022

Date of Calibration : 21 March 2022

Date of Issue : 21 March 2022

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	64-200354-1	02 Jun 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Tovadec)

Supervisor



รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

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

Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 65-300147-4

Page : 2 of 2

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

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
500	501.84
1000	1001.39

Uncertainty of measurement with in \pm 0.17 ml

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

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

- 000 -

D



ประจำเดือนพฤษภาคม พ.ศ. 2565



TSP High Volume Sampler Calibration

Verification Report No.

A8605 -TSP- 02

☒ PM ☐ Onsite

Site: บริเวณ เหนือโถงเก็บ ซากสัตว์

UTM : 47P N1514475 E654269

Sampler: ETSP#06

Recorder: ECRANG15315224

Date: 3 May 22

Technical: Surakit D.

Approval: Sarawut K.

CONDITIONS

Barometric Press. (hPa): 1011.0

Temperature (deg C): 30.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 758.3

Temperature (deg K): 303.0

Corrected Avg Press. (mm Hg): 758.8

Average Temp. (deg K): 303.0

CALIBRATION OFFICE

Brand: Tisch Environmental, Inc

Model: TE-5028A

Serial#: 1328

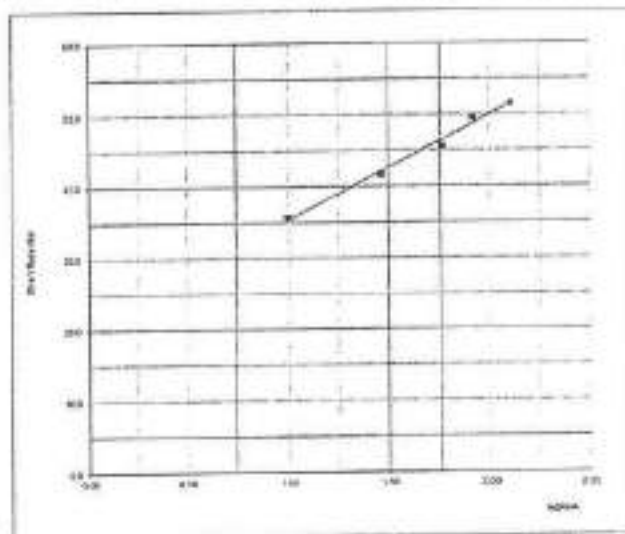
Qstd Slope: 1.63957

Qstd Intercept: -0.01202

Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (h)	Qstd (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 18.5833 Intercept = 11.8409 Corr. coeff = 0.9906 # of Observations 5 Range of Chart 33 at 1.1 - 1.7 m ³ /min. 43
1	11.63	2.088	52.0	51.51	
2	9.81	1.900	46.0	45.57	
3	6.43	1.535	40.0	39.62	
4	4.52	1.262	36.0	35.66	
5	2.98	1.650	32.0	31.70	



Calibrated by :

(Surakit Damcholvichit)
 3 May 2022

Approved by :

(Sarawut Keewatnual)
 3 May 2022

This report shall not be reproduced except in full without the written approval of Evtelab Co., Ltd.

www.evtelab.com



รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ



บริษัท อีวีแอล จำกัด (มหาชน) 347/5 หมู่ 10 ต.บางพลีใหญ่ อ.บางพลี จ.สมุทรปราการ 10540
 Evl Lab. Co., Ltd. 347/5 Moo 10 Bang Phli Dist. Bang Phli Suburb, Bangkok 10540
 Tel: 02-622-8277-8 Fax: 02-622-2073 E-mail: info@evl.co.th



www.evltesting.com

PM10 High Volume Sampler Calibration

Verification Report No.

B6505 -PM 01

PM	Onsite
Site: บริษัท เ็นไอเนชั่น จำกัด	
UTM: 47P N1514475 E654269	
Sampler: EPM#17	
Recorder: ECRDS0161B124	
Date: 3 May 22	Technical: Surakit D.
Approval: Sarawut K.	

CONDITIONS

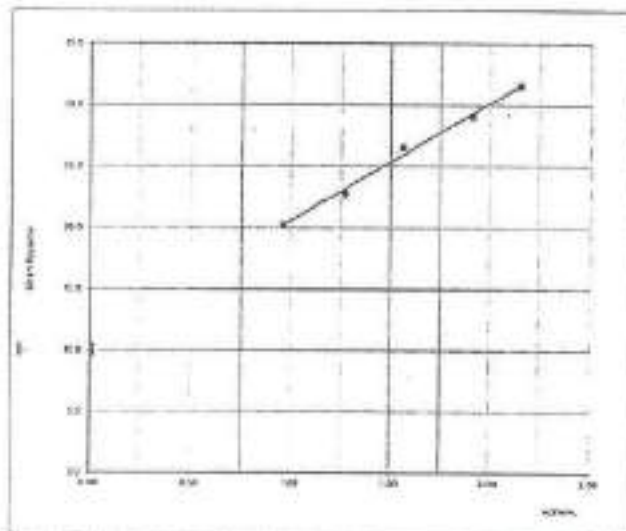
Barometric Press. (hPa): 1011.0	Corrected Pressure (mm Hg): 758.3
Temperature (deg C): 30.0	Temperature (deg K): 303.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.6
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc.	Slope: 1.02667
Model: TE-5028A	Intercept: -0.00753
Serial#: 132B	Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Q _a (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	12.14	2.153	50.0	31.61	Slope = 9.5841
2	9.57	1.912	46.0	29.08	Intercept = 10.9676
3	6.36	1.560	42.0	26.55	Corr. coeff. = 0.9965
4	4.21	1.271	36.0	22.76	SFR = 1.132
5	2.39	0.959	32.0	20.23	SSP = 34.55
					# of Observations: 5
					Range of Chart: 34
					at SFR ±10%: 35



Calibrated by: [Signature]
 (Surakit Darncholwicht)
 3 May 2022

Approved by: [Signature]
 (Sarawut Keawwinnual)
 3 May 2022

This report shall not be reproduced except in full, without the written approval of Evl Lab. Co., Ltd.

www.evltesting.com

EV-001-01 Rev. 02/2022



รับรองสำเนาถูกต้อง
 วิศวกรรมการวัดควบคุมสุณ



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6505009

Page:1/1

Calibrated Date: 1-May-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO, 43C	Manufacturer THERMO S/N: E50TE43C103362
---	--

Calibration System

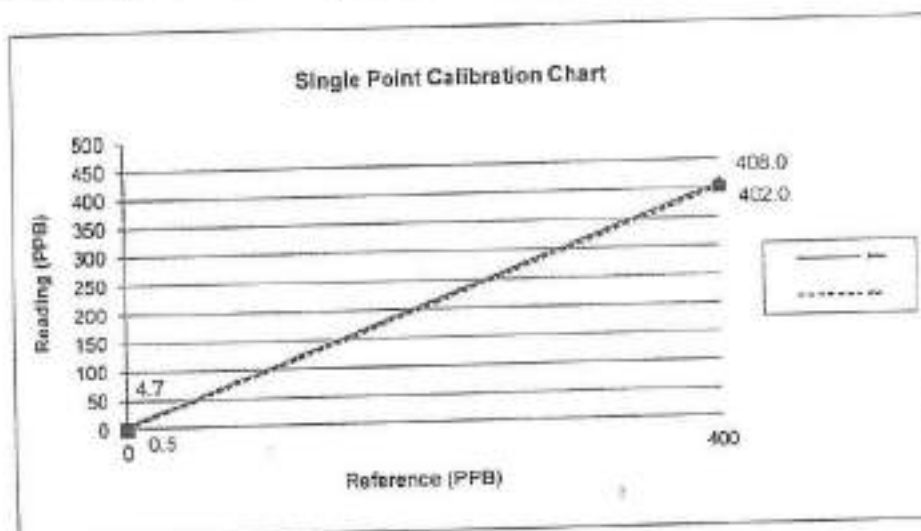
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.65 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 26.9 °C

Humidity: 47 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	4.7	4.7	400.0	408	2.0
After	0.0	0.5	0.5	400.0	402	0.5



This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



บริษัท เน็ดิส ซัพพลาย อินสตรูเมนต์ จำกัด
ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

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

526 Sol Bangkhee 7 Bangkhee Bangkok 10160 526 Sol Bangkhee 7 Bangkhee Bangkok 10160
Tel: 02-6537-1761 2 Lines 02-6537-1766 2 Lines 02-6537-1766 2 Lines 02-6537-1766 2 Lines



MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 1-05-2022

S/N : ESOTE43C103362

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -850 (V)	-650	-653
LAMP VOLTAGE 950 - 1,200 (V)	990	985
LAMP INTENSITY 20000 - 50000 Hz	32568	32577
INTER TEMP 15 - 45 DEG C	37	37
CHAMBER TEMP 47 - 51 C	49	49
COOLER TEMP -5 - (-2) DEG C	-2.5	-2.5
PRESSURE 400 - 1000.0 mm Hg	764	765
FLOW 0.350 - 0.650 LPM	0.42	0.4

Calibrate By :

Sirirat Poonlak

Approve By :

Sarawut Keawsrinual

Sirirat Poonlak

Sarawut Keawsrinual

Date:

1-May-22

Date:

1-May-22



neediss

Neediss Supply Instrument Co., Ltd.

This report may be reproduced except in full without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com



รับรองสำเนาถูกต้อง

รับรองสำเนาถูกต้อง

รับรองสำเนาถูกต้อง



NOx Analyzer Verification Test Report

Calibration Report No.: 6505006

Page:1/2

Calibrated Date: 1-May-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42CD75279
--	--

Calibration System

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

Environment: Temperature 26.5 °C

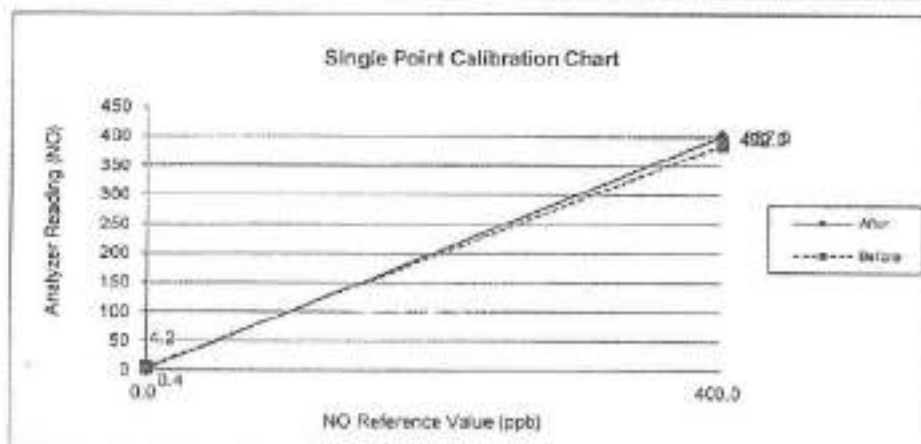
Humidity: 51 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	4.2	0.0	4.2	387	400.0	-1.7
NO ₂	5.1	0.0	5.1	23.0	0.0	2.9
NOx	9.3	0.0	9.3	410	400.0	1.2

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.4	0.0	0.4	402	400.0	0.2
NO ₂	0.5	0.0	0.5	4.0	0.0	0.5
NOx	0.9	0.0	0.9	405	400.0	0.7



This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



สิ่งนี้ไม่ใช่เอกสาร

รับรองสำหรับลูกค้า

Neediss Co., Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ



MODEL : NOx ANALYZER Model 42C THERMO

DATE : 1-05-2022

S/N : ENOTE42CD75279

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -850 (V)	-675	-678
LAMP VOLTAGE 950 - 1,200 (V)		
INTER TEMP 15 - 45 DEG C	43	43
CHAMBER TEMP 47 - 51 C	49	50
COOLER TEMP -5 - (-2) DEG C	-2	-2
PRESSURE 400 - 1000.0 mm Hg	350	360
SAMPLE FLOW 0.350 - 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.035 - 0.075 LPM	0.05	0.05
No/Nox BKG	12/9.0	12/9.1
No/Nox Slope	1.0/0.5	0.9/0.8

 Calibrate By : Sirirat Poonlak


 Approve By : Sarawat Keawsrinual

Sirirat Poonlak

Sarawat Keawsrinual

Date: 1-May 22

Date: 1-May-22


neediss
 Neediss Supply Instrument Co.,Ltd.

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com


thing to save environment

 มีรองสำเนาถูกต้อง
 1/1/2565



Verification Test Report

Report No.:

6505 -SLM 03

☒ PM

☐ Onsite UTM :

47P N 1514452 E 654258

Calibrated Date: 3 May 2022

Site : บริษัทเอ็นโรแล็บ จำกัด

Equipment: Sound Level Meter

Manufacturer: NEEDISS

Model: NDSM 309

Serial : 8002

Environment: Temperature 26 °C Humidity 51 %RH

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

Serial No.1351075

Date of Calibration March 21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	93.60	-0.06	93.66

Calibrated By:

(Surakit Darncholwicht)

Date:

3 May 2022

Approve By:

(Sarawut Keawsriwal)

Date:

3 May 2022

This report shall not be reproduced except in full, without the written approval of Envilab Co., Ltd.



C6505-T5P 02

☐ PM ☒ Onsite

Side: บริษัท เจริญวิทย์ จำกัด

UTM: 47P N1514475 E654269

Sampler: ET5P#32

Recorder: ECRANG15315224

Date: 3 May 22

Technical Support: 800-441-5700

Approval: Sarema K

CONDITIONS

Barometric Press. (hPa): 1011.0

Temperature (deg C): 30.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 758.3

Temperature (deg K) 303.0

Corrected Avg Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand Tisch Environmental, Inc.

Model TE-5028A

Serial# 1328

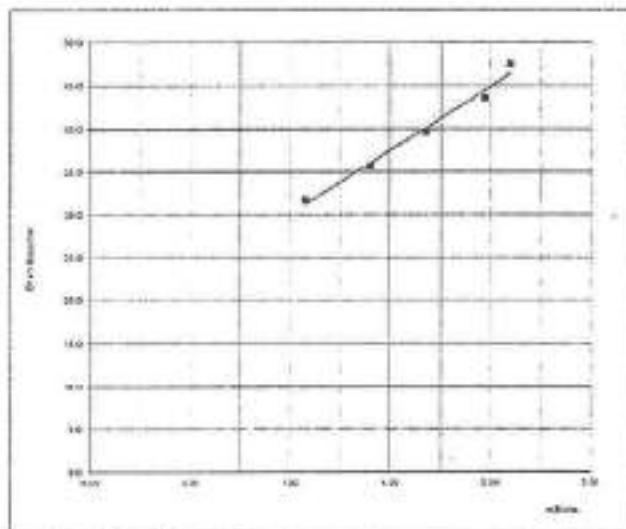
Gold Slope: 1.63957

Unit weight:	150.000
Unit increment:	-0.01202

Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Q _{std} (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION	
1	11.52	2.058	50.0	49.53	Slope =	15.8450
2	9.34	1.854	46.0	45.57	Intercept =	16.7579
3	6.14	1.504	42.0	41.81	Corr. coeff =	0.9956
4	4.97	1.354	38.0	37.84		
5	2.41	0.845	32.0	31.70	# of Observations:	5
					Range of Chart at 1.1 - 1.7 m ³ /min	35 44



Calibrated by:

{ Surakit Darnicholwicht }
3 May 2022

Approved by:

(Saranut Keawwattana)
3 May 2022



บริษัท อีวีแอล จำกัด (มหาชน) EVL Co., Ltd.
 101 หมู่ 10 ต.บ้านใหม่ อ.เมือง จ.นนทบุรี 11000
 โทร: 02-502-8877-8 โทร: 02-502-8733 อีเมล: info@evltesting.com



PM10 High Volume Sampler Calibration

Verification Report No.

06505-PM 02

Loc: PM Site: เขตรักษาพันธุ์สัตว์ป่าห้วยขาแข้ง UTM: 47P N1514475 E654269 Sampler: NFM004 Recorder: ECRDS01618124	Date: 4 May 22 Technical: Surakit D. Approval: Sarawut K.
--	---

CONDITIONS

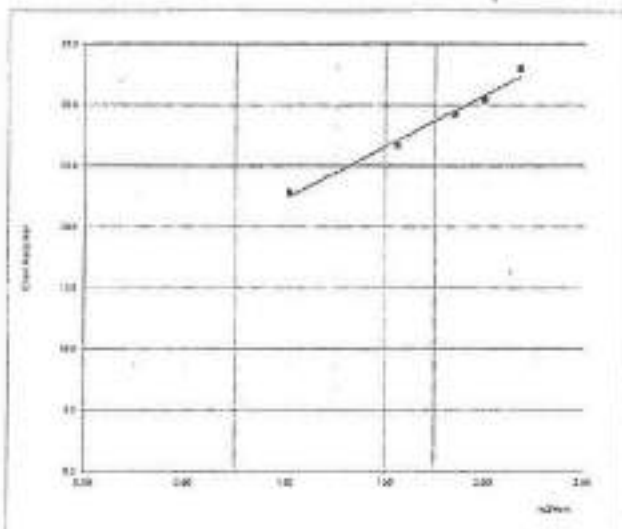
Berometric Press. (hPa): 1010.0	Corrected Pressure (mm Hg): 757.0
Temperature (deg C): 31.0	Temperature (deg K): 304.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tech Environmental, Inc	Slope: 1.02667
Model: TE-5026A	Intercept: -0.00753
Serial#: 1328	Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Q _s (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	10.52	2.009	50.0	31.57	Slope = 10.0683
2	8.50	1.806	40.0	30.41	Intercept = 11.5478
3	6.32	1.558	42.0	26.61	Corr. coeff. = 0.9924
4	4.22	1.275	38.0	24.07	SFR = 1.137
5	2.37	0.957	34.0	21.54	SSP = 36.30
					# of Observations: 5
					Range of Chart at SFR ±10%: 35
					37



Calibrated by: (Signature)
 (Surakit Damcholvichit)
 4 May 2022

Approved by: (Signature)
 (Sarawut Keawsthanal)
 4 May 2022

This report shall not be reproduced except in full, without the written approval of EVL Co., Ltd.



รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

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

536 หมู่ 10 ต.บางพลีใหญ่ อ.บางพลี จ.สมุทรปราการ 10560-536 Soi Bangplai 7 Bangplai Bangplai Bangkok
Tel: 02-555-7440 E-mail: info@neediss.com



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6505006

Page:1/1

Calibrated Date: 1-May-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO_43C	Manufacturer THERMO S/N: ESOTE43C069871
--	--

Calibration System

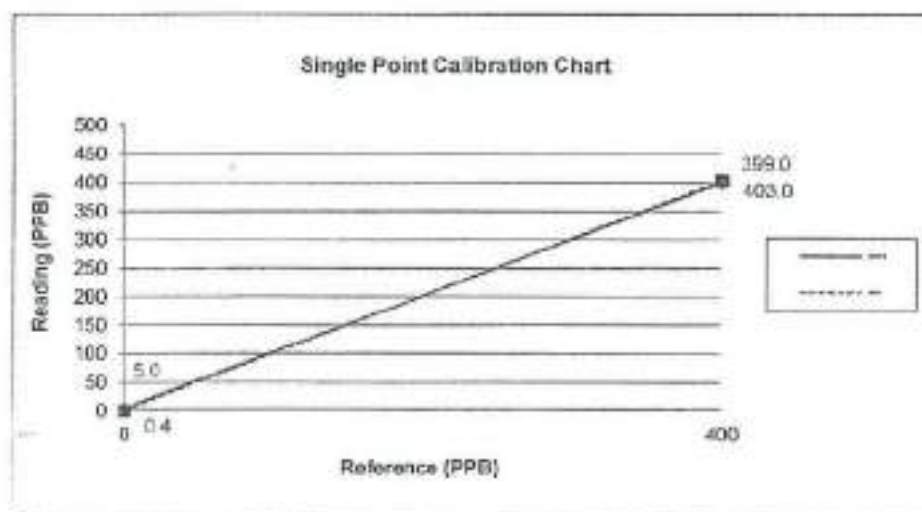
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 544	NO Conc 44.68 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 26.8 °C

Humidity: 47 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	5.0	5.0	400.0	399	-0.3
After	0.0	0.4	0.4	400.0	403	0.8



This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



Signature
Date: 2022-05-01

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

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

135 หมู่ 5 ตำบลบางพลีใหญ่ อำเภอบางพลี จังหวัดสมุทรปราการ 10560 536-561 Bangkok 7 Bangkok Bangkok Bangkok
Tel : 02-802-7142 Fax : 02-802-7143 E-mail : info@neediss.com



MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 1-05-2022

S/N : ESQTE43C069871

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 --850 (V)	-450	-653
LAMP VOLTAGE 950 - 1,200 (V)	990	985
LAMP INTENSITY 20000 - 50000 Hz	32568	32577
INTER TEMP 15 - 45 DEG C	37	37
CHAMBER TEMP 47 - 51 C	49	49
COOLER TEMP -5 - (-2) DEG C	-2.5	-2.5
PRESSURE 400 - 1000.0 mm Hg	764	765
FLOW 0.350 - 0.650 LPM	0.42	0.4

Calibrate By : Sirirat Poonlak

Approve By : Sarawut Keawsrinual

Sirirat Poonlak

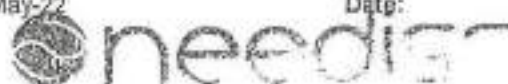
Sarawut Keawsrinual

Date:

1-May-22

Date:

1-May-22



This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com

We know the best thing to save environment



รับรองสำเนาถูกต้อง
วันที่ 1-05-2022 มีคนตรวจเอกสาร 0001



neediss

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

536 ซอยบางนาซอย 7 แขวงบางนา เขตคลองเตย กรุงเทพมหานคร 10160 536 Soi Bangna-soi 7 Bangnahe Bangkok Bangkok
Tel: 02-8422-0148 Fax: 02-842-0149 E-mail: info@neediss.com neediss.com



NOx Analyzer Verification Test Report

Calibration Report No.: 6505003

Page:1/2

Calibrated Date: 1-May-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO₂/NOx Analyzer
Model: 42C

Manufacturer THERMO
S/N: ENOTE42C786364

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101	NO Conc 44.68 PPM
S/N: 792	SO ₂ Conc 45.34 PPM
ZERO AIR Generator ZAG7001	CO Conc 4500 PPM
S/N: 644	Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 26.1 °C

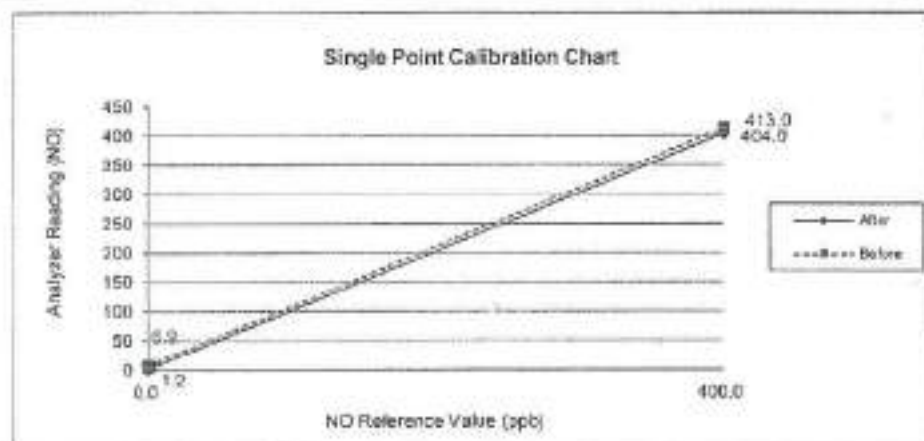
Humidity 52 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	6.9	0.0	6.9	413	400.0	1.6
NO ₂	3.6	0.0	3.6	2.0	0.0	0.2
NOx	10.5	0.0	10.5	415	400.0	1.8

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	1.2	0.0	1.2	404	400.0	0.5
NO ₂	0.6	0.0	0.6	4.0	0.0	0.5
NOx	1.8	0.0	1.8	409	400.0	1.0



This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com



บริษัท นีดีส ซัพพลาย อินสตรูमेंท์ จำกัด
536 ซอยบางนาซอย 7 แขวงบางนา เขตคลองเตย กรุงเทพมหานคร 10160
Tel: 02-8422-0148 Fax: 02-842-0149 E-mail: info@neediss.com neediss.com



neediss

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

535 ถนนมิตรภาพ 7 แขวงเมืองเก่า เขตเมืองเก่า กรุงเทพมหานคร 10100 - 535 Soi Bangkhoe 7 Bangkhoe Bangkok Bangkok
Tel : 022-9021-2140-2141 Fax : 02-261-11158 E-mail : info@neediss.com



MODEL : NOx ANALYZER Model 42C THERMO

DATE : 1-05-2022

S/N : ENOTE42C768384

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -850 (V)	-675	-678
LAMP VOLTAGE 950 - 1,200 (V)		
INTER TEMP 15 - 45 DEG C	43	43
CHAMBER TEMP 47 - 51 C	49	50
COOLER TEMP -5 - (-2) DEG C	-2	-2
PRESSURE 400 - 1000.0 mm Hg	350	380
SAMPLE FLOW 0.350 - 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.035 - 0.075 LPM	0.05	0.05
No/Nox BKG	12/9.0	11/9.1
No/Nox Slope	1.0/0.8	0.9/0.8

Calibrate By : Sirrat Poonlak

Approve By : K.

Sirrat Poonlak

Sarawut Keawsrinual

Date: 1-May-22

Date: 1-May-22



neediss

Neediss Supply Instrument Co. Ltd

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



With a commitment to the environment

พร้อมใจกันเพื่อสิ่งแวดล้อม

พร้อมใจกันเพื่อสิ่งแวดล้อม



บริษัท เอ็นวีแอล จำกัด (มหาชน) Environmental Engineering & Technology Co., Ltd.
Environmental Engineering & Technology Co., Ltd. 1027/00131 กรุงเทพฯ 10270
Tel : 0-2623-0070-8 Fax : 02-534-9178 E-mail : info@evltesting.com



Verification Test Report

Report No.:

6505 -SLM 05

☐ PM

☒ Onsite UTM :

47P N 1514462 E 654258

Calibrated Date: 3 May 2022

Site : บริษัทเอ็นวีแอล จำกัด

Equipment: Sound Level Meter

Manufacturer: NEEDISS

Model: NDSM 309

Serial : 5001

Environment: Temperature 26 °C Humidity 61 %RH

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

Serial No.1351075

Date of Calibration : March 21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	93.50	-0.16	93.66

Calibrated By:

(Surakit Darncholwichit)

Date:

3 May 2022

Approve By:

(Sarawut Keawsrinual)

Date:

3 May 2022

This report shall not be reproduced except in full, without the written approval of EvlLab Co., Ltd.



**neediss**บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.536 ซอยบางนา 7 แขวงบางนา เขตบางนา กรุงเทพมหานคร 10190 536 Soi Bangna 7 Bangna Bangkok Bangkok
Tel. 02-802-3980-2 Fax. 02-802-3988 E:info@neediss.com

Verification Report of Ambient Air Sampling



PM



Onsite UTM

Report No :

6505004

Instrument :

PM-2.5 Sampler SINGLE

Validation Date:

5-May-22

Manufacturer :

Tisch Environmental

Model :

TE-Wilbur 2.5

Serial/ID No. :

EP2TWILBU0478

Environment :

Humidity(%RH) : 48

Temperature (°C) : 26.9

Pressure (mmHg) : 744

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	26.9	26.9
Filter	-10.0	0.0	20.0	45.0	26.7	26.8

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	16.67 LPM	0 LPM

Engineer :

Phanuwat Suanbubpha

Approve By:

Sarawut Keawsrinual

Issu Date:

5-May-22

Date:

5-May-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

**www.neediss.com**

We know the best thing to save environment

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

**neediss**บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.536 ซอยบางพลี 7 แขวงบางพลี เขตบางพลี กรุงเทพมหานคร 10160 536 Soi Bangplai 7 Bangplai Bangkok Bangkok
Tel. 02-802-3980-2 Fax. 02-802-3988 E:info@neediss.com

Verification Report of Ambient Air Sampling



PM



Onsite UTM :

Report No :

6505015

Instrument :

PM-2.5 Sample Single

Validation Date:

5-May-22

Manufacturer :

Rupprecht, Patashnick

Model :

200-H

Serial/ID No. :

EP2RP200039702

Environment :

Humidity(%RH) : 52

Temperature (°C) : 27.3

Pressure (mmHg) : 756

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	27.2	27.1

Flow Control :

Calibration mode : AM8 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	16.66 LPM	0.01 LPM

Engineer :

Phanuwat Suanbubpha

Approve By:

Sarawut Keawsrinul

Issu Date:

5-May-22

Date:

5-May-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

**www.neediss.com**

We know the best thing to save environment

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Calibration Certification Information

Cal. Date: January 19, 2022 Rootmeter S/N: 438320 Ta: 294 °K
 Operator: Jim Tisch Pa: 749.05 mm Hg
 Calibration Model #: TE-5028A Calibrator S/N: 1328

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3190	3.7	1.50
2	3	4	1	1.0220	5.2	2.50
3	5	6	1	0.9290	7.5	3.00
4	7	8	1	0.8590	8.7	3.50
5	9	10	1	0.6530	14.8	6.00

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)
0.9941	0.7536	1.2241	0.9951	0.7544	0.7673
0.9907	0.9694	1.5803	0.9917	0.9704	0.9906
0.9890	1.0646	1.7312	0.9900	1.0656	1.0851
0.9874	1.1495	1.8699	0.9884	1.1505	1.1721
0.9793	1.4996	2.4483	0.9802	1.5011	1.5346
QSTD	m=	1.63957	QA	m=	1.02667
	b=	-0.01202		b=	-0.00753
	r=	0.99999		r=	0.99999

Calculations

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

For subsequent flow rate calculations:

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

Standard Conditions

Tstd: 298.15 °K

Pstd: 760 mm Hg

Key

ΔH: calibrator manometer reading (in H2O)
 ΔP: rootmeter 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.



รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ *

Certificate of Calibration

Certificate No. : 65-200022-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Electronic Balance

Manufacturer : Santorius

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 : (23.7 to 23.8) °C

Relative Humidity : (57.1 to 58.0) %

Air Pressure : 1012.0 mbar

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 09 February 2022

Calibrated by : Akaradath Thippichai

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

Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02213103	18 Nov 2022	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

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachatas 3 Rd., Bangpoo, Pakkred, Northburi 11120

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

Certificate of Calibration

Certificate No. : 65-200022-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.01	0.0001	0.00011
0.1	0.0001	0.00011
1	0.0000	0.00011
2	0.0001	0.00011
5	0.0000	0.00012
10	0.0001	0.00012
20	-0.0001	0.00013
50	0.0000	0.00014
100	-0.0002	0.00020
200	-0.0004	0.00038

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

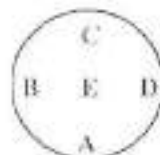
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k=2.14$, providing a level of confidence of approximately 95%.

Eccentric error

Load test : 50 g

A B C D E

-0.0001 -0.0002 -0.0002 -0.0001 0.0000 g



Repeatability

Load test : 200 g

Sidev. : 0.00005 g

- 000 -

Handwritten signature



CAL

Calibratech Co., Ltd.

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

Tel (02) 904-6211 Fax (02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



Certificate of Calibration

Certificate No. : 65-200022-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Electronic Balance

Manufacturer : Sartorius

Model : SECURA3102-1S

Serial No. : 0034409695

ID No. : ELABBALANCE03

Capacity : 3100 g

Resolution : 0.01 g

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

Ambient Temperature : (23.7 to 24.2) °C

Relative Humidity : (57.6 to 57.8) %

Air Pressure : 1012.0 mbar

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 09 February 2022

Calibrated by : Akaradeth Thippichai

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

Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
F181-F1821	65-210044-1	31 Jul 2022	National Institute of Metrology (Thailand), INM17

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-P0031-01

Envilab Co., Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachinuan 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 65-200022-2

Page : 1 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
10	0.00	0.0082
20	0.00	0.0082
50	0.00	0.0082
100	0.00	0.0082
200	0.00	0.0083
500	-0.01	0.0085
1000	-0.01	0.0093
1500	-0.01	0.011
2000	-0.01	0.012
3000	-0.01	0.023

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

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

Eccentric error

Load test : 1000 g

A	B	C	D	E
0.00	0.01	0.02	0.00	0.00

g



Repeatability

Load test : 2000 g

Stdev. : 0.000 g

- 000 -



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: EnwLab Co., Ltd.
Address: 540, 540/1 Soi Bang Khao 7, Bang Khao
City: Bang Khao Contact: Apornrat Aphidet
Zip / Postal: 10160
State / Province: Bangkok
Order Number: 

Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: XPR2 Asset Number: ELABBALANC07
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/W002720

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: 25.5 °C	End: 25.1 °C	Start: 65.9 %	End: 82.2 %

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

Approved Signatory:


☒ Kasakorn Tassanachaisakul
☐ Sand Jitniyan
☐ Surachet Sukkare



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

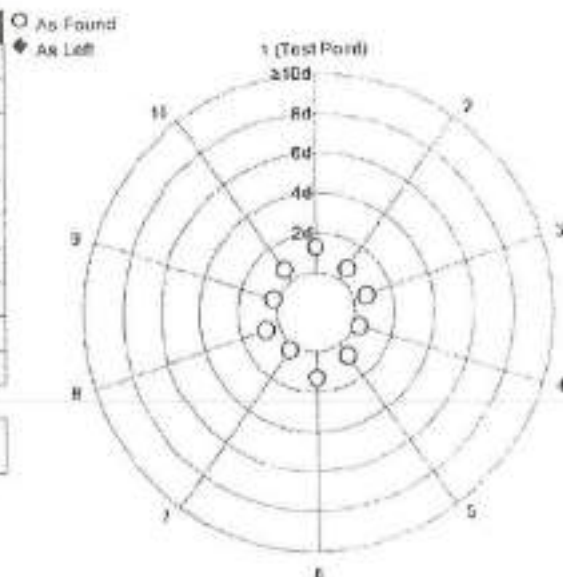
Measurement Results

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	0.0000003 g	N/A
--------------------	-------------	-----



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

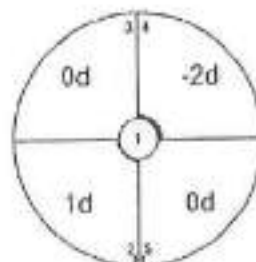
The results of this graph are based upon the absolute values of the differences from the mean value.

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

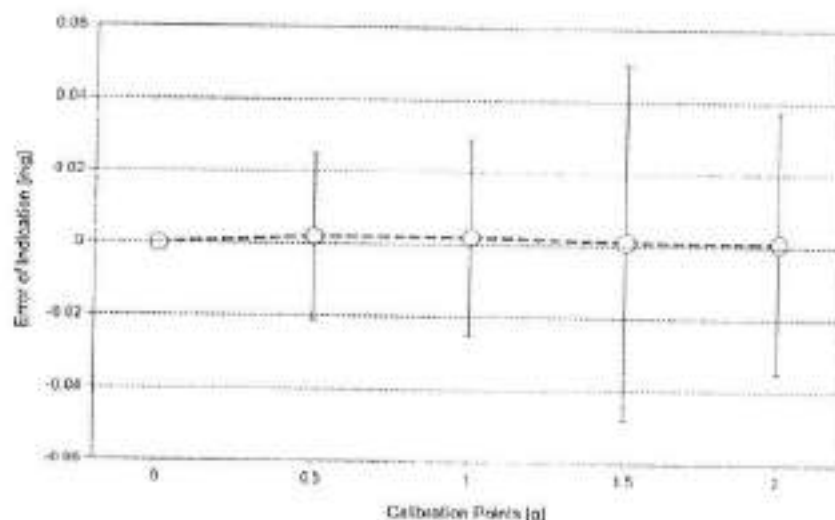
The "d" in the graph represents the readability of the range interval in which the test was performed.

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 *	0.500000 g	0.500000 g	0.000000 g	0.023 mg	2
9 *	0.999999 g	0.999999 g	0.000000 g	0.027 mg	2
10	1.499999 g	1.499999 g	0.000000 g	0.040 mg	2
11 *	1.999977 g	1.999978 g	0.000001 g	0.038 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 listed 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



รับรองสำเนาถูกต้อง
ผู้ตรวจการสำนักงานมาตรฐาน
กรมการมาตรฐานและมาตรวิทยา

Remarks

FACT adjustment functionality activated
Equipment condition: Good
Next calibration according to customer's procedure
Calibration date 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.



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: $1.0 \cdot 10^{-6} / ^\circ\text{C}$

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

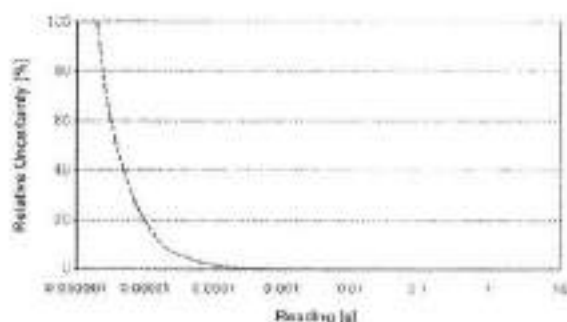
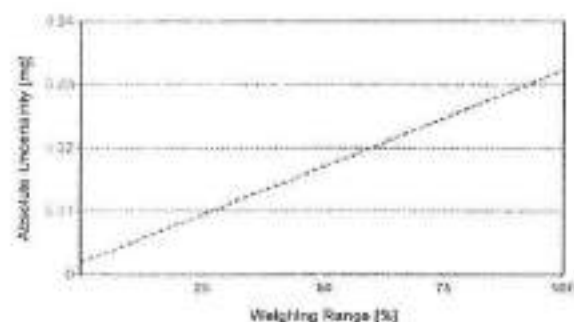
Linearization of Uncertainty Equation

	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	0.85%	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	0.0049 mg	0.0023%	N/A	N/A
2.100000 g	0.032 mg	0.0015%	N/A	N/A



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.

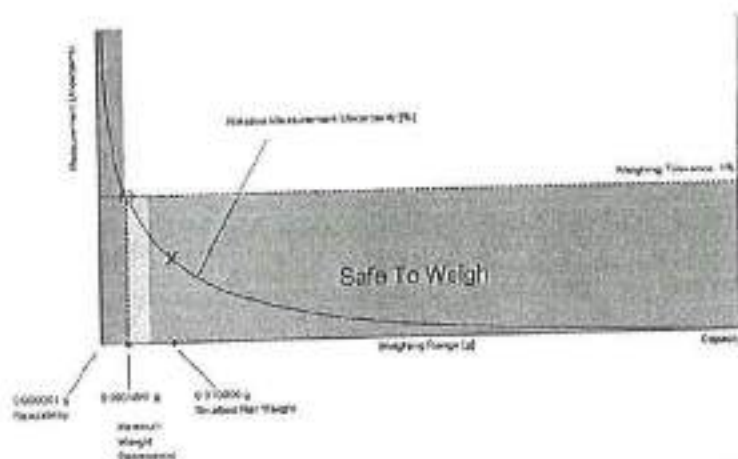
Process Requirements

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.



รับรองสำเนาถูกต้อง
ผู้จัดทำ: ฝ่ายควบคุมคุณภาพ

Minimum Weight

As Found Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.0018649 g	0.0037295 g	0.0055942 g	0.0083907 g	0.0214935 g
0.2%	0.0009256 g	0.0018511 g	0.0027811 g	0.0041904 g	0.0095072 g
0.5%	0.0003688 g	0.0007376 g	0.0011124 g	0.0018549 g	0.0037855 g
1%	0.0001841 g	0.0003682 g	0.0005538 g	0.0009256 g	0.0018549 g
2%	0.0000920 g	0.0001841 g	0.0002763 g	0.0004611 g	0.0009256 g
5%	0.0000368 g	0.0000736 g	0.0001104 g	0.0001841 g	0.0003688 g



Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.0018649 g	0.0037295 g	0.0055942 g	0.0083907 g	0.0214935 g
0.2%	0.0009256 g	0.0018511 g	0.0027811 g	0.0041904 g	0.0095072 g
0.5%	0.0003688 g	0.0007376 g	0.0011124 g	0.0018549 g	0.0037855 g
1%	0.0001841 g	0.0003682 g	0.0005538 g	0.0009256 g	0.0018549 g
2%	0.0000920 g	0.0001841 g	0.0002763 g	0.0004611 g	0.0009256 g
5%	0.0000368 g	0.0000736 g	0.0001104 g	0.0001841 g	0.0003688 g



Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with $k = 2$ and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "NA" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirement(s).



Signature: *[Handwritten Signature]*
ชื่อ: *[Handwritten Name]*
ตำแหน่ง: *[Handwritten Title]*

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%	0.000050 g	0.000008 g	✓	0.000008 g	✓
0.2%	0.000100 g		✓		✓
0.5%	0.000250 g		✓		✓
1%	0.000500 g		✓		✓
2%	0.001000 g		✓		✓
5%	0.002500 g		✓		✓

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

Eccentricity

Test Load: 1 g

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

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



Error of Indication

As Found

Reference Value	Error	Control limits for various weighing tolerances					
		0.1%	0.2%	0.5%	1%	2%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A
0.50004 g	0.00002 g	0.000250 g	0.000500 g	0.001250 g	0.002500 g	0.005000 g	0.012500 g
0.99990 g	0.00002 g	0.000500 g	0.001000 g	0.002500 g	0.005000 g	0.010000 g	0.025000 g
1.49994 g	0.00001 g	0.000750 g	0.001500 g	0.003750 g	0.007500 g	0.015000 g	0.037500 g
1.99977 g	0.00001 g	0.001000 g	0.002000 g	0.005000 g	0.010000 g	0.020000 g	0.050000 g
Result		✓	✓	✓	✓	✓	✓

As Left

Reference Value	Error	Control limits for various weighing tolerances					
		0.1%	0.2%	0.5%	1%	2%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A
0.50004 g	0.00002 g	0.000250 g	0.000500 g	0.001250 g	0.002500 g	0.005000 g	0.012500 g
0.99990 g	0.00002 g	0.000500 g	0.001000 g	0.002500 g	0.005000 g	0.010000 g	0.025000 g
1.49994 g	0.00001 g	0.000750 g	0.001500 g	0.003750 g	0.007500 g	0.015000 g	0.037500 g
1.99977 g	0.00001 g	0.001000 g	0.002000 g	0.005000 g	0.010000 g	0.020000 g	0.050000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.



W. H.
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Service Date: 2022-03-24
 Document Number: TH2022-721-002422-LABBalanceHR
 Envilab Co., Ltd.
 540, 540/1 Soi Bang Khao 7, Bang Khao, Bang Khoo, Bangkok 10160
 Apornrat Aphidat

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	Routine testing performed	Yes
Process tolerance in %:	1%		
Smallest sample net weight:	0.001g		

Check List

Environmental Conditions		General & Functional Checks	
Room temperature fluctuation	✓	Leveling	✓
Exposure to direct sun	✓	Overheating	✓
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: Apornrat Aphidat Position: QA Phone: 095-5973884 Email: Tac@envilab.com

Additional Remarks & Recommendations

Engineer Details

Date: 24-Mar-2022

Name: Suprat Seksawad

Signature: *Suprat*

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

X Bad/Fail

— Not Applicable

0408 - 540/1 Lardle Rd., Bangna Tai Sub-District, Bangna District, Bangkok 10260, +66 2729 0362
 MT-TH ServiceSupport@mt.com
 www.mt.com

METTLER TOLEDO Service

Report Version: 1.13, Software Version: 4.27.1.13, Page: 1/1, ©METTLER TOLEDO



รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0383

MTC No. EEL BP. 59/0365

CALIBRATION CERTIFICATE

Submitted by : Envilab Co., Ltd.

Address : 540, 540/1 Soi Bangkhao 7, Bangkhao, Bangkhao, Bangkok, 10160, Thailand.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Acoustic Calibrator

Manufacturer : Bruel&Kjaer

Model : 4230

Serial No. : 1351075

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.

2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.

3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.

4. Digital Multimeter Agilent 34401A S/N MY44005560.

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

6. Audio Analyzer Keithley 2015-P S/N 4106495.

7. Condenser Microphone Bruel&Kjaer 4180 S/N 2889871.

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \%$

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be measured by standard microphone using an insert voltage technique.

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

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

Date of Receipt : 10 Mar. 2022

Date of Calibration : 21 Mar. 2022

1 / 2

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.BLMTC.002 Rev.4

Head Office
35 Mu 5 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9300
Fax. (66) 0 2577 9009
E-mail : rump@tistr.or.th Website: www.tistr.or.th

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



Office
156 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5237
Fax. (66) 0 2579 1121-30 ext. 5219, 5225, 5237
E-mail : mtc@tistr.or.th Website: www.tistr.or.th



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0383

MTC No. EEL BP 59/0365

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 Brüel&Kjær 4180	93.66	-0.34	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Brüel&Kjær 4180	997.8	-2.2	± 1.5	$\pm 1.0\%$

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Brüel&Kjær 4180	1.55	± 0.50	$\pm 3.0\%$

Note: 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by:

(Mr. Weerachai Deechaiyao)

Approved by:

(Mr. Prayate Quaypa)
Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 21 Mar. 2022

Date of Issue : 22 Mar. 2022

Ref : 2011265031501147002

End of Certificate

2 / 2

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.

FMJL/MTC.002 Rev.4

Head Office

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

Office/Laboratory

Soi 10, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-90 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : info@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1171-30 ext. 5219, 5225, 5237
Fax. (66) 0 2579 1171
E-mail : rumpact@tistr.or.th



รับรองตามกฎข้อ ๕๖
ผู้จัดทำรายงานผลการสอบเทียบ

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer:	AIR LIQUIDE (THAILAND)		Reference Number:	160-402305646-1
	LTD		Cylinder Volume:	148.7 CF
Part Number:	E05N191E15A0003		Cylinder Pressure:	2015 PSIG
Cylinder Number:	EB0146406		Valve Outlet:	650
Laboratory:	124 - Plumsteadville - PA		Certification Date:	Jan 03, 2022
PGVP Number:	A12022			
Gas Code:	CO, CO2, NO, NOX, SO2, BALN			

Expiration Date: Jan 03, 2030

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards [May 2012]" document EPA 800/R-12/031, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 6.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	100.2 PPM	G1	+/- 0.6% NIST Traceable	12/27/2021, 01/03/2022
CARBON MONOXIDE	100.0 PPM	98.02 PPM	G1	+/- 0.5% NIST Traceable	12/27/2021
NITRIC OXIDE	100.0 PPM	100.1 PPM	G1	+/- 1.0% NIST Traceable	12/27/2021, 01/03/2022
SULFUR DIOXIDE	100.0 PPM	100.2 PPM	G1	+/- 1.0% NIST Traceable	12/27/2021, 01/03/2022
CARBON DIOXIDE	8.600 %	7.962 %	G1	+/- 0.9% NIST Traceable	12/27/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	09010241	KAL004894	98.48 PPM CARBON MONOXIDE/NITROGEN	+/- 0.5%	Oct 16, 2024
NTRM	200610-56	CC733475	98.61 PPM NITRIC OXIDE/NITROGEN	+/- 0.6%	Oct 06, 2026
GMIS	124206889118	CC322805	4.294 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Sep 03, 2024
NTRM	11010419	KAL004813	99.6 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Jul 28, 2023
NTRM	08010636	K019200	13.94 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 30, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iS50 FTIR AUP2010245 CO2	FTIR	Dec 02, 2021
SIEMENS ULTRAMAT6E N1-C5-180	NDIR	Dec 09, 2021
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Dec 18, 2021
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Dec 29, 2021
Nicolet iS50 FTIR AUP2010245 SO2	FTIR	Dec 23, 2021

Triad Data Available Upon Request

NOTES: Gross Weight: 26.1 Kg, Net Weight: 5.1 Kg.

UF-0X50X



Melinda A. Huber
 Approved for Release

Page 1 of 160-402305646-1



รับรองสำเนาถูกต้อง
 วัตถุประสงค์การใช้งาน



CALIBRATION LABORATORY Co., LTD.

2/10-11, 34-55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10330
Tel. 02-578-0253-4 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 : 721A2501/721A2901
SERIAL NO. : UM12908/UM10362
CLID. NO. : 252101372
JOB CONTROL NO. : 210720067309

CUSTOMER : ENVILAB CO., LTD.
536 SOI BANGKHAE 7 BANGKHAE
BANGKHAE BANGKOK 10160

DATE OF RECEIVED : 20 July 2021

DATE OF ISSUED : 23 July 2021

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

Calibrated By :

Chanwit Chongtham
Calibration Engineer

Approved By :

Mongkol Yotsoontorn
Authorized Signatory
23 July 2021



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. Q21067309

F3-011-04/01-12

page 1 of 3



รับรองว่าหาถูกต้อง
มีลักษณะที่ถูกต้องตามมาตรฐาน



thcalibration



CALIBRATION LABORATORY Co., LTD.

2/10-11/14, 55 Soi Prasen Manukit 29 Yaek 4, Prasen Manukit Rd., Ladprao, Bangkok 10230
Tel: 02-578-0383-4 Fax: 02-578-2872 www.cal-laboratory.com E-mail: info@cal-laboratory.com



REPORT OF CALIBRATION FOR

NOMENCLATURE	:	VIBRATION METER
MANUFACTURER	:	INSTANTEL
MODEL / TYPE	:	721A2501/721A2901
SERIAL NO.	:	UM12908/UM10862
DATE OF CALIBRATION	:	21 July 2021

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 according to ISO 16063-21 as calibration guideline. The calibration was performed by using Digital Multimeter, High Resolution Programmable Timer/Counter, Accelerometer and Measuring Amplifier which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Digital Multimeter, Hewlett Packard Model 34401A S/N. 3146A75935.
2. High Resolution Programmable Timer/Counter, Philips Model PM6680B S/N. SM607101.
3. Accelerometer with Measuring Amplifier, Bruel & Kjaer Model 8305, 2525 S/N. 397018, 2434988.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. EE-0138-20, Due Date 21 September 2021.
2. The measurements are traceable to International System of Units (SI), through Aeronautical Radio of Thailand Ltd. Certificate No. 07-0002/21, Due Date 04 January 2022.
3. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. AV-0047-20, Due Date 05 November 2021.

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:2013)"

Certificate No. Q21067309

F3-011-04/01-12

page 2 of 3



รับรองสำเนาถูกต้อง
ผู้จัดทำฝ่ายควบคุมคุณภาพ



calibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

2/10-11/14/55 Soi Prasert Manak 29 Yaek 4, Prasert Manak Rd., Ladphrab, Bangkok 10230
Tel: 02-578-0853-4 Fax: 02-578-2872 www.clclaboratory.com E-mail: sale@clclaboratory.com



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

1. ACCELERATION RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
(g)	(frequency)		(g)	(g)	(g)	\pm (% of rdg.)
1	50 Hz	peak	1.000	1.019	-0.019	1.1
2	50 Hz		2.000	2.058	-0.058	1.0
3	50 Hz		3.000	3.098	-0.098	1.0

2. VELOCITY RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
(mm/s)	(frequency)		(mm/s)	(mm/s)	(mm/s)	\pm (% of rdg.)
10	50 Hz	peak	10.000	10.073	-0.073	2.3
20	50 Hz		20.000	20.121	-0.121	1.8
30	50 Hz		30.000	30.416	-0.416	1.0

*3. DISPLACEMENT RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
(mm)	(frequency)		(mm)	(mm)	(mm)	\pm (% of rdg.)
0.01	50 Hz	peak	0.010	0.009	+0.001	6.0
0.02	50 Hz		0.020	0.018	+0.002	3.1
0.03	50 Hz		0.030	0.028	+0.002	2.1

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 007 Page 1 of 57

* means Calibrations marked " Not ANAB Accredited " in this Certificate have been included for completeness.

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

End of Certificate

Certificate No. Q21067309

F3-011-04/01-12

page 2 of 3



รับรองสำหรับผู้ใช้งาน
ผู้จัดการฝ่ายควบคุมคุณภาพ



acknowledgment

Mettler-Toledo (Thailand) Ltd.
845/4 - 845/5 Laksale Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+662 729 0382
MT-TH.ServiceSupport@mt.com



Accuracy Calibration Certificate

Customer

Company: EnviLab Co., Ltd.
Address: 540, 540/1 Soi Bang Khao 7, Bang Khua
City: Bang Khua Contact: Ngarmthip Sampansuang
Zip / Postal: 10160
State / Province: Bangkok
Order Number: 

Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing instrument
Model: XSR205DU Asset Number: N/A
Serial No.: B911363567 Terminal Model: SRAT
Building: N/A Terminal Serial No.: B911363567
Floor: 3 Terminal Asset No.: N/A
Room: B304

Range	Max. Capacity	Readability (d)
1	51 g	0.00001 g
2	220 g	0.0001 g

Procedure

Calibration Guideline: EURAMET cg-16 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CPW002/20

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-16 (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: 22.2 °C	End: 22.6 °C	Start: 58.1 %	End: 59.7 %

As Found Calibration Date: 02-Mar-2022
As Left Calibration Date: N/A
Issue Date: 03-Mar-2022

Calibrator:

Naruephon C.

Naruephon Chonprasertsuk

Approved Signatory:

Kassakorn Tassanachaisakul

- ☒ Kassakorn Tassanachaisakul
☐ Santi Jitnyom
☐ Surachet Sukkate



OK
ใบรับรองการสอบเทียบ
ผู้จัดการฝ่ายควบคุมคุณภาพ

Measurement Results

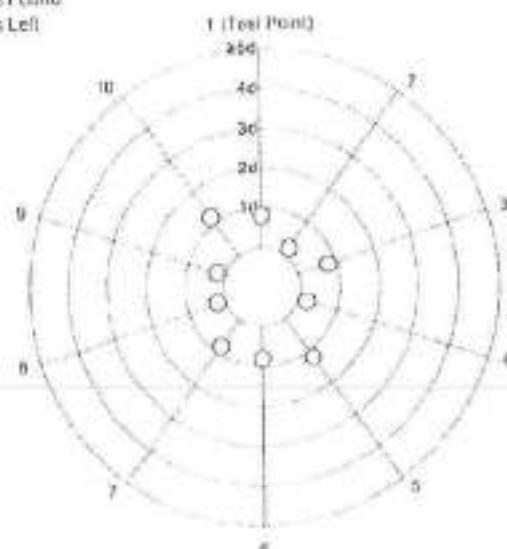
Repeatability

Test Load: 70 g

	As Found	As Left
1	70.00001 g	N/A
2	70.00002 g	N/A
3	70.00001 g	N/A
4	70.00002 g	N/A
5	70.00003 g	N/A
6	70.00001 g	N/A
7	70.00001 g	N/A
8	70.00002 g	N/A
9	70.00002 g	N/A
10	70.00003 g	N/A

Standard Deviation	0.000008 g	N/A
--------------------	------------	-----

○ As Found
◆ As Left



The "1" in the graph represents the readability of the range interval in which the test was performed.

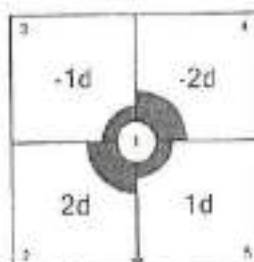
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	100.0000 g	N/A
2	100.0002 g	N/A
3	99.9999 g	N/A
4	99.9998 g	N/A
5	100.0001 g	N/A

Maximum Deviation	0.0002 g	N/A
-------------------	----------	-----



As Found

The "1" in the graph represents the readability of the range interval in which the test was performed.

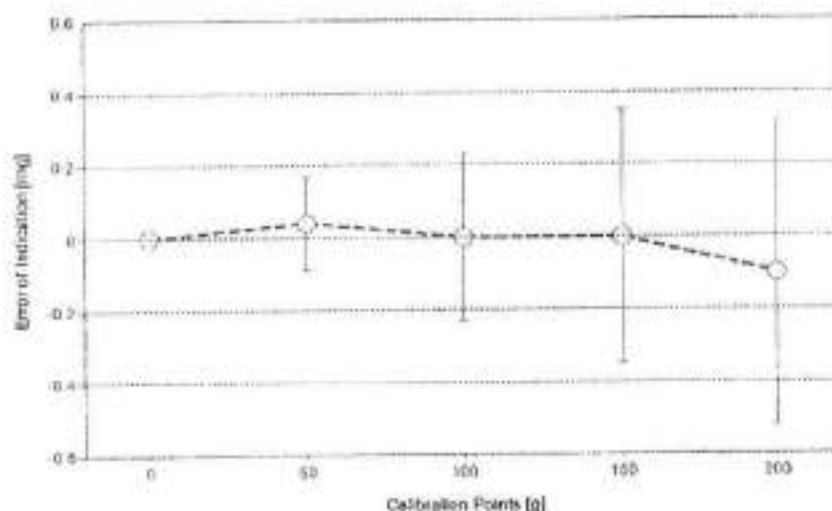


รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.00000 g	0.017 mg	2
2	0.10000 g	0.10000 g	0.00000 g	0.023 mg	2
3	0.50000 g	0.50001 g	0.00001 g	0.028 mg	2
4	0.99999 g	0.99999 g	0.00000 g	0.032 mg	2
5	1.99999 g	2.00000 g	0.00001 g	0.040 mg	2
6	5.00001 g	5.00001 g	0.00000 g	0.048 mg	2
7	10.00001 g	10.00002 g	0.00001 g	0.062 mg	2
8	49.99998 g	50.00002 g	0.00004 g	0.13 mg	2
9	100.0000 g	100.0000 g	0.0000 g	0.23 mg	2
10	150.0000 g	150.0000 g	0.0000 g	0.35 mg	2
11	199.9999 g	199.9998 g	-0.0001 g	0.42 mg	2



○ 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.



รองผู้อำนวยการ
ผู้จัดการฝ่ายควบคุม

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.:	WS29	Date of Issue:	06-Jan-2022
Certificate Number:	117036	Calibration Due Date:	09-Jul-2025

Weight Set 2: OIML E2

Weight Set No.:	WS76	Date of Issue:	31-Jan-2022
Certificate Number:	C205470237	Calibration Due Date:	12-Jul-2025

Thermo Hygrometer

Equipment No.:	IN195	Date of Issue:	14-Jun-2021
Certificate Number:	21H1221	Calibration Due Date:	01-Jun-2022

Remarks

FACT adjustment functionality activated

Equipment condition: Good

Next calibration according to customer's procedure

End of Accredited Section

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



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: $1.5 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: $3 K$

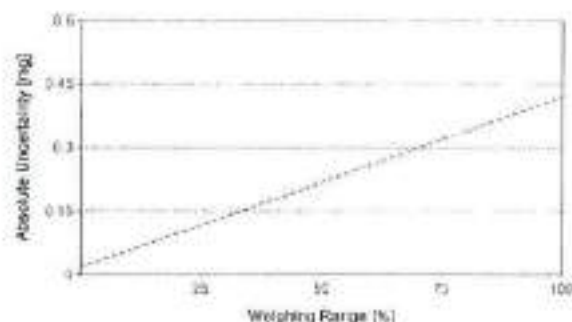
Linearization of Uncertainty Equation

Range			As Found	As Left
	d	Max		
1	0.00001 g	81 g	$U_1 = 0.018 \text{ mg} + 0.00497 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	220 g	$U_2 = 0.08 \text{ mg} + 0.00492 \text{ mg/g} \cdot R$	N/A

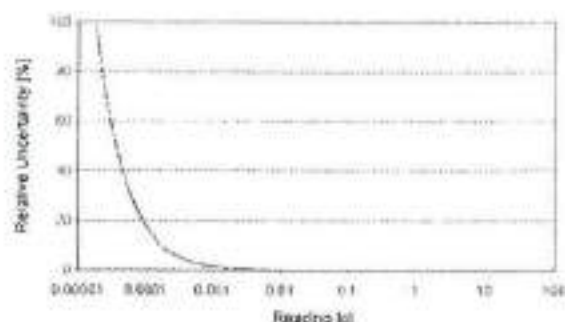
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

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

Net Indication	As Found		As Left	
0.00220 g	0.018 mg	0.82%	N/A	N/A
0.02200 g	0.018 mg	0.082%	N/A	N/A
0.22000 g	0.018 mg	0.0082%	N/A	N/A
2.20000 g	0.029 mg	0.0013%	N/A	N/A
220.0000 g	1.1 mg	0.00052%	N/A	N/A



As Found



As Left

The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



S K SALES AND SERVICE CO.,LTD.
194/56, 194/57 Thakham Rd, Somde Dom
Bang Khun Tien Bangkok 10150
Tel : 02-417-2144 Fax : 02-417-2155



Certificate of Calibration

Reference No. : 4182/2202-017
Customer : Envilab Co., Ltd. (Head Office)
540, 540/1 Soi Bangkhao 7, Bangkhao,
Bangkhao Bangkok 10160
Equipment : Digital Thermo-Hygrometer
Manufacturer : Testo
Model : 608-H1
Serial No. : 83353807
ID No. : -
Received Date : 7 March 2022
Calibrated Date : 9 March 2022
Issued Date : 15 March 2022

Certificate No. : L2203-290
Page 1 of 2

Environment	Start Calibration	Stop Calibration
Ambient Temperature (°C)	24.7	25.5
Relative Humidity (% RH)	51	52

Calibrated by : Mr. Nattawut Reangdech

Calibration Method

In-house method : by comparison with standard hygrometer for humidity measurement function and comparison with standard thermometer for temperature measurement function into humidity/temperature chamber

Condition of this result of calibration

1. Reference standard instrument

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Hygrometer	HL-NT2-D	61458576	QR21-0851	13 May 22
2) Digital Thermometer With Probe	GT11	08000089	PSL-T 0072/85	14 November 2022

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

3. This certificate can be traceable to International System of Unit :

- Through Thailand Institute of Scientific And Technological Research (TISTR)
- Through Quality Reborn Co.,Ltd.

Approved by :


☐ Mr. Suphachai Sakri ☐ Mr. Phayak Tooli ☒ Miss Tantaraporn Peltong

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

This certificate may not be reproduced other than in full except with the prior written approval of the S K Sales And Service Company Limited.

รับรองสำเนาถูกต้อง

Result of Calibration

Function : Humidity Measurement Reference Temperature at 25 °C

STD Reading (% RH)	UUC Reading (% RH)	UUC Error (% RH)	Measurement Uncertainty (\pm % RH)
50.00	49.0	-1.00	2.3

Function : Temperature Measurement

STD Reading (°C)	UUC Reading (°C)	UUC Error (°C)	Measurement Uncertainty (\pm °C)
25.012	25.0	-0.012	0.35

Resolution : 0.1 (°C) , 0.1 % RH

STD= Standard

UUC= Unit Under Calibration

** End of Calibration Report **



รับรองสำเนาถูกต้อง

การตรวจสอบและเทียบค่า

Sp.

CAL

Calibratech Co., Ltd.

7/106-7 Moo 3, Sukhaphachon 3 Rd., Banggood, Pakkred, Northburi 11120

Tel. (037) 964-6211 Fax. (037) 964-5155, e-mail: calibratech.co@ yahoo.com, calibratech.co@ hotmail.com



NSG-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-420020-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkhac7, Bangkhac, 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 : 9515S

Serial No. : 9X1K0003

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

Ambient Temperature : (23.5 to 24.8)°C

Relative Humidity : (50 to 55) %

Date of Received : 02 March 2022

Date of Calibration : 02 March 2022

Date of Issue : 05 March 2022

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	61235182	795894	14 Feb 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.985	61223875	769927	15 May 2022	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.008	61244986	795895	25 Feb 2023	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%

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

EXL-P0031-03



Envilab Co., Ltd. ผู้ประกอบการค้ามาตรฐาน

Certificate of Calibration

Certificate No. : 65-420020-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (± mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	177.5	0.0	0.12
	0.0000	7	7.00	0.0	0.0	0.085
	-177.4800	10	10.00	-177.5	0.0	0.12

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.008	4.005	0.003	0.0084
	6.985	7.001	-0.016	0.010
	10.008	10.009	-0.001	0.014

Remark

UUC : Unit Under Calibration

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

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

- 000 -

B



Handwritten signature





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES J : EQUIPMENT CALIBRATION AND TESTING SERVICES

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

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

Cert.No.: 22TW70

Page.: 1 of 2

Certificate of Testing

Equipment :	Dissolved Oxygen Meter
Manufacturer :	Hanna
Model :	HI 9147
Serial No. :	H0007030
ID No. :	ELABDOHI914701
Received Date :	15 March 2022
Test Date :	18 March 2022
Reference :	2203-0566DN-1
Submitted by :	Envilab Co.,Ltd (Head office) 540, 540/1 Soi Bangkhao 7, Bangkhao, Bangkhao, 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 Sirithan
Approved by :	 Approved Signatory
	<input checked="" type="checkbox"/> Males Butkruea <input type="checkbox"/> Saithip Meangmai <input type="checkbox"/> Warakorn Lemgatrakul
Issue Date :	22 March 2022



0284369

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Cert.No.: 22TW70

Page.: 2 of 2

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: KC3N0639K

Titration Method (Azide Modification Method) (mg/L)	Dissolved Oxygen Meter Reading (mg/L)	Standard Deviation (mg/L)
8.04	8.1	0.045

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

-o0o-

Malu



Dr. Abul
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

a 1100969

CAL

Calibratech Co., Ltd.

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

Tel.(02) 964-5211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



Certificate of Calibration

Certificate No. : 64-400527-3

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. : 100613-0

ID No. : ELABREFRIG140L

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

Ambient Temperature : (24.5 to 25.0) °C

Relative Humidity : (55 to 58) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 15 October 2021

Date of Calibration : 15 October 2021

Date of Issue : 16 October 2021

Calibrated by : Bunjeed Masri

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No.

Cert. No.

Due Date

Traceability

400046 & 400023

64-400443-1

29 Mar 2022

National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjeed Masri)

Supervisor

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-P0031-01



Envilab Co., Ltd.

รับรองสำหรับลูกค้า
มีเอกสารเป็นหลักฐานการรับรอง

Certificate of Calibration

Certificate No. : 64-400527-3

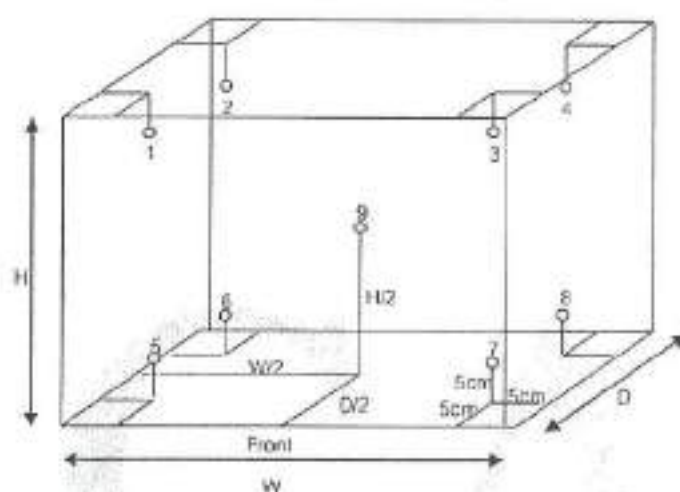
Page : 2 of 2

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	19.9	19.8	19.8	19.9	19.9	19.9	20.0	19.8	20.1	0.53

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.0	20.0	0.4	0.1	0.4

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%

- 000 -

Bu



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhpraditsan 3 Rd., Banggood, Pakkred, Nonthaburi 11120

Tel:(02) 964-6211 Fax:(02) 964-5155, e-mail : cal@caltech.co.th, cal@caltech.co.th@hotmail.com



MSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-400569-1

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Air Chamber (Refrigerator)

Manufacturer : M-LAB

Model : BIC-140

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 1011

ID No. : ELABBODC140N03

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

Ambient Temperature : (23.0 to 23.8) °C

Relative Humidity : (55 to 60) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 12 November 2021

Date of Calibration : 12 November 2021

Date of Issue : 18 November 2021

Calibrated by : Banjerd Masri

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No.

Cert. No.

Due Date

Traceability

400046 & 400023 64-400443-1

29 Mar 2022

National Institute of Metrology Thailand (NIMT)

Approved by :

(Banjerd Masri)

Supervisor

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/0031-03



Calibratech Co., Ltd. 540, 540/1 Soi Bangkhao 7, Bangkhao, Bangkok 10160
ผู้จัดทำเอกสารมาตรฐาน
Envilab Co., Ltd.

Certificate of Calibration

Certificate No. : 64-400569-1

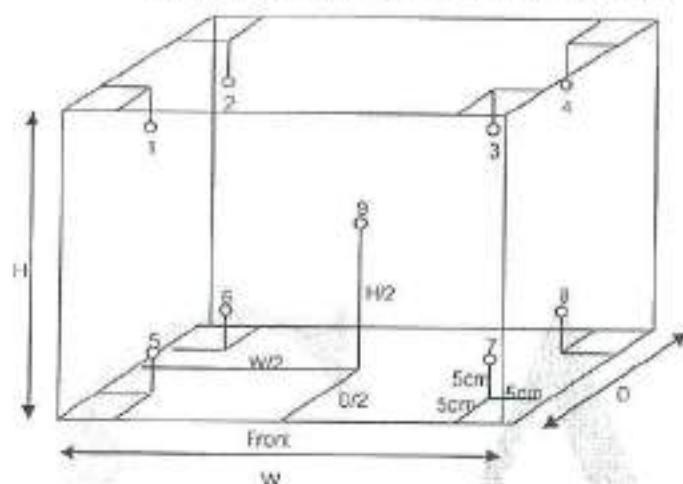
Page : 2 of 2

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	
4.0	4.0	4.0	3.3	3.2	3.4	3.4	3.9	3.9	4.0	3.4	4.2	0.57

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
4.0	4.0	4.0	1.0	0.1	1.0

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%

- oio -



CAL

Calibratech Co., Ltd.

7/106-1 Moo 2, Sakthapachan 3 Rd., Bangpoed, Pakkred, Nonthaburi 11120

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



Certificate of Calibration

Certificate No. : 65-400155-2

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 31.0) °C

Relative Humidity : (60 to 65) %

Line Voltage : (224.2 to 225.2) V

Date of Received : 24 March 2022

Date of Calibration : 24 March 2022

Date of Issue : 29 March 2022

Calibrated by : Permpon Changpu

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 & 400032	64-400589-1	25 May 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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-P0031-03



Envilab Co., Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Certificate No. : 65-400155-2

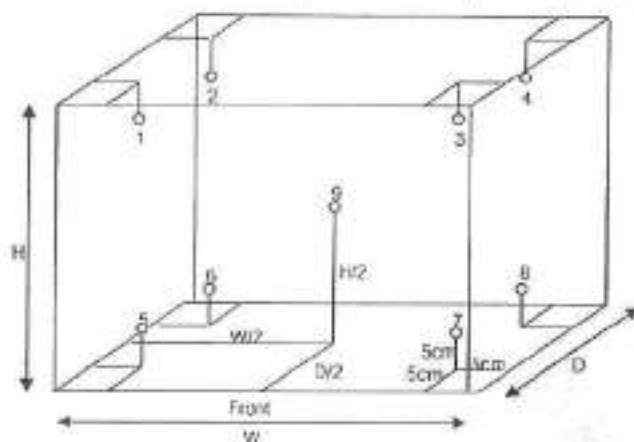
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.56 m

Capacity = 0.07 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	
104.0	103.5	103.5	103.9	104.2	104.2	104.2	104.1	104.0	103.7	104.2	104.3	0.69
110.0	109.5	109.5	110.0	110.3	110.3	110.2	110.2	110.0	109.7	110.2	110.3	0.69
180.0	179.0	179.0	179.1	180.0	180.0	180.1	180.1	179.8	179.0	180.1	180.3	0.95

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	103.5	103.5	0.7	0.1	0.8
110.0	109.5	109.5	0.7	0.1	0.8
180.0	179.0	179.0	1.5	0.2	1.5

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 -

B



Noted

รับรองสำหรับลูกค้า

ผู้รับรอง: นายสมชาย ใจดี



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhaphasathan 2 Rd., Banggood, Pukkong, Nonthaburi 11120

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



NSC-TIS-17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-400053-1

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 : (22.7 to 23.5) °C

Relative Humidity : (45 to 50) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 07 February 2022

Calibrated by : Permpon Chanpu

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
400029 & 400031	64-400388-1	24 May 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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-P0031-03



รับรองสำเนาถูกต้อง
ผู้จัดทำ: ฝ่ายควบคุมคุณภาพ



Certificate of Calibration

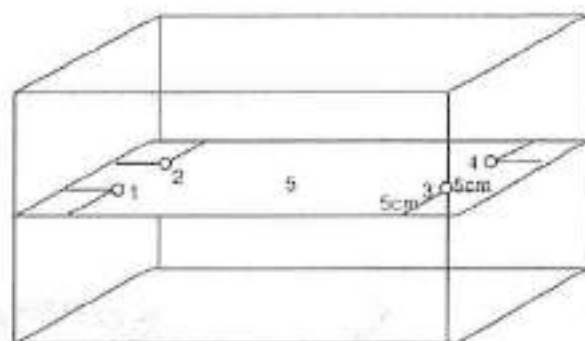
Certificate No. : 65-400053-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @					Uncertainty (± °C)	Measured Uniformity (°C)	Measured Stability (°C)
			Sensor No.							
			1	2	3	4	5			
95.0	95.0	95.0	95.35	95.45	95.51	95.66	95.56	0.19	0.27	0.06

Remark The uncertainty is not combine uniformity of the water bath

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

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

- oOo -

B✓



รับรองมาตรฐาน
ผลิตภัณฑ์อุตสาหกรรม
ประเทศไทย



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachosin 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120

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



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-300146-10

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Cylinder

Manufacturer : PYREX

Class : A

Capacity : 50 ml

Graduation : 1 ml

ID No. : C-WW-020/18

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

Relative Humidity : $(50 \pm 15) \%$

Air Pressure : 1002.0 mbar

Date of Received : 09 March 2022

Date of Calibration : 21 March 2022

Date of Issue : 21 March 2022

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	64-200354-1	02 Jun 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Tovadee)

Supervisor

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-00331-03



บริษัท แคลบราเทค จำกัด
ผู้ให้บริการมาตรฐานสูง



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpoo, Phakred, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 65-300146-10

Page : 2 of 2

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

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
30	29.79
50	49.73

Uncertainty of measurement with in \pm 0.054 ml

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

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

- o O o -

D.



W. H. H.

รับรองสำเนาถูกต้อง
ผู้จัดทำเอกสารคุณภาพ



CAL

Calibratech Co., Ltd.

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

Tel. (02) 964-6311 Fax. (02) 964-5155, e-mail: calibratech_cat@yahoo.com, calibratech_cat@hotmail.com



NSC-TISI-TS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-300147-4

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Cylinder

Manufacturer : ISOLAB

Class : A

Capacity : 1000 ml

Graduation : 10 ml

ID No. : C-WW-028/18

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

Relative Humidity : (50 ± 15) %

Air Pressure : 1002.0 mbar.

Date of Received : 09 March 2022

Date of Calibration : 21 March 2022

Date of Issue : 21 March 2022

Calibrated by : Areearat 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	64-200354-1	02 Jun 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by:

[Wipa Tevadec]

Supervisor

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



รับรองว่าถูกต้อง



วันที่ 27/03/2022

Certificate of Calibration

Certificate No. : 65-300147-4

Page : 2 of 2

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

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
500	501.84
1000	1001.39

Uncertainty of measurement with in \pm 0.17 ml

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

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

- 000 -

D



Dr. Jit



ประจำเดือนมิถุนายน พ.ศ. 2565



บริษัท เอวิเทสท์ จำกัด (EVITEST) : บริษัททดสอบและตรวจสอบคุณภาพสิ่งแวดล้อม
Environmental Co., Ltd. : บริษัททดสอบและตรวจสอบคุณภาพสิ่งแวดล้อม
Tel : 02-003-1577-5 Fax : 02-003-1771 E-mail : info@evitesting.com



TSP High Volume Sampler Calibration

Verification Report No.

B6506 -TSP- 01

☒ PM ☐ OnSite

สถานีวัดค่าฝุ่นละออง

UTM : 47P N1514475 E654269

Sampler: ETSP#25

Recorder: ECRANG15315224

Date: 1 Jun 22

Technical: Wisan R.

Approval: Sarawut K.

CONDITIONS

Barometric Press. (hPa): 1010.0

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.8

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION OFFICE

Brand: Tisch Environmental, Inc.

Model: TE-5026A

Serial#: 1328

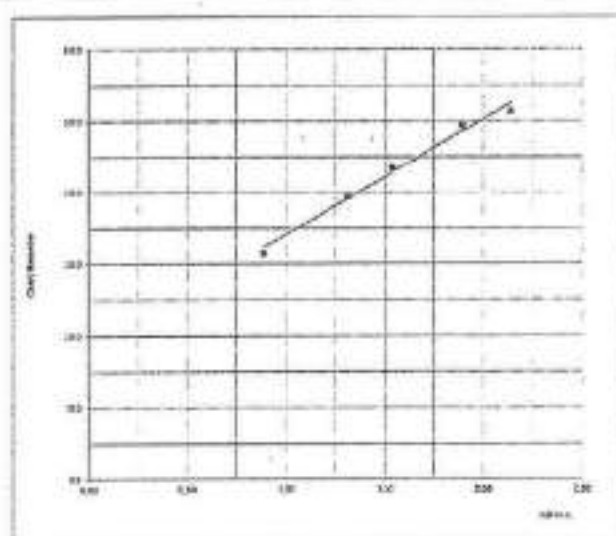
Qstd Slope: 1.83967

Qstd Intercept: -0.01202

Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 16.1421 Intercept = 17.9530 Corr. coeff = 0.9941 # of Observations: 5 Range of Chart at 1.1 - 1.7 m ³ /min: 37 / 45
1	12.51	2.136	52.0	51.32	
2	9.82	1.694	50.0	49.34	
3	6.47	1.538	44.0	43.42	
4	4.69	1.311	40.0	39.47	
5	2.14	0.888	32.0	31.58	



Calibrated by:

(Wisan Ritthakamon)
1 June 2022

Approved by:

(Sarawut Keawrattana)
1 June 2022

This report shall not be reproduced except when, without the written approval of Evitest Co., Ltd.

www.evitesting.com

Environmental cooperation with sustainable development

EVITEST CO., LTD.



มีรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



บริษัท เอวิเทสทิง จำกัด 50/303 ถนนสาย 1 แขวง พญาไท เขต พญาไท กรุงเทพมหานคร 10760
EVL Co., Ltd. 503/301 9/1 Bangpa-In 1 Bangkok 10760, Thailand
Tel : 02-602-9377-8 Fax : 02-602-9379 E-mail : info@evltesting.com



Scan QR code

PM10 High Volume Sampler Calibration

Verification Report No.

B6506 -PM 01

[x] PM [] Onsite Site: บริษัท เอวิเทสทิง จำกัด UTM: 47P N1514475 E654269 Sampler: EPM#17 Recorder: ECRDS01618124	Date: 1 Jun 22 Technical: Wisan R. Approval: Sarawut K.
---	---

CONDITIONS

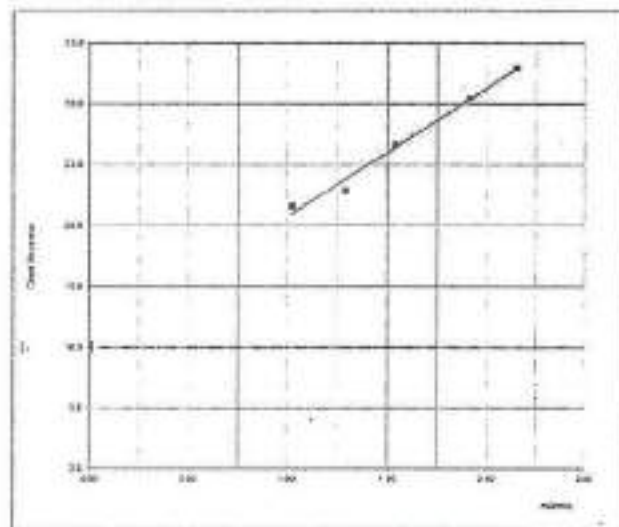
Barometric Press. (hPa): 1010.0	Corrected Pressure (mm Hg): 757.6
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION OFFICE

Brand: Tisch Environmental, Inc	Slope: 1.02667
Model: TE-5028A	Intercept: -0.00753
Serial#: 1328	Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H2O (in)	Qs (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.98	2.146	52.0	32.99	Slope = 10.6370
2	9.51	1.913	48.0	30.46	Intercept = 10.0648
3	6.14	1.539	42.0	26.65	Corr. coeff. = 0.9928
4	4.32	1.292	36.0	22.84	SFR = 1.141
5	2.71	1.025	34.0	21.57	SSP = 34.99
					# of Observations: 5
					Range of Chart at SFR +10%: 34
					36



Calibrated by :
(Wisan Ritthikamon)
1 June 2022

Approved by :
(Sarawut Keewinud)
1 June 2022

This report shall not be reproduced except in full, without the written approval of Evltest Co., Ltd.

www.evltesting.com



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Rev. 001 of Rev. 000/01/20



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6506006

Page:1/1

Calibrated Date: 1-Jun-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO_43C	Manufacturer THERMO S/N: ESOTE43C069871
--	--

Calibration System

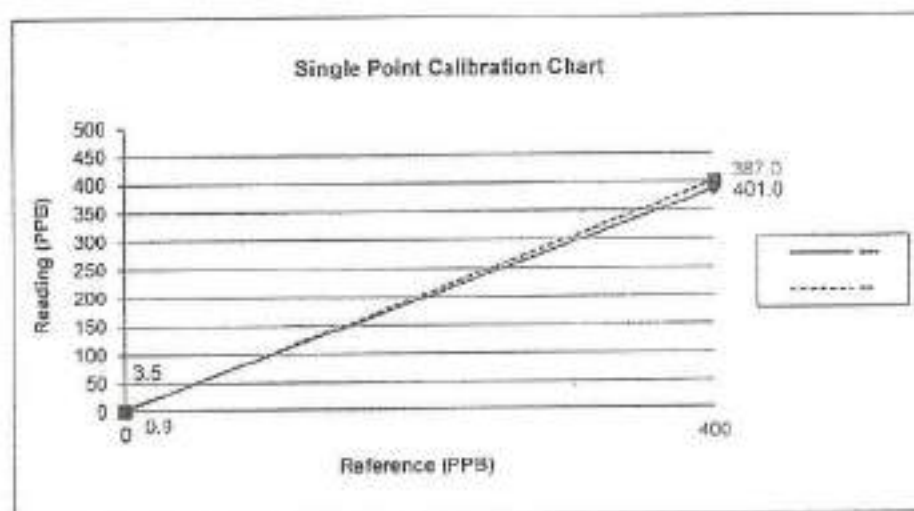
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792	NO Conc 44.68 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM
ZERO AIR Generator ZAG7001 S/N: 644	Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 26.4 °C

Humidity: 47 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	3.5	3.5	400.0	387	-3.3
After	0.0	0.9	0.9	400.0	401	0.3



บริษัท นีดีส ซัพพลาย อินสตรูमेंท์ จำกัด
Neediss Supply Instrument Co., Ltd.
บริการฝ่ายควบคุมคุณภาพ

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com

We find the best thing to save environment

Page:1/1



neediss

บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.
536-20167888 1-800-000-0000 (Toll Free) 536-20167888 1-800-000-0000 (Toll Free)
Tel: 02-802-11881 Fax: 02-802-09881 Email: info@neediss.com



MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 1-06-2022

S/N : ESOTE43C089871

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - 850 (V)	-650	-653
LAMP VOLTAGE 950 - 1,200 (V)	990	985
LAMP INTENSITY 20000 - 50000 Hz	32568	32577
INTER TEMP 15 - 45 DEG C	37	37
CHAMBER TEMP 47 - 51 C	49	49
COOLER TEMP -5 - (-2) DEG C	-2.5	-2.5
PRESSURE 400 - 1000.0 mm Hg	764	765
FLOW 0.350 - 0.650 LPM	0.42	0.4

Calibrate By : Sirirat Poonlak

Approve By : Sarawut Keewsrinual

Sirirat Poonlak

Sarawut Keewsrinual

Date: 1-Jun-22

Date: 1-Jun-22



neediss

Neediss Supply Instrument Co., Ltd.

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com



รับรองสำเนาถูกต้อง

มีตราประทับควบคุมคุณภาพ



neediss

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

536 ซอยบางพลี 7 แขวงบางพลี เขตภาษีเจริญ กรุงเทพฯ 10150 536 Soi Bangkhoe 7 Bangkhoe Bangkok
Tel: 02-802-34480 Fax: 02-802-34558 E: info@neediss.com



NOx Analyzer Verification Test Report

Calibration Report No.: 6506006

Page:1/2

Calibrated Date: 1-Jun-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42CD75279
--	--

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19, 2024 EBO140762

Environment: Temperature 26.6 °C

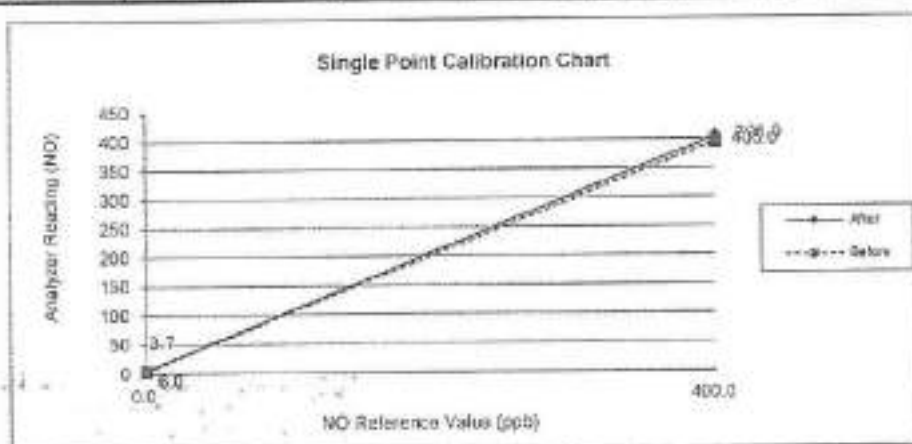
Humidity: 46 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	3.7	0.0	3.7	396	400.0	-0.5
NO ₂	8.7	0.0	8.7	17.0	0.0	2.1
NOx	12.4	0.0	12.4	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	6.0	0.0	6.0	405	400.0	0.5
NO ₂	-4.9	0.0	-4.9	3.0	0.0	0.4
NOx	1.1	0.0	1.1	408	400.0	1.0



รับรองสำเนาถูกต้อง
ผู้ลงนามฝ่ายควบคุมคุณภาพ

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

www.neediss.com

We know the Last Thing to solve environment



neediss

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

528 ถนนพหลโยธิน 7 แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10130 โทร: 02-002-0000-0000 Fax: 02-002-0000-0000 Email: info@neediss.com



MODEL : NOx ANALYZER Model 42C THERMO

DATE : 1-06-2022

S/N : ENOTE42CD75279

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -850 (V)	-675	-678
LAMP VOLTAGE 950 - 1,200 (V)		
INTER TEMP 15 - 45 DEG C	43	43
CHAMBER TEMP 47 - 51 C	49	50
COOLER TEMP -5 - (-2) DEG C	-2	-2
PRESSURE 400 - 1000.0 mm Hg	350	380
SAMPLE FLOW 0.350 - 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.035 - 0.075 LPM	0.05	0.05
Na/Nox BKG	12/9.0	12/9.1
Na/Nox Slope	1.0/0.8	0.9/0.8

Calibrate By : Sirirat Poonlak

Approve By : Sarawat Keawsrinual

Sirirat Poonlak

Sarawat Keawsrinual

Date: 1-Jun-22

Date: 1-Jun-22



neediss

Neediss Supply Instrument Co.,Ltd.



รับรองสำเนาถูกต้อง
มีผลใช้บังคับตามสมุดบัญชี

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com

We know the best thing to save environment



บริษัท เอ็นวีแอล จำกัด (มหาชน) 540/500/1 ซอยบางกะปิ 7 แขวงบางกะปิ เขตห้วยขวาง กรุงเทพมหานคร 10160
EnviLab Co., Ltd. 540/500/1 Soi Bangkapi 7 Bangkapi Bangkue Bangkok 10160
Tel : 02-602-3577-8 Fax: 02-602-3773 E-mail : info@evltesting.com



Copyright © EnviLab Co., Ltd. 2019

Verification Test Report

Report No.:

6506 -SLM 01

☒ PM

☐ Onsite UTM:

47P N 1514462 E 654258

Calibrated Date: 1 June 2022

Site : บริษัท เอ็นวีแอล จำกัด

Equipment: Sound Level Meter

Manufacturer: NEEDISS

Model: NDSM 309

Serial : 8001

Environment: Temperature 25 °C Humidity 58 %RH

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

Serial No.1351075

Date of Calibration : March 21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.66	93.80	0.14	93.66

Calibrated By:

(Wisan Ritthikamon)

Date:

1 June 2022

Approve By:

(Sarawat Keewsriual)

Date:

1 June 2022



รับรองสำเนาถูกต้อง

EnviLab Co., Ltd. จัดทำภายใต้ระบบควบคุม QA

This report shall not be reproduced except in full, without the written approval of EnviLab Co., Ltd.



บริษัท อีวีแอล จำกัด (มหาชน) 563/25 หมู่ 5 ต.บ้านใหม่ อ.เมือง จ.นนทบุรี 11000
โทรศัพท์ : 02-509-8888 โทรสาร : 02-509-8889 E-mail : info@evl.co.th
www.evltesting.com



TSP High Volume Sampler Calibration

Verification Report No.

B5506-TSP_Q2

☒ PM ☐ Onsite

Site: บริษัท เ็นโนแอนด์ จำกัด

UTM : 47P N1514475 E654289

Sampler: ETSP#04

Recorder: ECRANG15315224

Date: 1 Jun 22

Technical: Wisan R.

Approval: Sarawut K.

CONDITIONS

Barometric Press. (hPa): 1010.0

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.6

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5028A

Serial#: 1328

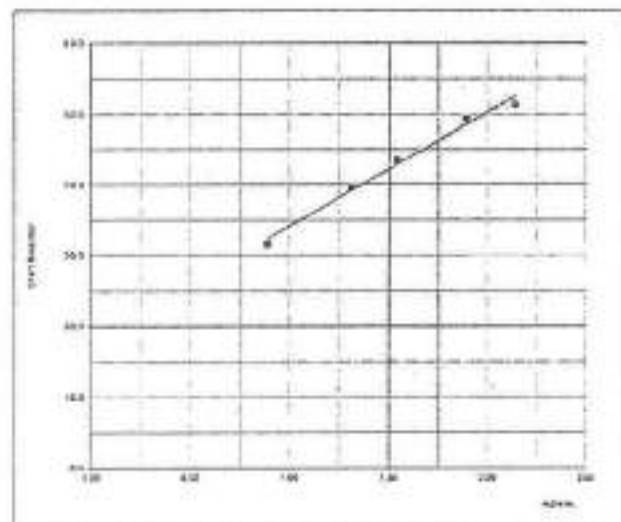
Qstd Slope: 1.63957

Qstd Intercept: -0.01202

Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 12.1636 Intercept = 23.2799 Corr. coeff. = 0.9935 # of Observations: 5 Range of Chart: 36 at 1.1 - 1.7 m3/min: 44
1	12.10	2.101	50.0	49.34	
2	9.82	1.894	46.0	45.40	
3	7.36	1.640	44.0	43.42	
4	4.54	1.290	40.0	39.47	
5	2.89	1.031	36.0	35.53	



Calibrated by:

(Wisan Rittikamon)
1 June 2022

Approved by:

(Sarawut Keawsirirul)
1 June 2022

This report shall not be reproduced except in full, without the written approval of EVL Co., Ltd.



www.evltesting.com



รับรองสำเนาถูกต้อง
โดยนางสาวดวงเดือนคุณตุณกร 19

REV-001-02 Rev.06/11/2020



บริษัท อีวีแอล จำกัด (มหาชน) 575/001 หมู่ 10 ต.บ้านใหม่ อ.เมือง จ.นนทบุรี 11000
EVL Co., Ltd. 800/001 ต.บ้านใหม่ อ.เมือง จ.นนทบุรี 11000
Tel: 02-602-3571-2 Fax: 02-602-1737 E-mail: info@evltesting.com



PM10 High Volume Sampler Calibration

Verification Report No.

B6506-PM 02

G PM C Onsite

Site: บริษัท เอนไวรอนเม้นท์ จำกัด

UTM: 47P N1514475 E654289

Sampler: EPM100

Recorder: ECRD501518124

Date: 1 Jun 22

Technical: Wisan R.

Approval: Sarawut K.

CONDITIONS

Barometric Press. (hPa): 1010.0

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.6

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc.

Model: TE-5028A

Serial#: 1328

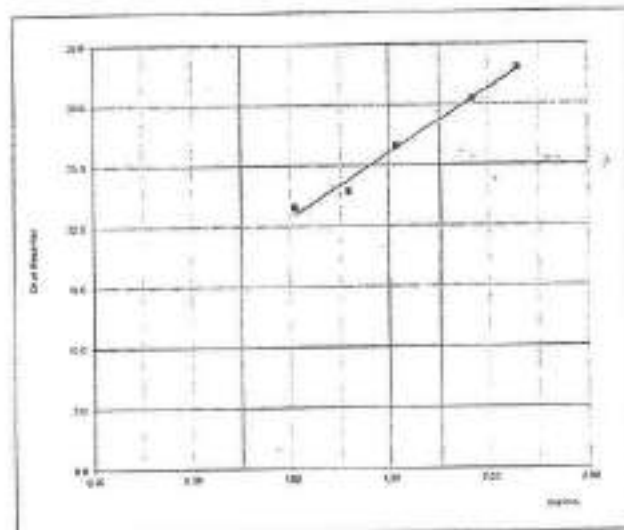
Slope: 1.02667

Intercept: -0.00753

Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Q _a (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	10.78	2.037	62.0	32.98	
2	8.56	1.614	48.0	29.19	
3	6.32	1.561	40.0	25.38	
4	4.14	1.265	36.0	22.84	
5	2.87	1.054	30.0	19.04	
					Slope = 13.5550
					Intercept = 4.9289
					Corr. coeff. = 0.9938
					SFR = 1.141
					SSP = 32.14
					# of Observations: 5
					Range of Chart 31
					at SFR ±10% 34



Calibrated by:

Wisan R.

(Wisan Rittthikamon)
1 June 2022

Approved by:

Sarawut K.

(Sarawut Keawritual)
1 June 2022

This report shall not be reproduced, copied, or used without the written approval of EVL Co., Ltd.

www.evltesting.com

Printed by: Revit Co., Ltd. on 21/06/22

Page 1 of 1 (01/06/2022)



ได้รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 1-06-2022

S/N : ESOTE43C053884

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -850 (V)	-650	-653
LAMP VOLTAGE 950 - 1,200 (V)	990	985
LAMP INTENSITY 20000 - 50000 Hz	32568	32577
INTER TEMP 15 - 45 DEG C	37	37
CHAMBER TEMP 47 - 51 C	49	49
COOLER TEMP -5 - (-2) DEG C	-2.5	-2.5
PRESSURE 400 - 1000.0 mm Hg	764	765
FLOW 0.350 - 0.650 LPM	0.42	0.4

Calibrate By : Sirint Porak

Approve By : K

Sirint Porak

Sarawat Keawsrinual

Date: 1-Jun-22

Date: 1-Jun-22

neediss

Neediss Supply Instrument Co.,Ltd.

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com



รับรองสำเนาถูกต้อง

วันที่ 1 มิ.ย. 2565
 1-06-22
 รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ



NOx Analyzer Verification Test Report

Calibration Report No.: 6506002

Page:1/2

Calibrated Date: 1-Jun-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42C704385
--	--

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140782

Environment: Temperature 26.4 °C

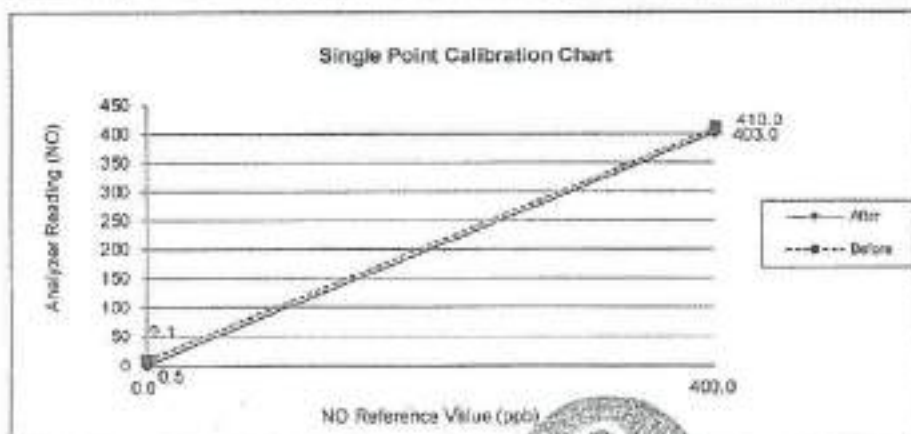
Humidity: 46 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	9.1	0.0	9.1	410	400.0	1.2
NO ₂	1.1	0.0	1.1	3.0	0.0	0.4
NOx	10.2	0.0	10.2	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	403	400.0	0.4
NO ₂	0.2	0.0	0.2	3.0	0.0	0.4
NOx	0.7	0.0	0.7	406	400.0	0.7



รับรองสำเนาถูกต้อง
ผู้ดำเนินการสอบเทียบ

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com

We know the best thing is to save environment



neediss

บริษัท เน็ดิส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.
555 หมู่12 ตำบล 7 หมู่บ้าน ถนนพหลโยธิน แขวงสามเสนอ เขตพญาไท กรุงเทพมหานคร 10600
Tel: 02-402-3980-3 Fax: 02-017-2148 E-mail: neediss@neediss.com



MODEL : NOx ANALYZER Model 42C THERMO

DATE : 1-06-2022

S/N : ENOTE42C704365

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -850 (V)	-675	-678
LAMP VOLTAGE 950 - 1,200 (V)		
INTER TEMP 15 - 45 DEG C	44	43
CHAMBER TEMP 47 - 51 C	50	50
COOLER TEMP -5 - (-2) DEG C	-3	-2
PRESSURE 400 - 1000.0 mm Hg	350	380
SAMPLE FLOW 0.350 - 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.035 - 0.075 LPM	0.05	0.05
Nw/Nox BKG	12/9.0	12/9.1
Nw/Nox Slope	1.0/0.8	0.9/0.8

Calibrate By :

Sirrat Poonrak

Approve By :

Sarawut Keawsrinual

Sirrat Poonrak

Sarawut Keawsrinual

Date:

1-Jun-22

Date:

1-Jun-22



neediss

Neediss Supply Instrument Co., Ltd.



รับรองสำเนาถูกต้อง

Envirolab Co., Ltd. ผู้จัดการฝ่ายควบคุมดูแล

This report not be reproduced except in full without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com

We know the best thing to save environment



บริษัท เอ็นวีเทสティング จำกัด 340/246/1 ซ.บางกะปิ แขวงบางกะปิ เขตห้วยขวาง กรุงเทพฯ 10310
EVL Co., Ltd. 340/246/1 So. Bangkapi, Bangkapi Suburban Bangkok 10310
Tel: 02-800-8577-8 Fax: 02-800-3771 E-mail: info@evl-testing.com



www.evlab.co.th

Verification Test Report

Report No.:

6506 -SLM 02

☒ PM ☐ Onsite-UTM: 47P N 1514462 E 654258

Calibrated Date: 1 June 2022

Site : บริษัทเอ็นวีเทส จำกัด

Equipment: Sound Level Meter

Manufacturer: NEEDISS

Model: NDSM 309

Serial : 8008

Environment: Temperature 25 °C Humidity 58 %RH

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

Serial No.1351075

Date of Calibration : March.21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
93.65	93.80	0.14	93.66

Calibrated By:

(Wisan Ritthikamon)

Date:

1 June 2022



Approve By:

(Signature)

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

(Sarawut Keawsriinul)

1 June 2022

This report shall not be reproduced except in full, without the written approval of Evlab Co., Ltd.

**neediss**บริษัท เน็ดิส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.536 ซอยบางนา 7 แขวงบางนา เขตบางนา กรุงเทพมหานคร 10150 536 Soi Bangna 7 Bangnae Bangkok Bangkok
Tel. 02-802-3980-2 Fax. 02-802-3988 E: info@neediss.com

Verification Report of Ambient Air Sampling



PM



Onsite UTM :

Report No :

6505017

Instrument :

PM-2.5 Sample Single

Validation Date:

2-Jun-22

Manufacturer :

Andersen

Model :

RASS PM2.5-300

Serial/ID No. :

EP2ADPM2500134

Environment :

Humidity(%RH) :

50

Temperature (°C) :

27.5

Pressure (mmHg) :

757

Reference Standard:

Temperature Calibrator : DIGICON, model: CC-VTR-5H, 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	20.1	45.1	27.3	27.1
Filter	-10.1	0.1	19.9	44.8	27.3	27.2
DGM	-9.9	0.1	20.3	45.1	27.4	27.1

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	DGM, CC/Tick	Coef.
16.67 LPM	16.67 LPM	0 LPM	6.66	1

Engineer :

Phanuwat Suanbubpha

Issu Date:

2-Jun-22

Approve By:

Sarawut Keawsinual

Date:

2-Jun-22

This report not be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.

**www.neediss.com**

We know the best thing to solve environment

รับรองว่ามาตรฐานถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

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

536 ซอยบงกช 7 แขวงบงกช เขตบึงกุ่ม กรุงเทพฯ 10160 536 Soi Bongkhoe 7, Bongkhoe, Bangkok, Bangkok
Tel: 02-802-3980-2; Fax: 02-802-3988; E: info@neediss.com



Verification Report of Ambient Air Sampling

☒ PM ☐ Onsite UTM : Report No : 6506016
Instrument : PM-2.5 Sample Single Validation Date: 2-Jun-22
Manufacturer : Rupprecht, Patashnick
Model : 200-H
Serial/ID No. : EP2RP200049702
Environment :
Humidity(%RH) : 52 Temperature (°C) : 27.4 Pressure (mmHg) : 756

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	27.2	27.3

Flow Control :

Calibration mode : AMB Flow Device

Flow set : 16.67 LPM

Avg. Pressure at Ref. : 746 mmHg.

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

Engineer :

Phanuwat Suanbubpha

Issu Date:

2-Jun-22

Approve By:

Sarawut Keawsrival

2-Jun-22

This report can be reproduced except in full, without the written approval of Neediss Supply Instrument Co., Ltd.



www.neediss.com

We know the best thing to save environment

Certificate of Calibration

Calibration Certification Information

Cal. Date: January 19, 2022 Rootmeter S/N: 438320 Ta: 294 °K
Operator: Jim Tisch Pa: 749.05 mm Hg
Calibration Model #: TE-5028A Calibrator S/N: 1328

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3190	3.7	1.50
2	3	4	1	1.0220	6.2	2.50
3	5	6	1	0.9290	7.5	3.00
4	7	8	1	0.8590	8.7	3.50
5	9	10	1	0.6530	14.8	6.00

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)
0.9941	0.7536	1.2241	0.9951	0.7544	0.7673
0.9907	0.9694	1.5803	0.9917	0.9704	0.9906
0.9890	1.0646	1.7312	0.9900	1.0656	1.0851
0.9874	1.1495	1.8699	0.9884	1.1506	1.1721
0.9793	1.4996	2.4483	0.9802	1.5013	1.5346
QSTD	m=	1.63957	QA	m=	1.02667
	b=	-0.01202		b=	-0.00753
	r=	0.99999		r=	0.99999

Calculations

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

Standard Conditions

Tstd: 298.15 °K

Pstd: 760 mm Hg

Key

ΔH: calibrator manometer reading (in H2O)

ΔP: rootmeter 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. : 65-200022-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540, 540/1 Soi Bangkhac 7, Bangkhac, 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 : (23.7 to 23.8) °C

Relative Humidity : (57.1 to 58.0) %

Air Pressure : 1012.0 mbar

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 09 February 2022

Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02213103	18 Nov 2022	National Institute of Metrology (Thailand), (NIMT)



Approved by :



(Sarachai Promhong)

ผู้ตรวจสอบและควบคุมห้อง Laboratory Manager

ผู้ดูแลระบบห้องปฏิบัติการ

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

Calibratech Co.,Ltd.

7/105-7 Moo 2, Sakulprachasan 3 Rd., Banggood, Padred, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 65-200022-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.01	0.0001	0.00011
0.1	0.0001	0.00011
1	0.0000	0.00011
2	0.0001	0.00011
5	0.0000	0.00012
10	0.0001	0.00012
20	-0.0001	0.00013
50	0.0000	0.00014
100	-0.0002	0.00020
200	-0.0004	0.00038

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

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

Eccentric error

Load test : 50 g

A B C D E

-0.0001 -0.0002 -0.0002 -0.0001 0.0000 g



Repeatability

Load test : 200 g

Stdev. : 0.00005 g

- 000 -



บริษัท สานนาบุคคัส
บริการมาตรฐานคุณวุฒิฯ



Certificate of Calibration

Certificate No. : 65-200022-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Electronic Balance

Manufacturer : Sartorius

Model : SECURA3102-1S

Serial No. : 0034409695

ID No. : ELABBALANCEN03

Capacity : 3100 g

Resolution : 0.01 g

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

Ambient Temperature : (23.7 to 24.2) °C

Relative Humidity : (57.6 to 57.8) %

Air Pressure : 1012.0 mbar

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 09 February 2022

Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
F181-F1821	65-210044-1	31 Jul 2022	National Institute of Metrology (Thailand), (NIMT)



Approved by :



(Surachai Promhong)

Surachai Promhong
Laboratory Manager
ผู้จัดการห้องปฏิบัติการ

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

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sakthapachan 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 65-200022-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
10	0.00	0.0082
20	0.00	0.0082
50	0.00	0.0082
100	0.00	0.0082
200	0.00	0.0083
500	-0.01	0.0085
1000	-0.01	0.0093
1500	-0.01	0.011
2000	-0.01	0.012
3000	-0.01	0.023

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

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

Eccentric error

Load test : 1000 g

A	B	C	D	E	
0.00	0.01	0.02	0.00	0.00	g



Repeatability

Load test : 2000 g

Stdev. : 0.000 g

- o o o -



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Mettler-Toledo (Thailand) Ltd.
848/4 - 848/5 Lualaba Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+66 2723 0382
MT-TH.ServiceSupport@mt.com



Accuracy Calibration Certificate

Customer

Company: ErwiLab Co., Ltd.
Address: 546, 540/1 Soi Bang Khue 7, Bang Khue
City: Bang Khue Contact: Apornrat Aphidet
Zip / Postal: 10160
State / Province: Bangkok
Order Number:  8332378413

Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: XPR2 Asset Number: ELABBALANCE07
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 Guidelines: EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CP/W022/20

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.

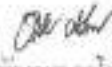
In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	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:




Kassaorn Tassanachaisakul


Sand Jitniyom
☒ Kassaorn Tassanachaisakul
☐ Sand Jitniyom
☐ Suphat Sukasawat

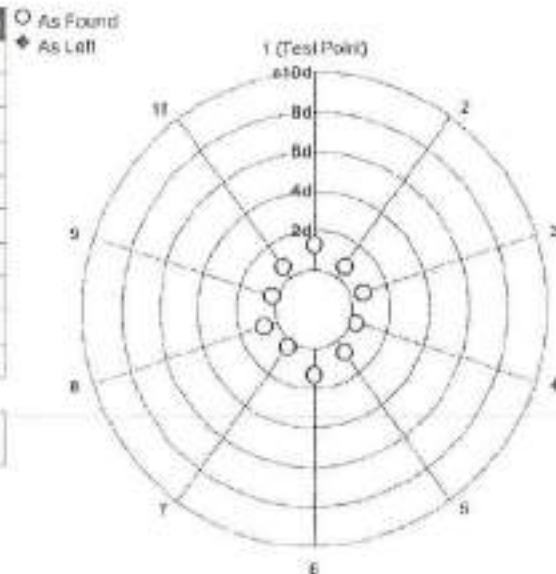
Measurement Results

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	0.0000005 g	N/A
--------------------	-------------	-----



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

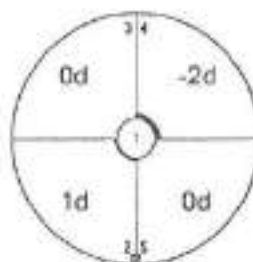
The results of this graph are based upon the absolute values of the differences from the mean value.

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	0.999993 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.



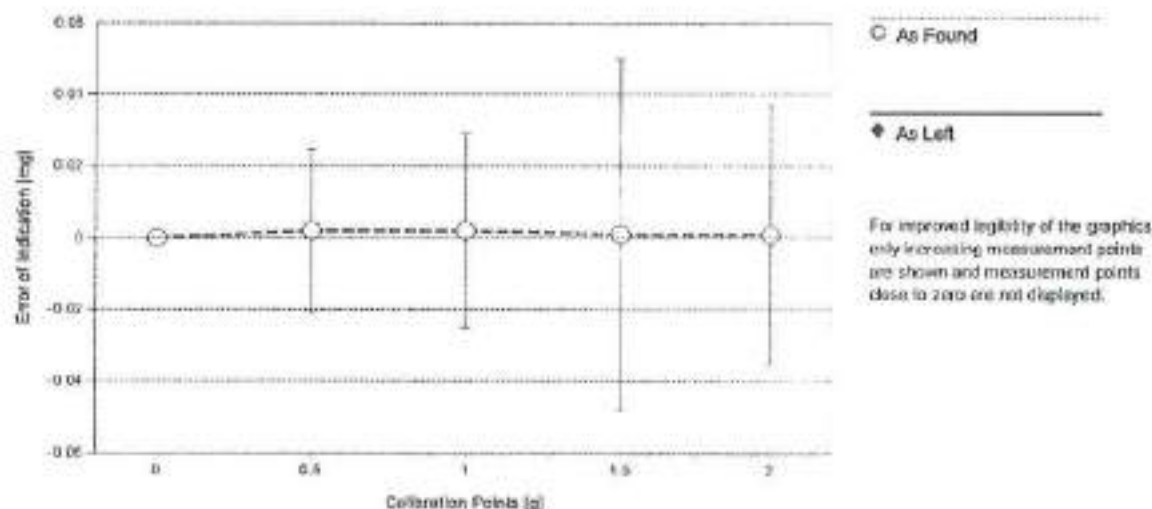
รับรองถ้าหากถูกต้อง
ผู้ตรวจการฝ่ายควบคุมคุณภาพ

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	0.0055 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	0.048 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.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor $k=2$ 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.:	WS91	Date of Issue:	03-May-2021
Certificate Number:	172902	Calibration Due Date:	28-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 date 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.



Th. H.
กรรมการผู้จัดการ
บริษัท เอนวิซบ จำกัด

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: $4 K$

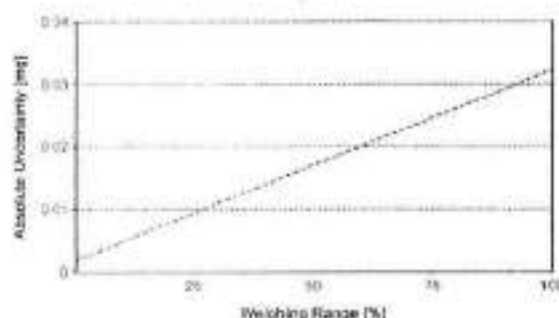
Linearization of Uncertainty Equation

	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

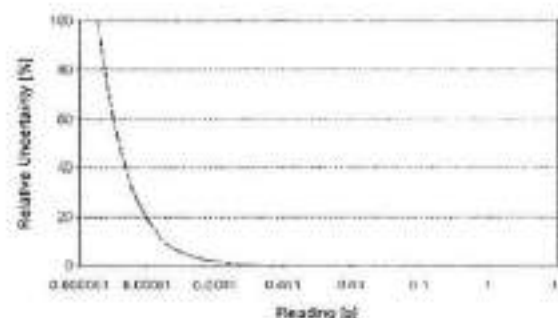
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

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	0.0046 mg	0.0023%	N/A	N/A
2.100000 g	0.032 mg	0.0015%	N/A	N/A



As Found



As Left



Signature
นางอรรณพพร อึ้งน้อย
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.

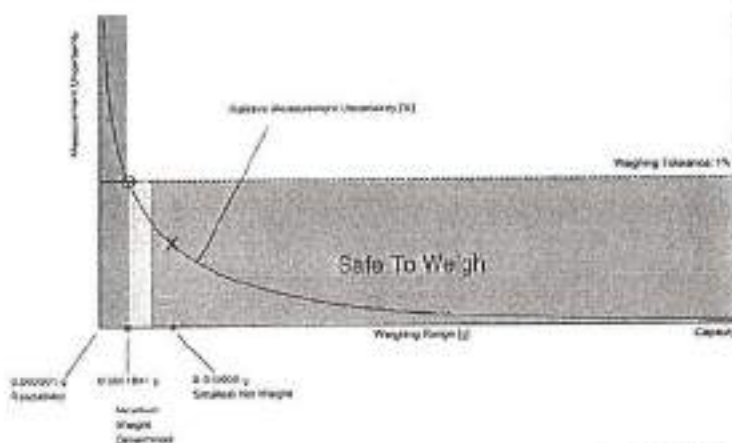
Process Requirements

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 shown is a simplified representation. This graph reflects As Left testing, unless only As Found was performed.



Dr. [Signature]
ผู้อำนวยการกอง
การมาตรวิทยา
กรมการ度量衡
กระทรวงพาณิชย์

Minimum Weight

As Found Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.0018649 g	0.0037855 g	0.0057042 g	0.0099072 g	0.0214935 g
0.2%	0.0009256 g	0.0018649 g	0.0028181 g	0.0047674 g	0.0099072 g
0.5%	0.0003686 g	0.0007394 g	0.0011124 g	0.0018649 g	0.0037855 g
1%	0.0001841 g	0.0003686 g	0.0005538 g	0.0009256 g	0.0018649 g
2%	0.0000920 g	0.0001841 g	0.0002763 g	0.0004611 g	0.0009256 g
5%	0.0000368 g	0.0000736 g	0.0001104 g	0.0001841 g	0.0003686 g



Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.0018649 g	0.0037855 g	0.0057042 g	0.0099072 g	0.0214935 g
0.2%	0.0009256 g	0.0018649 g	0.0028181 g	0.0047674 g	0.0099072 g
0.5%	0.0003686 g	0.0007394 g	0.0011124 g	0.0018649 g	0.0037855 g
1%	0.0001841 g	0.0003686 g	0.0005538 g	0.0009256 g	0.0018649 g
2%	0.0000920 g	0.0001841 g	0.0002763 g	0.0004611 g	0.0009256 g
5%	0.0000368 g	0.0000736 g	0.0001104 g	0.0001841 g	0.0003686 g



Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with $k = 2$ and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.



Official stamp and signature of the Thai Ministry of Commerce.
กรมการค้าต่างประเทศ
ผู้ตรวจการฝ่ายควบคุมคุณภาพ

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%	0.000050 g	0.000008 g	✓	0.000008 g	✓
0.2%	0.000100 g		✓		✓
0.5%	0.000250 g		✓		✓
1%	0.000500 g		✓		✓
2%	0.001000 g		✓		✓
5%	0.002500 g		✓		✓

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

Eccentricity

Test Load: 1 g

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

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



ON
บริษัท สหประชา จำกัด
ผู้ให้บริการมาตรฐานการชั่ง

Error of Indication

As Found

Reference Value	Error	Control limits for various weighing tolerances					
		0.1%	0.2%	0.5%	1%	2%	5%
0.000000 g	0.000000 g	N/A	N/A	N/A	N/A	N/A	N/A
0.500004 g	0.000002 g	0.000250 g	0.000500 g	0.001250 g	0.002500 g	0.005000 g	0.012500 g
0.999990 g	0.000002 g	0.000500 g	0.001000 g	0.002500 g	0.005000 g	0.010000 g	0.025000 g
1.499994 g	0.000001 g	0.000750 g	0.001500 g	0.003750 g	0.007500 g	0.015000 g	0.037500 g
1.999977 g	0.000001 g	0.001000 g	0.002000 g	0.005000 g	0.010000 g	0.020000 g	0.050000 g
Result		✓	✓	✓	✓	✓	✓

As Left

Reference Value	Error	Control limits for various weighing tolerances					
		0.1%	0.2%	0.5%	1%	2%	5%
0.000000 g	0.000000 g	N/A	N/A	N/A	N/A	N/A	N/A
0.500004 g	0.000002 g	0.000250 g	0.000500 g	0.001250 g	0.002500 g	0.005000 g	0.012500 g
0.999990 g	0.000002 g	0.000500 g	0.001000 g	0.002500 g	0.005000 g	0.010000 g	0.025000 g
1.499994 g	0.000001 g	0.000750 g	0.001500 g	0.003750 g	0.007500 g	0.015000 g	0.037500 g
1.999977 g	0.000001 g	0.001000 g	0.002000 g	0.005000 g	0.010000 g	0.020000 g	0.050000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.



DM dhl
รับรองค่ามาตรฐาน
ผู้จัดการฝ่ายควบคุมคุณภาพ

Service Date: 2022-03-24
 Document Number: TH2055-721-032422-LABBalanceHR
 EnnLab Co., Ltd.
 540, 540/1 Soi Bang Khao 7, Bang Khao, Bang Khoo, Bangkok 10150
 Arponrat Aphidet

METTLER TOLEDO

Balance Health Report

Device Details

System Details			
Manufacturer:	Mettler Toledo	Accessory 1:	
Model:	XPR2	Accessory 2:	
Serial number:	CD1115R5B1	Weight set for routine testing:	Yes /
Firmware:	2.9.200.6		

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
Spares parts available:	Yes	Last minimum weight determination:	
Regulations:	ISO		
Process tolerance in %:	1%	Routine testing performed:	Yes
Smallest sample net weight:	0.051g		

Check List

Environmental Conditions		General & Functional Checks	
Room temperature fluctuation	✓	Leveling	✓
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	✓
Weighting 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		Use of instrument	
Identify safe weighing range		Replace instrument	
QWP 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: Arponrat Aphidet	Position: N/A	Phone: 090-0973854
			Email: Tac@evlasing.com
Additional Remarks & Recommendations			Engineer Details
			Date: 24-Mar-2022
			Name: Suphat Sukawad
			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

8834 - 8460 Lissach Rd., Sarona Tai Sub-District, Sarona District, Bangkok 10260, +66 2123 0362
 MT-Th.Service@mettler.com
 www.mt.com

METTLER TOLEDO Service

Report Version: 1.13, Software Version: 4.27.1.13, Page: 1/1, © METTLER TOLEDO



รับรองสำเนาถูกต้อง
 ผู้ถือการมีอาควบคุมดูแล



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0383

MTC No. EEL. BP. 59/0365

CALIBRATION CERTIFICATE

Submitted by : Envilab Co., Ltd.
Address : 540, 540/1 Soi Bangkhoe 7, Bangkhoe, Bangkhoe, Bangkok, 10160, Thailand.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
 : Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Acoustic Calibrator
Manufacturer : Bruel&Kjaer
Model : 4230
Serial No. : 1351075

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$
Relative Humidity : $(50 \pm 15) \%$
Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Standards used :

1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Keithley 2015-P S/N 4106495.
7. Condenser Microphone Bruel&Kjaer 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be measured by standard microphone using an insert voltage technique.

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

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

Date of Receipt : 10 Mar. 2022

Date of Calibration : 21 Mar. 2022



Official Signature

1 / 2

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

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

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

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

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

FM.BL.MTC.002 Rev.4



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-65/0383

MTC No. EEL, BP. 59/0365

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 HzAcoustic 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 Brüel&Kjaer 4180	93.66	-0.34	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Brüel&Kjaer 4180	997.8	-2.2	± 1.5	$\pm 1.0\%$

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Brüel&Kjaer 4180	1.55	± 0.50	$\pm 3.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

(Mr. Weerachai Deechaiyao)

Approved by :

(Mr. Prayote Klunypa)

TISTR

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 21 Mar. 2022

Date of Issue : 22 Mar. 2022

Ref: 2011265031501147002

End of Certificate

2 / 2

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

Advertising the Report/Certificate and publicity of the results except in full and unchanged unless prior permission is obtained from the governor of TISTR.

Head Office

35 Mu. 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Chengwat Rajaburi 17120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpat@tistr.or.th Website : www.tistr.or.th

Office/Laboratory

Sri T.C. 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 : mtc@tistr.or.th

รับรองสำหรับลูกค้า

บริการการวัดและสอบเทียบ

Office

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

FMEL-MTC-002 Rev.4

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: AIR LIQUIDE (THAILAND)
 LTD
 Part Number: E05N191E15A0003
 Cylinder Number: EB0148406
 Laboratory: 124 - Plumsteadville - PA
 PGVP Number: A12022
 Gas Code: CO,CO₂,NO,NO₂,SO₂,BALN
 Reference Number: 160-402305646-1
 Cylinder Volume: 148.7 CF
 Cylinder Pressure: 2015 PSIG
 Valve Outlet: 660
 Certification Date: Jan 03, 2022

Expiration Date: Jan 03, 2030

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do not Use This Cylinder below 100 psig, i.e. 6.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	100.2 PPM	G1	+/- 0.8% NIST Traceable	12/27/2021, 01/03/2022
CARBON MONOXIDE	100.0 PPM	98.02 PPM	G1	+/- 0.5% NIST Traceable	12/27/2021
NITRIC OXIDE	100.0 PPM	100.1 PPM	G1	+/- 1.0% NIST Traceable	12/27/2021, 01/03/2022
SULFUR DIOXIDE	100.0 PPM	100.2 PPM	G1	+/- 1.0% NIST Traceable	12/27/2021, 01/03/2022
CARBON DIOXIDE	8.000 %	7.962 %	G1	+/- 0.8% NIST Traceable	12/27/2021
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	09010241	KAL004894	98.48 PPM CARBON MONOXIDE/NITROGEN	+/- 0.5%	Oct 16, 2024
NTRM	200610-56	CC733475	98.61 PPM NITRIC OXIDE/NITROGEN	+/- 0.6%	Oct 06, 2026
GMIS	124206889119	CC322885	4.294 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Sep 03, 2024
NTRM	11610419	KAL004813	98.6 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.6%	Jul 28, 2023
NTRM	08010836	KD10200	13.94 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 30, 2024

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iS50 FTIR AUP2010245 CO2	FTIR	Dec 02, 2021
SIEMENS ULTRAMAT6E N1-C8-180	NDIR	Dec 09, 2021
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Dec 16, 2021
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Dec 28, 2021
Nicolet iS50 FTIR AUP2010245 SO2	FTIR	Dec 23, 2021

Triad Data Available Upon Request

NOTES: Gross Weight: 28.1 Kg, Net Weight: 5.1 Kg.

UF-0X5CX



Mulinda A. Fisher
 Approved for Release



Chutthi

บริษัท อีร์แกส จำกัด
 (ผู้ประกอบการควบคุมคุณภาพ)



CALIBRATION LABORATORY Co., LTD.

2/10-11, 14, 55 Soi Pongman Mankul 25 Yaek 4, Prasen Manukul Rd., Ladphrao, Bangkok 10230
Tel: 02-573-0353-4 Fax: 02-576-2672 www.cali-laboratory.com E-mail: sale@cali-laboratory.com



REPORT OF CALIBRATION FOR

NOMENCLATURE	:	VIBRATION METER
MANUFACTURER	:	INSTANTEL
MODEL / TYPE	:	721A2601/721A3301
SERIAL NO.	:	UM14629/UM14629[EVMINMMA TE4629]
DATE OF CALIBRATION	:	26 January 2022

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, Universal Counter and Portable Vibration Calibrator which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Digital Multimeter, Agilent Technologies Model 34401A S/N. US36044686.
2. Universal Counter, Hewlett Packard Model 5315A S/N. 2448A13042.
3. Portable Vibration Calibrator, The Modal Shop Model 9110D S/N. 11424.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand) Certificate No. EE-0070-21, Due Date 23 July 2022.
2. The measurements are traceable to International System of Units (SI), through Aeronautical Radio of Thailand Ltd. Certificate No. 07-0073/21, Due Date 14 May 2022.
3. The measurements are traceable to International System of Units (SI), through The Modal Shop, Inc. Certificate No. 2649.01, Due Date 10 November 2022.

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:2013)"

Certificate No. Q22008275

F3-011-04/01-12



[Signature]

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

page 2 of 3



@calibration



CALIBRATION LABORATORY Co., LTD.

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



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

1. ACCELERATION RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
(g)	(frequency)		(g)	(g)	(g)	\pm (% of rdg.)
1	50 Hz	peak	1.000	1.030	-0.030	1.1
2	50 Hz		2.000	2.076	-0.076	1.0
3	50 Hz		3.000	3.091	-0.091	1.0

2. VELOCITY RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
(mm/s)	(frequency)		(mm/s)	(mm/s)	(mm/s)	\pm (% of rdg.)
10	50 Hz	peak	10.000	9.818	+0.182	2.3
20	50 Hz		20.000	19.782	+0.218	1.8
30	50 Hz		30.000	30.329	-0.329	1.0

*3. DISPLACEMENT RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
(mm)	(frequency)		(mm)	(mm)	(mm)	\pm (% of rdg.)
0.01	50 Hz	peak	0.010	0.010	0.000	6.0
0.02	50 Hz		0.020	0.020	0.000	3.1
0.03	50 Hz		0.030	0.031	-0.001	2.7

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

* means Calibrations marked " Not ANAB Accredited " in this Certificate have been included for completeness.

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

End of Certificate

Certificate No. Q22008275

F3-011-04/01-12



Chai Kiat

โปรดสำเนาทุกข้อถึง page 3 of 3
โปรดส่งคืนเอกสารฉบับนี้ด้วย



QR code



CALIBRATION LABORATORY Co., LTD.

2/10-11/14/55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel: 02-678-0353-4 Fax: 02-678-2672 www.cl-laboratory.com E-mail:sale@cl-laboratory.com



Supplement to Calibration Certificate No. Q22008275

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VIBRATION METER
MANUFACTURER : INSTANTEL
MODEL / TYPE : 721A2601/721A3301
SERIAL NO. : UM14629/UM14629[EVMINMMATE4629]
CLID. NO. : 252200217
JOB CONTROL NO. : 220125008275

CUSTOMER : ENVILAB CO., LTD. [HEAD OFFICE]
540,540/1 SOI BANGKHAE 7,
BANGKHAE, BANGKHAE BANGKOK 10160

DATE OF RECEIVED : 25 January 2022

DATE OF ISSUED : 04 February 2022

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

Calibrated By : Suwit Phuanbusabong
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
04 February 2022



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

Certificate No. Q22008275A1

F3-012-04/01-12



รับรองสำเนาถูกต้อง
ผู้รับทราบและอนุมัติ
Envilab Co., Ltd.

page 1 of 3



clc Calibration

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+662 723 0382
MT-TH.ServiceSupport@mtl.com



Accuracy Calibration Certificate

Customer

Company: EnviLab Co., Ltd.
Address: 540, 540/1 Soi Bang Khao 7, Bang Khao
City: Bang Khao Contact: Ngarmthip Sampanpung
Zip / Postal: 10160
State / Province: Bangkok
Order Number:  0231907248

Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: XSR205DU Asset Number: N/A
Serial No.: B911363567 Terminal Model: SRAT
Building: N/A Terminal Serial No.: B911363567
Floor: 3 Terminal Asset No.: N/A
Room: 8364

Range	Max. Capacity	Readability (d)
1	51 g	0.0001 g
2	220 g	0.0001 g

Procedure

Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CPW002/20

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: 22.2 °C	End: 22.6 °C	Start: 58.3 %	End: 59.7 %

As Found Calibration Date: 02-Mar-2022 Calibrator:
As Left Calibration Date: N/A
Issue Date: 03-Mar-2022

Approved Signatory: 
Naruephon Chonpraserstak

Approved Signatory:





กิตติศักดิ์ นพคุณ

กิตติศักดิ์ นพคุณ

กิตติศักดิ์ นพคุณ

☒ Katsakorn Tassanachaisakul
☐ Santi Jitniyom
☐ Satchet Sukkate

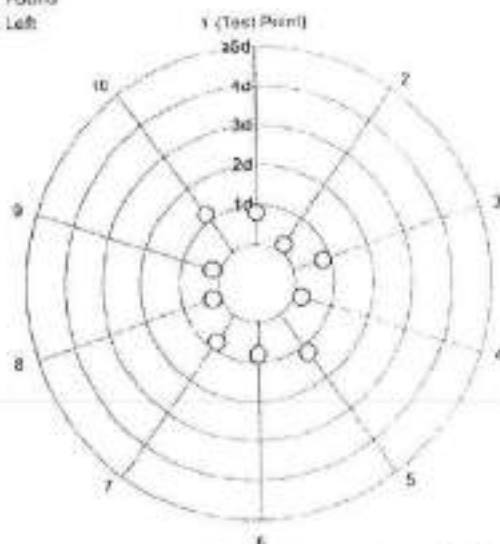
Measurement Results

Repeatability

Test Load: 70 g

	As Found	As Left
1	70.00001 g	N/A
2	70.00002 g	N/A
3	70.00001 g	N/A
4	70.00002 g	N/A
5	70.00003 g	N/A
6	70.00001 g	N/A
7	70.00001 g	N/A
8	70.00002 g	N/A
9	70.00002 g	N/A
10	70.00003 g	N/A
Standard Deviation	0.00008 g	N/A

○ As Found
◆ As Left



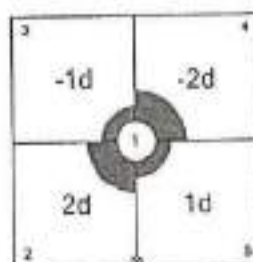
The "d" in the graph represents the readability of the range interval in which the test was performed.

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

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	100.0000 g	N/A
2	100.0002 g	N/A
3	99.9999 g	N/A
4	99.9998 g	N/A
5	100.0001 g	N/A
Maximum Deviation	0.0002 g	N/A



As Found

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

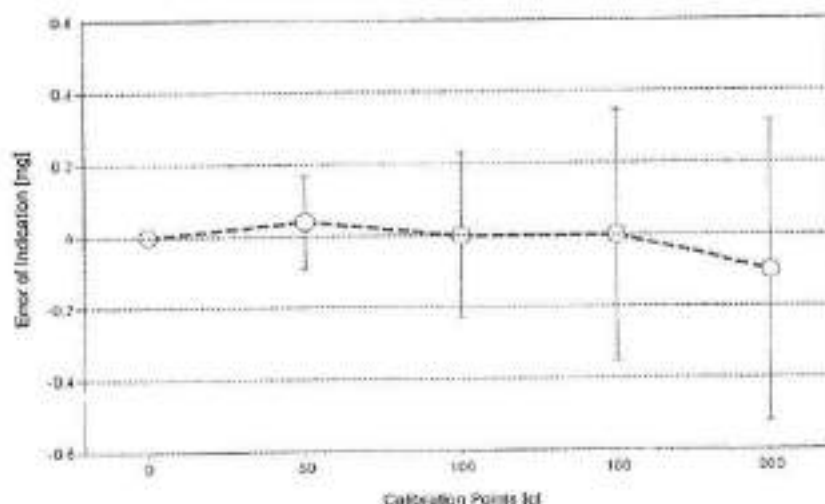


Signature
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.00000 g	0.017 mg	2
2	0.10000 g	0.10000 g	0.00000 g	0.023 mg	2
3	0.50000 g	0.50001 g	0.00001 g	0.028 mg	2
4	0.99999 g	0.99999 g	0.00000 g	0.032 mg	2
5	1.99999 g	2.00000 g	0.00001 g	0.040 mg	2
6	5.00001 g	5.00001 g	0.00000 g	0.046 mg	2
7	10.00001 g	10.00002 g	0.00001 g	0.062 mg	2
8	49.99998 g	50.00002 g	0.00004 g	0.13 mg	2
9	100.0000 g	100.0000 g	0.0000 g	0.23 mg	2
10	150.0000 g	150.0000 g	0.0000 g	0.35 mg	2
11	199.9999 g	199.9998 g	-0.0001 g	0.42 mg	2



○ As Found

◆ As Left

For improved legibility of the graphical 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.



รับรองสำเนาถูกต้อง
ผู้ตรวจการฝ่ายควบคุมคุณภาพ

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.:	WS22	Date of Issue:	05-Jan-2022
Certificate Number:	177036	Calibration Due Date:	03-Jul-2023

Weight Set 2: OIML E2

Weight Set No.:	WS76	Date of Issue:	31-Jan-2022
Certificate Number:	C205470252	Calibration Due Date:	12-Jul-2023

Thermo Hygrometer

Equipment No.:	IN193	Date of Issue:	14-Jun-2021
Certificate Number:	2111221	Calibration Due Date:	01-Jun-2022

Remarks

FACT adjustment functionality activated
Equipment condition: Good
Next calibration according to customer's procedure

End of Accredited Section

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



Signature
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

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: $1.5 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: $3 K$

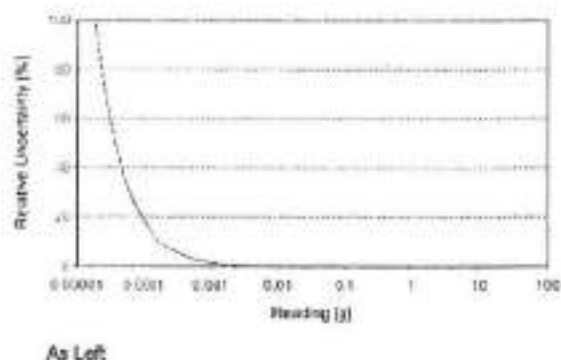
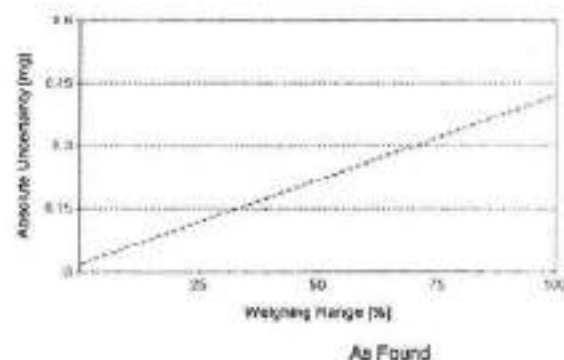
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.00001 g	81 g	$U_1 = 0.018 \text{ mg} + 0.00497 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	220 g	$U_2 = 0.06 \text{ mg} + 0.00492 \text{ mg/g} \cdot R$	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	
0.00220 g	0.018 mg	0.82%	N/A	N/A
0.02200 g	0.018 mg	0.082%	N/A	N/A
0.22000 g	0.018 mg	0.0082%	N/A	N/A
2.20000 g	0.029 mg	0.0013%	N/A	N/A
220.0000 g	1.1 mg	0.00052%	N/A	N/A



The weighing range shown in the absolute uncertainty graph refers to the first internal range of the device.



Signature
 1. บรรณสารมาตรฐานแห่งชาติ
 2. ผู้จัดการฝ่ายควบคุมคุณภาพ



S K SAIFS AND SERVICE CO., LTD.
194/56, 194/57 Thakorn Rd. Samud Dom
Bang Khun Thien Bangkok 10150
Tel : 02-417-2144 Fax : 02-417-2155



Certificate of Calibration

Reference No. : 4182/2202-017
Customer : Envilab Co., Ltd. (Head Office)
: 540, 540/1 Soi Bangkhao 7, Bangkhao,
: Bangkhao Bangkok 10160
Equipment : Digital Thermo-Hygrometer
Manufacturer : Testo
Model : 606-H1
Serial No. : 83353607
ID No. : -
Received Date : 7 March 2022
Calibrated Date : 9 March 2022
Issued Date : 15 March 2022

Certificate No. : L2203-290
Page 1 of 2

Environment	Start Calibration	Stop Calibration
Ambient Temperature (°C)	24.7	25.5
Relative Humidity (% RH)	51	52

Calibrated by : Mr. Nattawut Reangdech

Calibration Method

In-house method : by comparison with standard hygrometer for humidity measurement function
and comparison with standard thermometer for temperature measurement function into humidity/temperature chamber

Condition of this result of calibration

1. Reference standard instrument

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Hygrometer	HL-NT2-D	61468576	QR21-0851	13 May 22
2) Digital Thermometer With Probe	GT11	08000089	PSL-T 0072/65	14 November 2022

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

3. This certificate can be traceable to International System of Unit :

- Through Thailand Institute of Scientific And Technological Research (TISTR)
- Through Quality Reborn Co., Ltd.

Approved by :

Ep.

☐ Mr. Suphachal Sakri

☐ Mr. Phayak Toolit

☒ Miss Tantaraporn Pettong

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



รับรองสำเนาถูกต้อง
Envilab Co., Ltd. ผู้ให้บริการฟลายทวอยคูลด จำกัด

This certificate may not be reproduced other than in full except with the prior written approval of the S K Saifs And Service Company Limited.

Result of Calibration

Function : Humidity Measurement Reference Temperature at 25 °C

STD Reading (% RH)	UUC Reading (% RH)	UUC Error (% RH)	Measurement Uncertainty (\pm % RH)
50.00	49.0	-1.00	2.3

Function : Temperature Measurement

STD Reading (°C)	UUC Reading (°C)	UUC Error (°C)	Measurement Uncertainty (\pm °C)
25.012	25.0	-0.012	0.35

Resolution: 0.1 (°C) , 0.1 % RH

STD= Standard

UUC= Unit Under Calibration

** End of Calibration Report **



Dr. Nhat
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Sp.

Certificate of Calibration

Certificate No. : 65-420020-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkhao7, Bangkhao, 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. : B4170001

ID No. : ELABPHH74BW01

Electrode

Model : 9615S

Serial No. : 9X1K0003

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

Ambient Temperature : (23.5 to 24.8) °C

Relative Humidity : (50 to 55) %

Date of Received : 02 March 2022

Date of Calibration : 02 March 2022

Date of Issue : 05 March 2022

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	61235182	795894	14 Feb 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.985	61223875	769927	15 May 2022	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.008	61244986	795895	25 Feb 2023	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%

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. : 65-420020-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

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

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (\pm pH)
4, 7, 10	4.008	4.005	0.003	0.0084
	6.985	7.001	-0.016	0.010
	10.008	10.009	-0.001	0.014

Remark

UUC : Unit Under Calibration

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

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

- ๐๐๐ -



วันที่รับส่งมอบ
ผู้รับมอบ : นายสมชาย คุ้มคุณ





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.: 22TW70

Page.: 1 of 2

Certificate of Testing

Equipment :	Dissolved Oxygen Meter
Manufacturer :	Hanna
Model :	HI 9147
Serial No. :	H0007030
ID No. :	ELABDDHI914701
Received Date :	15 March 2022
Test Date :	18 March 2022
Reference :	2203-0568DN-1
Submitted by :	Envilab Co.,Ltd (Head office) 540, 540/1 Soi Bangkhao 7, Bangkhao, Bangkhao, 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 :	 Approved Signatory
	(<input checked="" type="checkbox"/>) Malee Butkrusa (<input type="checkbox"/>) Saithip Meangmai (<input type="checkbox"/>) Warakorn Lemgatrakul
Issue Date :	22 March 2022



รับรองว่าผลการทดสอบ
ผู้จัดการฝ่ายควบคุมคุณภาพ

B 0284369



Cert.No.: 22TW70
Page.: 2 of 2

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: KC3N0639K

Titration Method (Azide Modification Method) (mg/L)	Dissolved Oxygen Meter Reading (mg/L)	Standard Deviation (mg/L)
8.04	8.1	0.045

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

-o0o-



รับรองสำเนาถูกต้อง
ผู้อำนวยการฝ่ายควบคุมคุณภาพ

Maha

a 1100969

Certificate of Calibration

Certificate No. : 64-400527-3

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Air Chamber (Incubator)

Manufacturer : M-LAB

Model : BIC-140

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 100613-0

ID No. : ELABREFRIG140L

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

Ambient Temperature : (24.5 to 25.0) °C

Relative Humidity : (55 to 58) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 15 October 2021

Date of Calibration : 15 October 2021

Date of Issue : 16 October 2021

Calibrated by : Bunjerd Masri

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No.

Cert. No.

Due Date

Traceability

400046 & 400023 64-400443-1

29 Mar 2022

National Institute of Metrology Thailand (NIMT)

Approved by :


(Bunjerd Masri)

Supervisor



มีรองผู้อำนวยการ
ผู้ตรวจการฝ่ายควบคุมคุณภาพ

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. : 64-400527-3

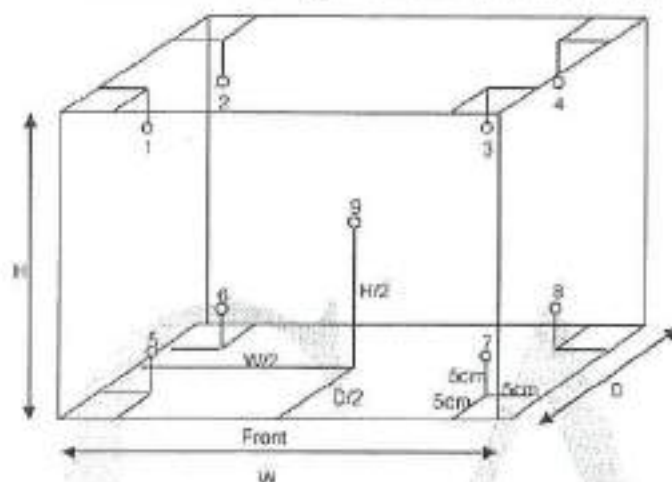
Page : 2 of 2

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	19.9	19.8	19.8	19.9	19.9	19.9	20.0	19.8	20.1	0.53

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.0	20.0	0.4	0.1	0.4

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%

- ๐0๐ -



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukprachasan 3 Rd., Bangkok, Pukked, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155; e-mail : calibratech.co@gmail.com, calibratech.cal@gmail.com



Certificate of Calibration

Certificate No. : 64-400569-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Air Chamber (Refrigerator)

Manufacturer : M-LAB

Model : BIC-140

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 1011

ID No. : ELABBODC140N03

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

Ambient Temperature : (23.0 to 23.8) °C

Relative Humidity : (55 to 60) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 12 November 2021

Date of Calibration : 12 November 2021

Date of Issue : 18 November 2021

Calibrated by : Bunjerd Masri

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No.	Cert. No.	Due Date	Traceability
400046 & 400023	64-400443-1	29 Mar 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor



รับรองสำเนาถูกต้อง
ผู้อำนวยการฝ่ายควบคุมคุณภาพ

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. : 64-400569-1

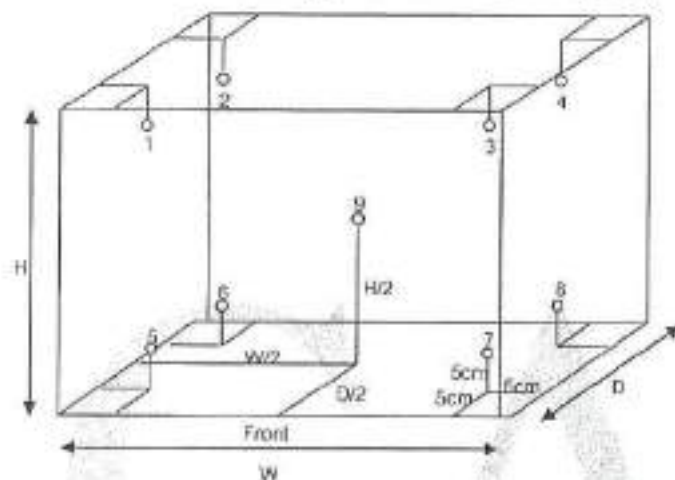
Page : 2 of 2

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	
4.0	4.0	4.0	3.3	3.2	3.4	3.4	3.9	3.9	4.0	3.4	4.2	0.57

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
4.0	4.0	4.0	1.0	0.1	1.0

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

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

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

-oOo-



รับรองสำหรับถูกต้อง
การวัดอุณหภูมิอากาศ

Signature



Certificate of Calibration

Certificate No. : 65-400155-2

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 31.0) °C

Relative Humidity : (60 to 65) %

Line Voltage : (224.2 to 225.2) V

Date of Received : 24 March 2022

Date of Calibration : 24 March 2022

Date of Issue : 29 March 2022

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

400079 & 400032

64-400589-1

25 May 2022

National Institute of Metrology Thailand (NIMT)



Approved by :



(Bunjerd Masri)

Supervisor

รับรองสำเนาถูกต้อง
Envilab Co., Ltd. บริการการวิเคราะห์อุณหภูมิ

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. : 65-400155-2

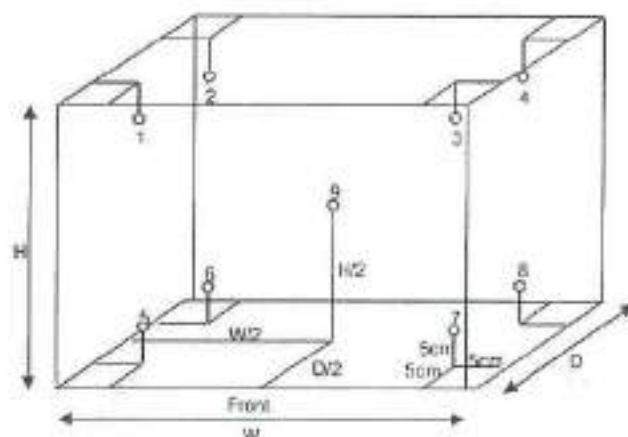
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.56 m

Capacity = 0.07 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	
104.0	103.5	103.5	103.9	104.2	104.2	104.2	104.1	104.0	105.7	104.2	104.3	0.69
110.0	109.5	109.5	110.0	110.3	110.3	110.2	110.2	110.0	109.7	110.2	110.3	0.69
180.0	179.0	179.0	179.1	180.0	180.0	180.1	180.1	179.8	179.0	180.1	180.3	0.95

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	103.5	103.5	0.7	0.1	0.8
110.0	109.5	109.5	0.7	0.1	0.8
180.0	179.0	179.0	1.5	0.2	1.5

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%

- 000 -



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co., Ltd.

2/106-7 Moo 2, Sukhprachasin 3 Rd., Banggood, Pakkred, Northaburi 11120

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



Certificate of Calibration

Certificate No. : 65-400053-1

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 : (22.7 to 23.5) °C

Relative Humidity : (45 to 50) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 07 February 2022

Calibrated by : Permpon Chanpu

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
400029 & 400031	64-400588-1	24 May 2022	National Institute of Metrology Thailand (NIMT)



Approved by :

(Bunjerd Masri)

Supervisor

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

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

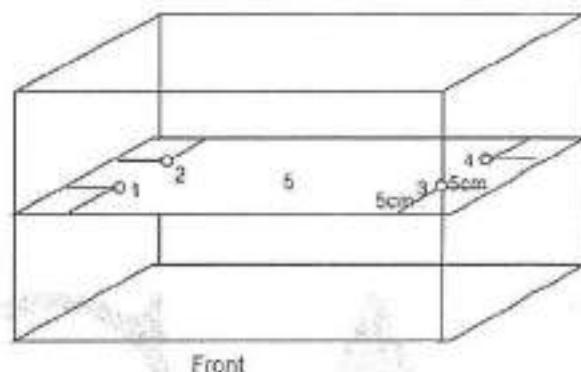
Certificate No. : 65-400053-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.					Uncertainty (±°C)	Measured Uniformity (°C)	Measured Stability (°C)
			1	2	3	4	5			
95.0	95.0	95.0	95.35	95.45	95.51	95.66	95.56	0.19	0.27	0.06

Remark: The uncertainty is not combine uniformity of the water bath.

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

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

- ๐0๐ -



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

B.



CAL

Calibratech Co., Ltd.

7706-7 Moo 2, Sukhaphichasri 3 Rd., Bangpoo, Pakkret, Nonthaburi 11120

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



NSC-TIS-TG 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-300146-10

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Cylinder

Manufacturer : PYREX

Class : A

Capacity : 50 ml

Graduation : 1 ml

ID No. : C-WW-020/18

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

Relative Humidity : (50 ± 15) %

Air Pressure : 1002.0 mbar

Date of Received : 09 March 2022

Date of Calibration : 21 March 2022

Date of Issue : 21 March 2022

Calibrated by : Areerat Sombua

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	64-200354-1	02 Jun 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by:

(Wipa Tonnadee)

Supervisor



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

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. : 65-300146-10

Page : 2 of 2

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

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
30	29.79
50	49.73

Uncertainty of measurement with in \pm 0.054 ml

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.10$, providing a level of confidence of approximately 95%

- c0o -



Dr. D.
 ธีรพงษ์ สำเภาทอง
 ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 65-300147-4

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Cylinder

Manufacturer : ISOLAB

Class : A

Capacity : 1000 ml

Graduation : 10 ml

ID No. : C-WW-028/18

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

Relative Humidity : (50 ± 15) %

Air Pressure : 1002.0 mbar.

Date of Received : 09 March 2022

Date of Calibration : 21 March 2022

Date of Issue : 21 March 2022

Calibrated by : Areerat Sombun

Calibration Method : In-house method CAL-M3601 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
2-11002	64-200354-1	02 Jun 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by :



(Wipa Tovallee)

Supervisor



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

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

Calibratech Co.,Ltd.

7/106-7 Moo 1, Sakheprachasan 3 Rd., Bangpaet, Pakkret, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 65-300147-4

Page : 2 of 2

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

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
500	501.34
1000	1001.39

Uncertainty of measurement with in \pm 0.17 ml

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

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

- 000 -

D



Dr. Chai
วิศวกรชำนาญการพิเศษ
ผู้ตรวจการควบคุมคุณภาพ

