

ภาคผนวก ง.

เอกสารผลการสอบเทียบเครื่องมือตรวจวัด

ประจำเดือนมกราคม พ.ศ. 2565



บริษัท เอ็นไวโรเทค จำกัด 540,540/1 ซอยบางนา 7 แขวงบางนา เขตบางนา กรุงเทพมหานคร 10150
Envilab Co., Ltd. 540,540/1 Soi Bangna 7 Bangnae Bangnae Bangkok 10150
Tel : 02-802-3577-9 Fax, 02-802-3773 E-mail : info@evltesting.com



Envilab Co., Ltd. 540,540/1

Verification Test Report

Report No.:

HO2100092-D005 -SLM 01

☐ PM

☒ Onsite UTM :

47 P 1529770 N 666269 E

Calibrated Date: 1 January 2022

Site : โครงการก่อสร้างอาคารพักอาศัยพร้อมสิ่งอำนวยความสะดวก สำนักงานปลัดกระทรวงกลาโหม

Equipment: Sound Level Meter

Manufacturer: ACO

Model: 6226

Serial : 50027

Environment: Temperature 28 °C Humidity 56 %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	94.0	0.2	93.8

Calibrated By:

(Surakit Damcholvichit)

Date:

1 January 2022

Approve By:

(Sarawut Keawsrinual)

Date:

1 January 2022

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บริษัท เอ็นไวโรลิบ จำกัด 540.540/1 ซอยบางกะปิ 7 บางกะปิ กรุงเทพฯ 10160
Envilab Co., Ltd. 540.540/1 Soi Bangkapi 7 Bangkapi Bangkok 10160
Tel : 02-802-3577-8 Fax. 02-802-3773 E-mail : info@evltesting.com



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Verification Test Report

Report No.:

HO2100092-D005 -SLM 02

☐ PM

☒ Onsite UTM.

47 P 1529587 N 666247 E

Calibrated Date: 1 January 2022

Site : โรงพยาบาลเกษมราษฎร์ ประทับใจ

Equipment: Sound Level Meter

Manufacturer: ACO

Model: 6226

Serial : 20022

Environment: Temperature 28 °C Humidity 56 %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	94.1	0.3	93.8

Calibrated By

(Surakit Darncholwicht)

Date

1 January 2022

Approve By

(Sarawut Keawsrinual)

Date

1 January 2022

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TSP High Volume Sampler Calibration

Verification Report No.

HO2100092-0005 -TSP 01

☐ PM ☒ Onsite

Site: กรุงเทพมหานคร อาคารพาณิชย์ 15 ชั้น ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร

UTM: 47P 1524271 N 668054 E

Date: 1 Jan 22

Sampler: NTSP#12

Technical: Surakul D.

Recorder: ECRANG15314821

Approval: Saravut K.

CONDITIONS

Barometric Press. (hPa): 1010.0

Corrected Pressure (mm Hg): 757.6

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 OFFICE

Brand: Ttech Environmental, Inc

Qstd Slope: 2.05054

Model: TE-6025A

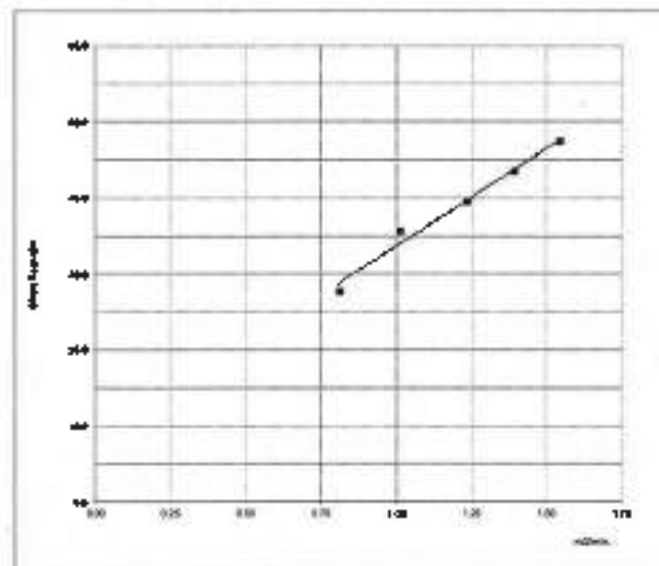
Qstd Intercept: -0.00430

Serial#: 2067

Date Certified: 11 Jan 21

CALIBRATIONS

Flute or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	10.25	1.545	48.0	47.45	
2	8.34	1.384	44.0	43.49	Slope = 25.6539 Intercept = 7.9907 Corr. coeff = 0.9914 # of Observations: 5 Range of Chart at 1.1 - 1.7 m3/min: 37 52
3	6.54	1.235	40.0	39.54	
4	4.39	1.012	36.0	35.69	
5	2.81	0.810	28.0	27.68	



Calibrated by:



(Surakul Damcholvichit)
1 January 2022

Approved by:



(Saravut Kuanwattana)
1 January 2022

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บริษัท อีวีแอล จำกัด 5405401 แขวงถนน 7 แขวงถนน แขวงถนน แขวงถนน 10166
EVL Co., Ltd. 300,500/1 So Bangkok 7 Bangkok Bangkok Bangkok 10166
Tel : 02-802-5577-8 Fax: 02-802-5773 E-mail : info@evltesting.com



PM10 High Volume Sampler Calibration

PM10 High Volume Sampler Calibration

Verification Report No.

HO2100092-0005 -PM 01

L PM E Onsite

Site: โรงงานผลิตชิ้นส่วนอากาศยานและเครื่องยนต์อากาศยาน บริษัทการบินไทย

UTM : 47P 1624271 N 668054 E

Date: 1 Jan 22

Sampler: NFA11

Technical: Surakot D

Recorder: ECRD501618025857

Approval: Sarikul K.

CONDITIONS

Barometric Press. (hPa): 1010.0

Corrected Pressure (mm Hg): 757.5

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 OFFICE

Brand: Tisch Environmental, Inc

Slope: 1.28401

Model: TE-5025A

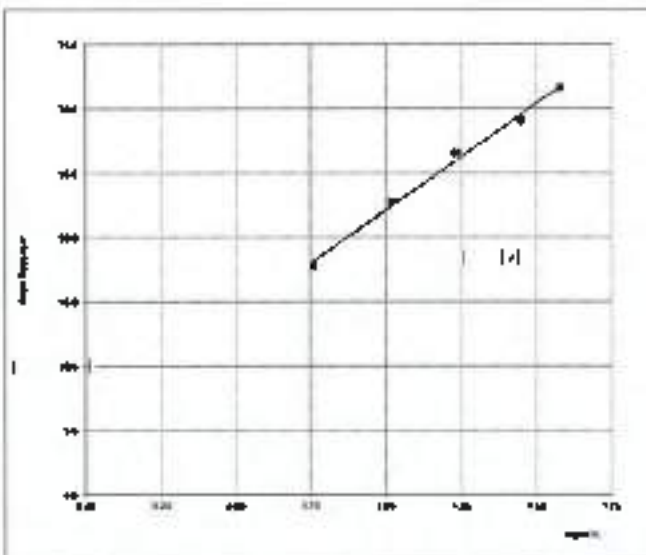
Intercept: -0.00265

Serial#: 2067

Date Certified: 11 Jan 21

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Q _a (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	10.23	1.580	50.0	31.67	Slope = 15.5952
2	8.62	1.451	46.0	29.14	Intercept = 6.5196
3	6.24	1.234	42.0	28.61	Corr. coeff = 0.9968
4	4.28	1.029	36.0	22.81	SFR = 1.137
5	2.36	0.760	28.0	17.74	SSP = 38.50
					# of Observations: 5
					Range of Chart: 36
					at SFR ±10%: 41



Calibrated by :

(Surakul Damchakichai)
1 January 2022

Approved by :

(Sarikul Keerachai)
1 January 2022

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49, Lertchai rd. 10110, Bangkok



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EVL Co., Ltd. 54/501/1 ซ. บางพลี 1 แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10110
Tel: 02-002-3872-8 Fax: 02-002-3773 E-mail: info@evltesting.com



Printed: 11 Jan 2022 10:05:02

PM10 High Volume Sampler Calibration

Verification Report No.

HQ2100092-D005 -PM 02

L PM	Onsite
Site: กรุงเทพมหานคร กรุงเทพมหานคร	
UTM: 47P 1029602 N 666283 E	
Sampler: HFAM01	
Recorder: ECROSD01618025857	
Date: 1 Jan 22	
Technician: Surakit D	
Approval: Saravul K.	

CONDITIONS

Barometric Press. (hPa): 1009.5	Corrected Pressure (mm Hg): 757.2
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 769.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

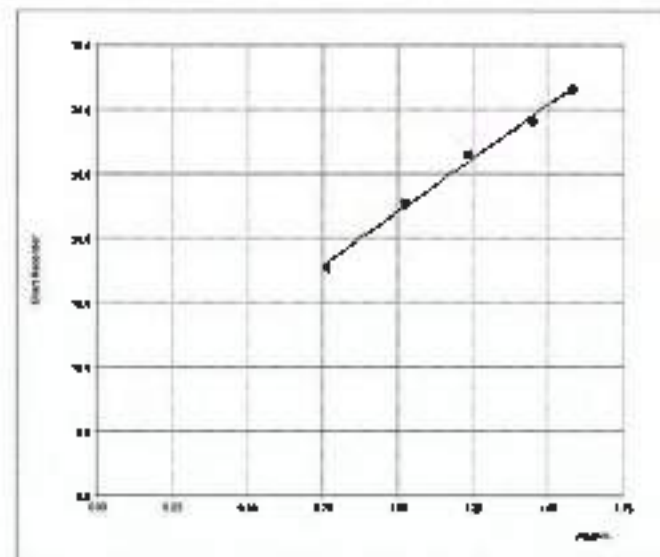
CALIBRATION ORIGIN

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

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

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Q _a (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	10.25	1.585	52.0	33.00	
2	6.62	1.453	46.0	29.19	Slope = 17.5910 Intercept = 4.3891 Corr. coeff. = 0.9929 SFR = 1.141 SEP = 38.55 # of Observations: 5 Range of Chart = 36 at SFR ±10% = 41
3	6.48	1.280	42.0	26.86	
4	4.18	1.013	34.0	21.58	
5	2.62	0.802	30.0	19.04	



Calibrated by:

(Surakit Darncholwichit)
1 January 2022

Approved by:

(Saravul Keawwattana)
1 January 2022

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PM10-02-2022-01-01-01

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10/01/2022 10:05:02



TSP High Volume Sampler Calibration

Verification Report No.

HO2100092-D005 -TSP 02

☐ PM

☒ Onsite

Site: กรุงเทพมหานคร กรุงเทพมหานคร

UTM: 47P 4529802 N 686283 E

Sampler: NTSPH01

Recorder: ECRANG15314321

Date: 1 Jan 22

Technician: Surakul D

Approval: Surakul K

CONDITIONS

Barometric Press. (hPa): 1009.5

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.2

Temperature (deg K): 305.0

Corrected Avg Press. (mm Hg): 759.6

Average Temp. (deg K): 303.0

CALIBRATION OFFICE

Brand: Tech Environmental Inc

Model: TE-5025A

Serial#: 2067

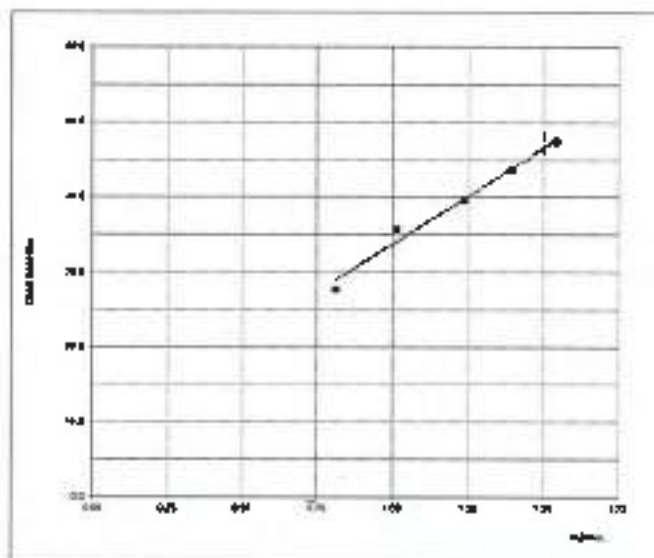
Qstd Slope: 2.05054

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
1	11.25	1.618	50.0	49.33	
2	9.82	1.494	44.0	43.41	Slope = 31.1967 Intercept = -2.3881 Corr. coeff. = 0.9908 # of Observations = 5 Range of Chart at 1.1 - 1.7 m3/min 33 51
3	7.24	1.297	38.0	37.49	
4	5.38	1.118	32.0	31.57	
5	3.24	0.868	26.0	25.65	



Calibrated by:

(Surakul Damchohichai)

1 January 2022

Approved by:

(Surakul Keeravithul)

1 January 2022

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Neediss Supply Instrument Co., Ltd.
536 ถนนพหลโยธิน 7 แขวงคลองจั่น เขตจตุจักร กรุงเทพฯ 10160 536 Soi Bangkhoe 7 Bangkhoe Bangkok Bangkok
Tel: 02-502-1980 Fax: 02-502-3708 Email: neediss.com

SO₂ Analyzer Verification Test Report

Calibration Report No.: 6501009

Page:1/1

Calibrated Date: 4-Jan-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO 43C	Manufacturer THERMO S/N: ES0TE43C103362
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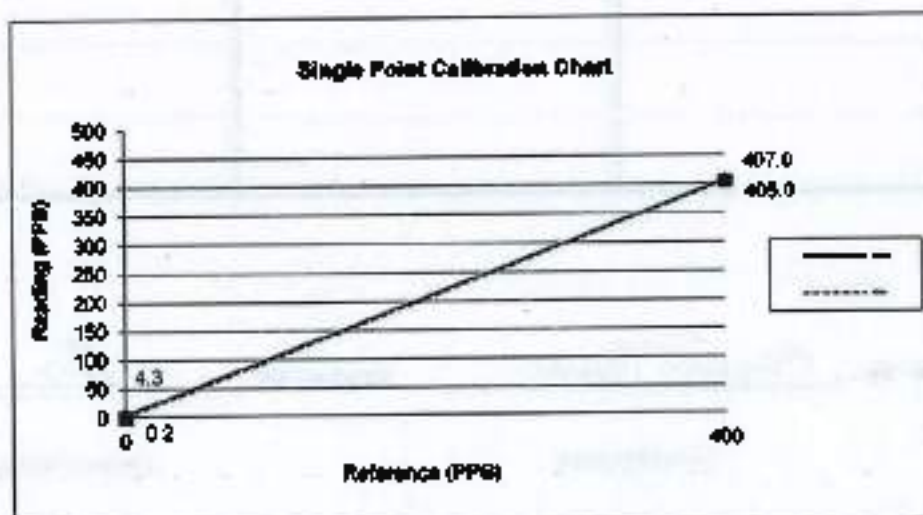
Calibration System

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

Environment: Temperature 23.9 °CHumidity: 49 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPM)	Reading (PPM)	Drift (PPM)	Reference (PPM)	Reading (PPM)	Drift%
Before	0.0	4.3	4.3	400.0	407	1.8
After	0.0	0.2	0.2	400.0	405	1.3

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Needliss Supply Instrument Co., Ltd.538 หมู่บ้านคลอง 7 แขวงคลองเตย เขตคลองเตย กรุงเทพฯ 10110 530 Soi Bangkok 7 Bangkok Bangkok Bangkok
Tel: 02-802-3940-2 Fax: 02-802-47798 E-mail: info@needliss.com

MODEL : SC2 ANALYZER Model 43C THERMO

DATE : 4-01-2022

SN : ESOTE43C103382

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450..-350 (V)	-450	-453
LAMP VOLTAGE 950 - 1,200 (V)	990	985
LAMP INTENSITY 20000 - 50000 Hz	32560	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 PoonlekApprove By : [Signature]

Sirint Poonlek

Sarawut Keanrarnruat

Date:

4-Jan-22

Date:

4-Jan-22

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 ผู้จัดการฝ่ายควบคุมคุณภาพ



neediss

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

330 หมู่ 13 ตำบล 7 หมู่บ้าน บางพลี อำเภอบางพลี 10100 525 Soi Bangkhoe 7 Bangkhoe Bangkok
Tel: 02-802-3780-3 Fax: 02-802-3788 Email: neediss.com



NOx Analyzer Verification Test Report

Calibration Report No.: 6501004

Page: 1/2

Calibrated Date: 4-Jan-21

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer: THERMO S/N: E90TE42C706372
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Calibration System

Calibrator Unit	Standard Gas
Calibrator Model: ESA MGC101 S/N: 782 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: 23.7 °C

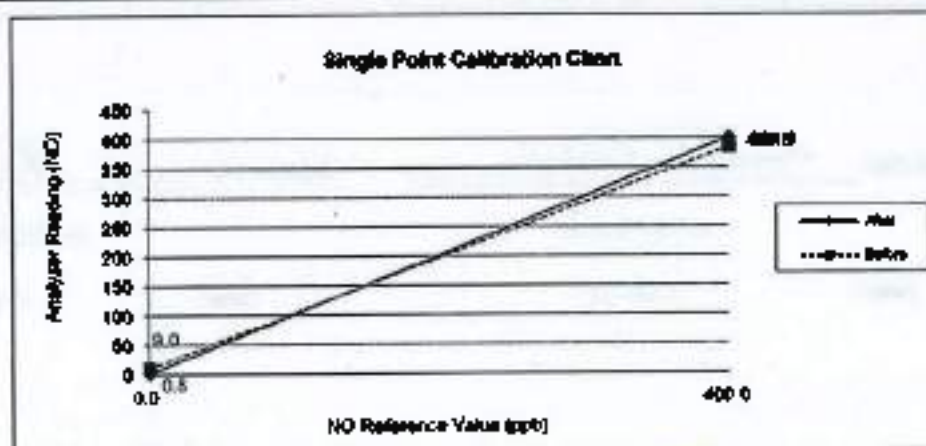
Humidity: 50 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	9.0	0.0	9.0	384	400.0	-2.0
NO ₂	2.2	0.0	2.2	26.0	0.0	3.3
NOx	11.2	0.0	11.2	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	0.8	0.0	0.8	400	400.0	0.0
NO ₂	0.3	0.0	0.3	2.0	0.0	0.2
NOx	1.1	0.0	1.1	402	400.0	0.2



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Neediss Supply Instrument Co., Ltd.20 หมู่ 7 ตำบลบางพลีใหญ่ อำเภอบางพลี จังหวัดสมุทรปราการ 10540
Tel. 02-602-0960-2 Fax. 02-602-0968 E: info@neediss.com

MODEL : NOx ANALYZER Model 42C THERMO

DATE : 4-01-2022

S/N : ENOTE42C786372

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 - 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	388	380
SAMPLE FLOW 0.350 - 0.900 LPM	0.45	0.45
OZONEATOR FLOW 0.035 - 0.075 LPM	0.05	0.05
No/Not BKG	12/9.0	12/9.1
No/Not Slope	1.00/0.8	0.99/0.8

Calibrate By: Sirint BoonlakApprove By: Mr. Sarawut Kammrinnul

Sirint Boonlak

Sarawut Kammrinnul

Date: 4-Jan-21

Date: 4-Jan-21

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SO₂ Analyzer Verification Test Report

Calibration Report No.: 8501001

Page: 1/1

Calibrated Date: 4-Jan-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO_43C	Manufacturer THERMO S/N: ESUTE-BC801866
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Calibration System

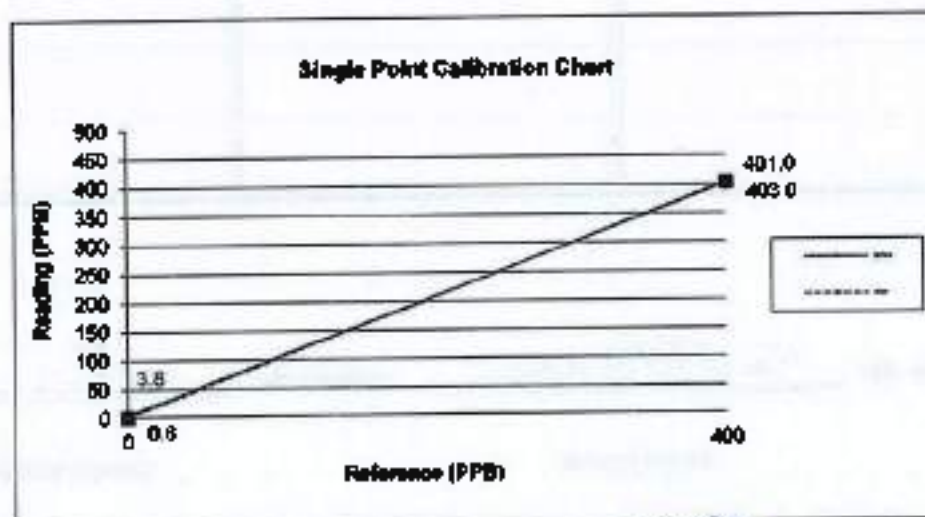
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: T92 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc: 44.68 PPM SO ₂ Conc: 45.34 PPM CO Conc: 4500 PPM Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature 22.9 °C

Humidity: 46 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPM)	Reading (PPM)	Drift (PPM)	Reference (PPM)	Reading (PPM)	Drift%
Before	0.0	3.8	3.8	400.0	401	0.3
After	0.0	0.8	0.8	400.0	403	0.8



Envirob Co. Ltd.

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ผู้จัดการฝ่ายควบคุมคุณภาพ

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Neediss Supply Instrument Co., Ltd.

508 หมู่ 10 ต.บางพลีใหญ่ อ.บางพลี จ.สมุทรปราการ 10510 508 Soi Bangkhoe 7 Bangkhoe Bangkhoe Bangkok
Tel: 02-902-62880-1 Fax: 02-902-62880-2 E: info@neediss.com



MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 4-01-2022

S/N : ES0TE43C801888

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - +350 (V)	-450	-453
LAMP VOLTAGE 950 - 1,200 (V)	990	985
LAMP INTENSITY 20000 - 30000 Hz	32568	31577
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	0.40

Calibrate By : Sirint Poonlek

Approve By : [Signature]

Sirint Poonlek

Saramud Keenarinual

Date:

4-Jan-22

Date:

4-Jan-22

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[Signature]
รับรองว่าเราถูกต้อง
ผู้ถือการฝ่ายควบคุมคุณภาพ

Product of Thailand

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Tel: 02-802-3960-2 Fax: 02-802-3968 E: info@neediss.com**NOx Analyzer Verification Test Report**

Calibration Report No.: 6501001

Page:12

Calibrated Date: 4-Jan-24

☒ PM ☐ Ozone**Instruments Information**Analyzer Type: NO/NO2/NOx Analyzer
Model: 42CManufacturer: THERMO
SN: EN0TE42C412226**Calibration System**

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 SN: 782 ZERO AIR Generator ZAG7001 SN: 844	NO Conc: 44.68 PPM SO2 Conc: 45.34 PPM CO Conc: 4500 PPM Expire Date: Feb 18, 2024 E80140782

Environment: Temperature: 23.8 °C

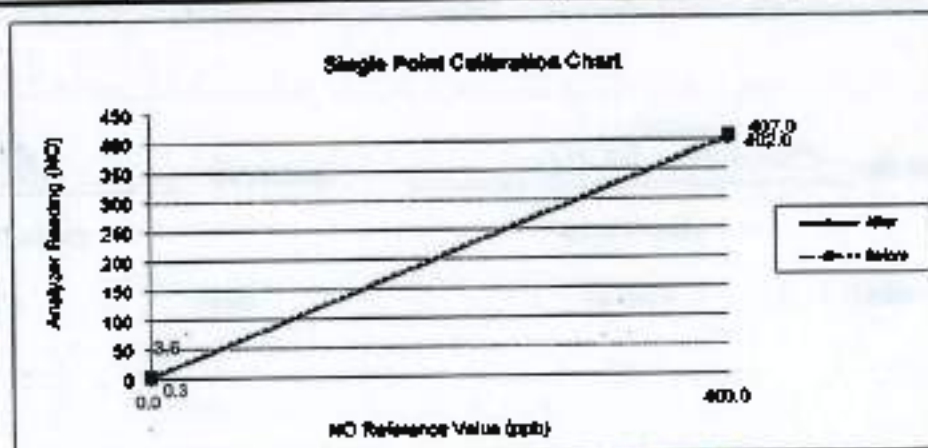
Humidity: 50 %RH

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	0.6	0.0	0.5	3.0	0.0	0.4
NOx	0.8	0.0	0.8	406	400.0	0.6

บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
ผู้ให้บริการด้านเครื่องมือวัด

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**neediss**บริษัท นีดีส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.535 หมู่ 7 ถนนสาย 7 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110 535 Soi Bangkhoe 7 Bangkhoe Bangkok Bangkok
Tel. 02-502-3980-2 Fax. 02-802-3988 E:info@neediss.com

MODEL : NOx ANALYZER Model 420 THERMO

DATE : 4-01-2022

S/N : ENOTE420412226

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)		
ENTER TEMP 15 - 45 DEG C	40	40
CHAMBER TEMP 47 - 51 C	40	50
COOLER TEMP -5 - (-2) DEG C	-2	-2
PRESSURE 400 - 1000.0 mm Hg	350	300
SAMPLE FLOW 0.350 - 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.015 - 0.075 LPM	0.05	0.05
No/Nox BKG	12/9.0	12/9.1
No/Nox Slope	1.0/0.3	0.9/0.3

Calibrate By :

Approve By :

Sirat Poonlak

Sarawut Keawwattana

Date:

4-Jan-21

Date:

4-Jan-21



Neediss Co., Ltd.

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ผู้จัดการฝ่ายควบคุมคุณภาพ

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Neediss Supply Instrument Co., Ltd.536 ถนนพหลโยธิน 7 แขวงพญาไท เขตพญาไท 10100 536 Soi Dongkhao 7 Dongkhao 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 :

6412003

Instrument :

PM-2.5 Sampler SINGLE

Validation Date:

6-Jan-22

Manufacturer :

Tisch Environmental

Model :

TE-Wilbur 2.5

Serial/ID No. :

EP2TIWILBU0452

Environment :

Humidity(%RH) :

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.164575

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	28.9
Filter	-10.0	0.0	20.0	45.0	29.0	28.9

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	16.66 LPM	0.01 LPM

Engineer :

Tanin Huachaisri

Approve By :

Sarawut Keawwinai

Issu Date:

6-Jan-22

Date:

6-Jan-22

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ผู้จัดการฝ่ายควบคุมคุณภาพ



Verification Report of Ambient Air Sampling

☒ PM ☐ Onsite UTM : Report No : **6412010**
Instrument : PM-2.5 Sampler SINGLE Validation Date: **6-Jan-22**
Manufacturer: Tisch Environmental
Model: TE-Walbur 2.5
Serial/ID No.: EP2TRWIL8U0483
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	28.8	29.0
Filter	-10.0	0.0	20.0	45.0	28.5	28.9

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 :

Tanin Huadcharoen

Issu Date:

6-Jan-22

Date:

6-Jan-22

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ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Calibration Certification Information

Cal. Date: January 11, 2021 Rootsmeter S/N: 438320 Ta: 293 °K
Operator: Jim Tisch Pa: 757.9 mm Hg
Calibration Model #: TE-502SA Calibrator S/N: 2067

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

For subsequent flow rate calculations:

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

Standard Conditions

Tstd: 298.15 °K

Pstd: 760 mm Hg

Key

ΔH: calibrator manometer reading (in H2O)

ΔP: rootsmeter manometer reading (mm Hg)

Ta: actual absolute temperature (°K)

Pa: actual barometric pressure (mm Hg)

b: intercept

m: slope

RECALIBRATION

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

CAL

Calibratech Co., Ltd.

7106-7 Moo 2, Sukhaphetthan 3 Rd., Bangpoet, Pakkred, Nonthaburi 11120

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



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-200011-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
536 Soi Bangkhae7, Bangkhae, Bangkok 10160

Equipment : Electronic Balance
Manufacturer : Sartorius **Model :** SECURA224-IS
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

<u>ID No.</u>	<u>Cen. No.</u>	<u>Exp. Date</u>	<u>Traceability</u>
E261-E264	C02204101	17 Nov 2021	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Promsombong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Signature

รับรองสำเนาถูกต้อง

บริษัท วิศวกรการวัด จำกัด



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	0.00036

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

Stddev. : 0.00005 g

- o o o -

Handwritten signature



Handwritten signature

รับรองสำเนาถูกต้อง

Calibratech Co., Ltd. ผู้ให้บริการตรวจสอบและสอบเทียบ



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Suklaphrachan 3 Rd., Bangpoo, Pakkred, Northaburi 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. : 64-410010-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkhoe7, Bangkhoe, Bangkok 10160

Equipment : Digital Thermo-Hygrometer

Manufacturer : ebro

Model : EBJ 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 Samchueni

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.

Corr. No.

Exp. Date

Traceability

400034 & 400036 SC-H-00041/64

12 Jul 2021

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

Approved by

(Benjerd Maeri)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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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 : Units 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



John

รับรองสำเนาถูกต้อง





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 Bangkhae 7, Bangkhae, Bangkhae, 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 microphones 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

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FAEEL MTC 002 Rev.3

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Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rungsak@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 : 196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592



ผู้จัดทำรายงานผลการสอบเทียบ
Envilab Co., Ltd.



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 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 I
1/2 inch Brüel&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 I
1/2 inch Brüel&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 I
1/2 inch Brüel&Kjaer 4180	0.68	± 0.50	$\pm 3.0\%$

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

Calibrated by:


(Mr. Tawikiat Lamsaran)

Approved by:


(Mr. Tawikiat Lamsaran)

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

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PM 68.MTC.002 Rev.5

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Fax. (66) 0 2579 8592
E-mail : sut@tistr.or.th

EnviLab

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E04N99E15A00V3	Reference Number:	160-402021734-1
Cylinder Number:	EB0140762	Cylinder Volume:	144.4 Cubic Feet
Laboratory:	124 - Plymouthville - PA	Cylinder Pressure:	2016 PSIG
PGVP Number:	A12021	Valve Outlet:	650
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 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. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Date
NOX	45.00 PPM	44.69 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	02/15/2021
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	200811-04	CG707568	40.82 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Feb 02, 2025
PRM	12306	DB46025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
GMS	124206889	CG323787	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 18, 2021
NTRM	0141708	KAL003190	49.67 PPM SULFUR DIOXIDE/NITROGEN	+/- 1.0%	Jan 20, 2022
NTRM	06012341	KAL004716	4657 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jan 07, 2024

The GRM, PRM or GCM 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 8 NIKD579	NDIR	Jan 27, 2021
Nicolet 850 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet 850 FTIR AUP2010245 NO2	FTIR	Jan 21, 2021
Nicolet 850 FTIR AUP2010245 SO2	FTIR	Jan 21, 2021

Test Data Available Upon Request

NOTES:

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



Michael A. Parkes
Approved for Release



On the
บริษัท อากาศพิเศษ
จำกัดการจำหน่ายตามคุณสมบัติ

Calibration Certificate

Part Number: 721A2601
Description: Micromate with DIN Geophone
Serial Number: UM18217
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.

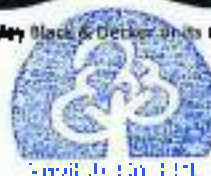
Please note that the sensor check function is intended to check that the sensors are connected to the unit, installed in the proper orientation and sufficiently level to operate properly. This function should not be confused with a formal calibration, which requires the sensors be checked against a reference 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: 

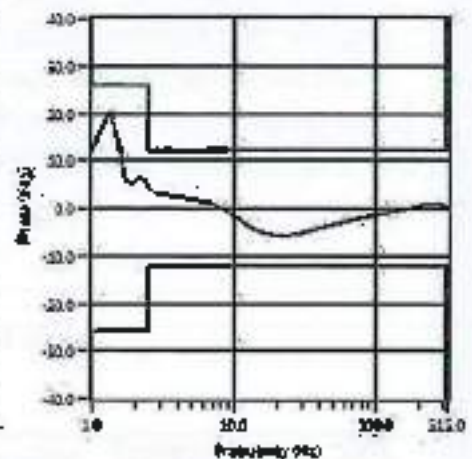
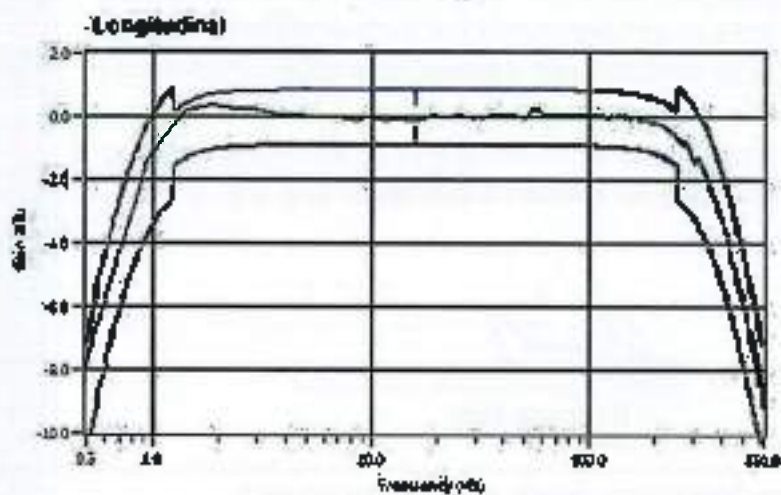
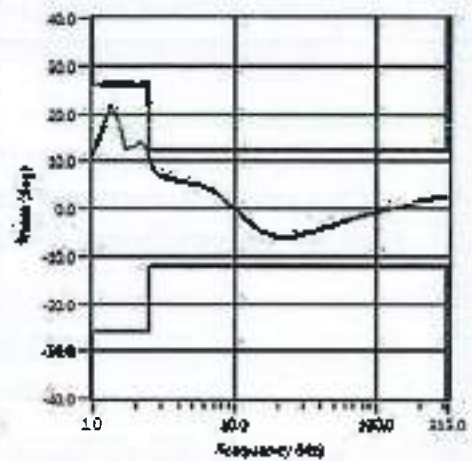
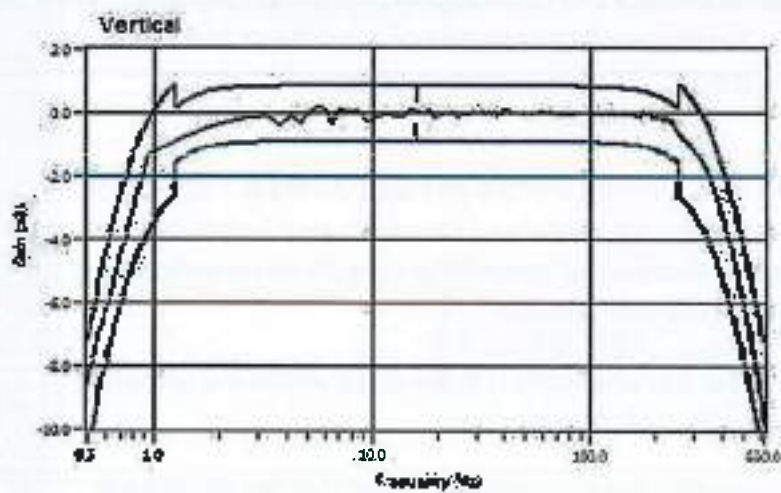
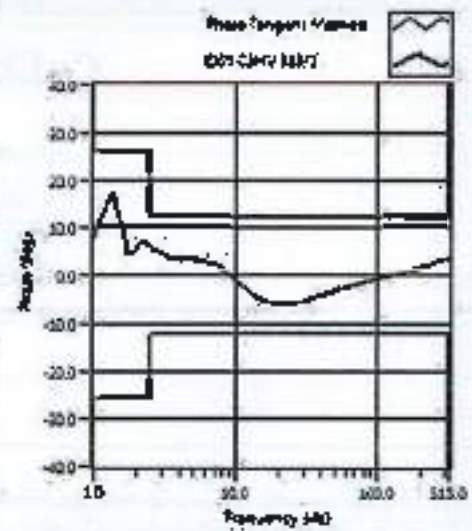
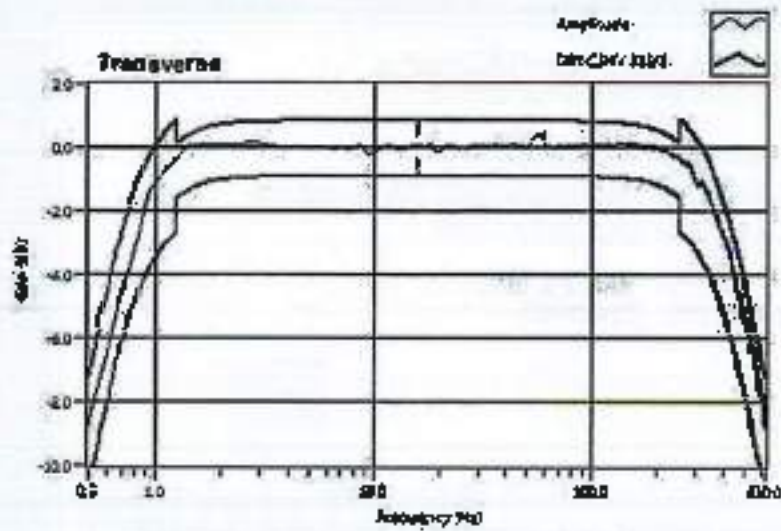
Xiaoming Yang



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



Frequency Response of UMI8217



Kongsak Co., Ltd.

รับจ้างสำรวจ
ผู้จัดการฝ่ายควบคุมดูแล

CAL

Calibratech Co., Ltd.

2196-7 Moo 2, Sukhagrachuen 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120

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



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-200849-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540, 540/1 Soi Bangkhaw7, Bangkhae, 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 : 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.	Exp. 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%

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001/001-001-001



Envilab Co., Ltd.

บริษัท อีวิลแลบ จำกัด

ผู้ให้บริการด้านความแม่นยำ



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaphichan 3 Rd., Banghrod, 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. : 64-200049-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UNC 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	0.00033

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 $k = 2.11$, 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

Stddev. : 0.000014 g

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รับรองสำเนาถูกต้อง

Calibratech Co., Ltd. กรุงเทพมหานคร



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sakthapachasan 3 Rd., Banggood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5133, e-mail : calibratech.cal@yahoo.com, calibratech.cal@gmail.com



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-410010-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkhae7, Bangkhae, 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 : Chontip Sanchusri

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.	Exp.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%

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CAL 00001403

Envilab Co.,Ltd. ผู้ให้บริการมาตรฐานคุณภาพ

CAL

Calibratech Co.,Ltd.

7704-7 Moo 2, Sukhaphachan 3 Rd., Bangpoed, Pakkred, Nonthaburi 11120

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

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%

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รับรองสำเนาถูกต้อง

ผู้ตรวจการให้ผลตรวจถูกต้อง



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 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	61208714	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%

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Certificate of Calibration

Certificate No. : 64-420053-1

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	0.00	0.011
	6.983	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%

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Cal

รับรองสำนักงานมาตรฐาน





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 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
Calibrated by :	Walalak Sirthean
Approved by :	 Approved Signatory
(<input checked="" type="checkbox"/>) Malee Butkruea	
(<input type="checkbox"/>) Saithip Meangmai	
(<input type="checkbox"/>) Warakorn Lernagtrakul	
Issue Date :	23 March 2021



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

B 0257191



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

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บริษัท สยาม จำกัด

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

1047872

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. : ELABB0DC140N03

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
ผู้ถือการดำเนินงานคุณวุฒิ

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Certificate of Calibration

Certificate No. : 64-400569-1

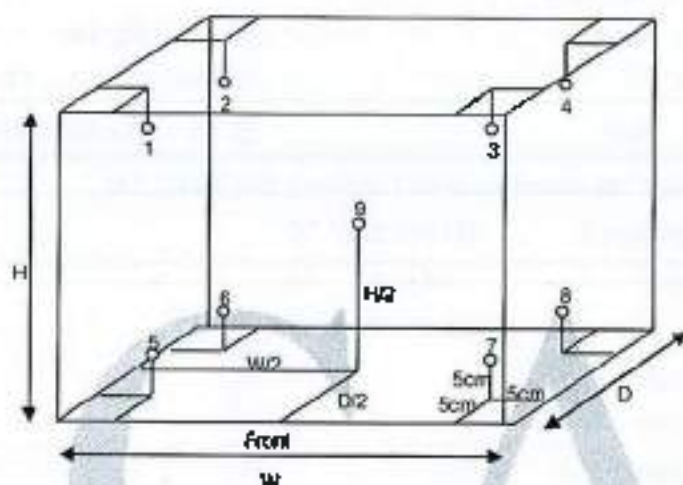
Page : 2 of 2

Result of Calibration : Without Adjustment

UNC 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 Temperatures (°C) @ Sensor No.										Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	10	
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%.

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Chai Chai

รับรองคุณภาพการสอบเทียบ





CALIBRATION CERTIFICATE

Date of Issue Feb 13, 2021

Cert No. 210323

Site Calibration

Order No. 21020066

Customer Envilab Co., Ltd.
640, 640/1 Soi Bangkhee 7, Bangkhee, Bangkok 10160

Place of Calibration MICRO ROOM (B302)

Description Incubator

Model IF75

Serial No. D319.0066

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-2053.
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. MY49007769, Certificate No. QR20-2119, Calibrated by
Quality Reborn Co., Ltd., ONAC Calibration No. 0292.

This certificate is traceable to SI unit.

D. Thi





CALIBRATION CERTIFICATE

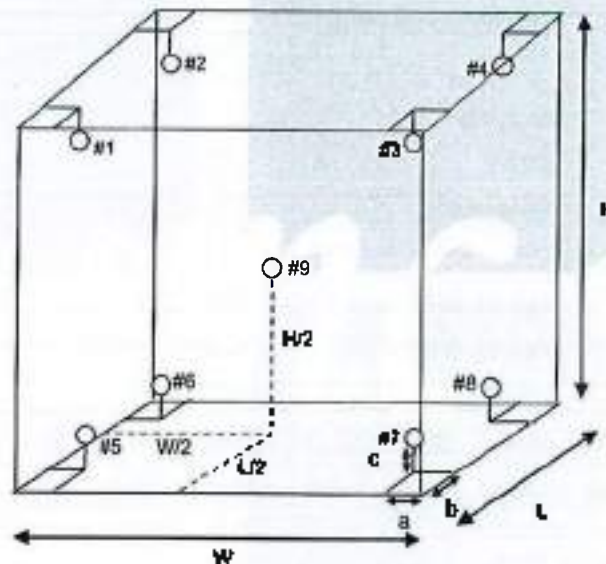
Date of Issue Feb 13, 2021

Site Calibration

Cert No. 21/0323

Order No. 21020066

Results (without adjustment)



Position of reference thermometers were placed

Note

- 1). Dimension (W x L x H) is 40 x 33 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.





CALIBRATION CERTIFICATE

Date of Issue Feb 13, 2021

Cert No. 2100323

Site Calibration

Order No. 21020086

Results (without adjustment)

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability \pm (°C)	Uniformity (°C)	Uncertainty \pm (°C)
44.5	44.5	Position 1	44.536	0.048	0.448	0.31
		Position 2	44.599			
		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)

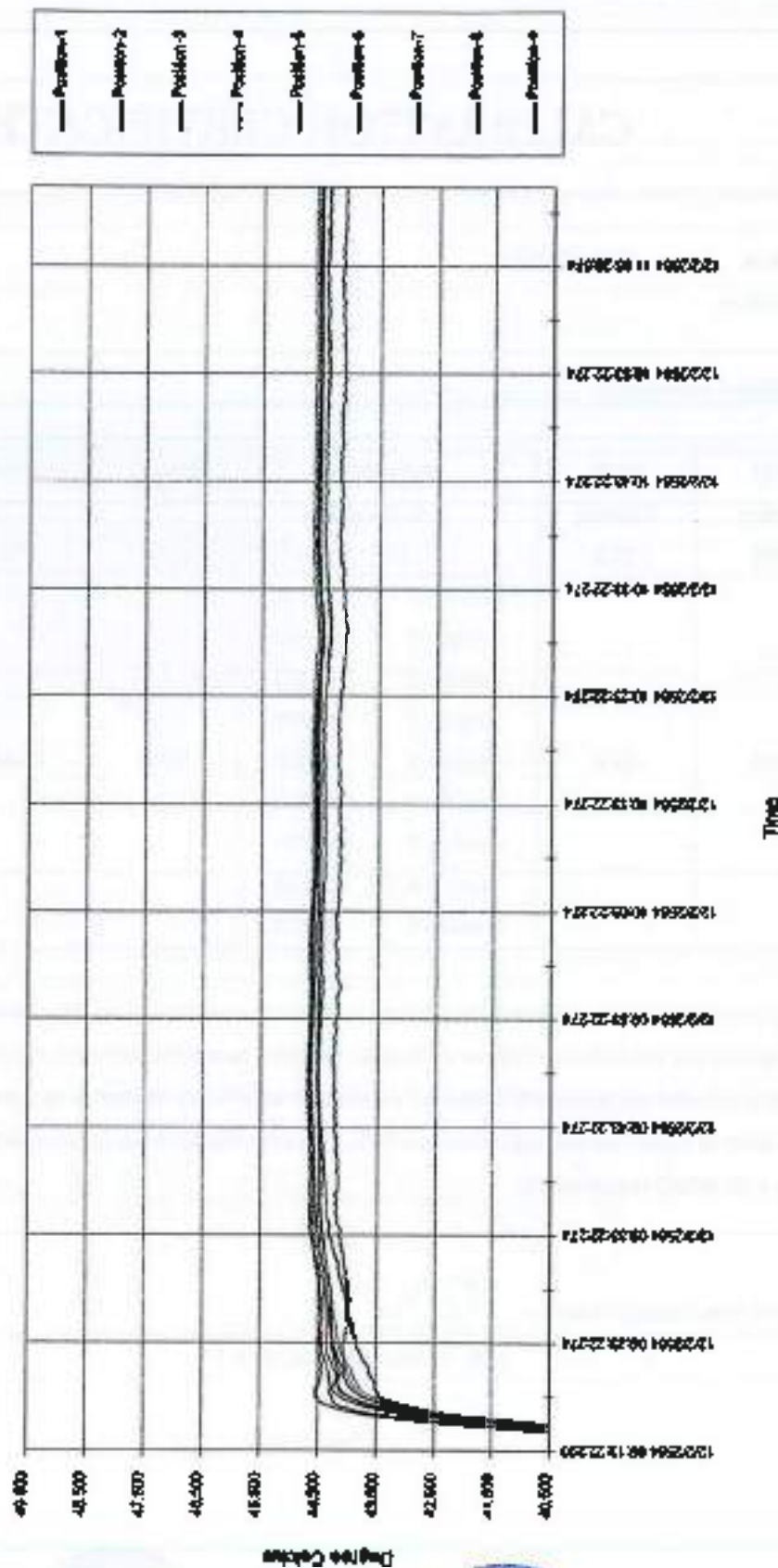
Page 3 of 3



รับรองเจ้าหน้าที่
ผู้ดำเนินการสำรวจควบคุมคุณภาพ

Carl No. 2100229

Incubator
Model: #775 Carl DS15.0000 ID No. *



Enyab Co., Ltd.

Ordn

บริษัท อีแนบ จำกัด
ผู้ให้บริการตู้ควบคุมอุณหภูมิ

Certificate of Calibration

Certificate No. : 64-400163-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Air Climber (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 : Penupon 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 :

(Bunjerd Masri)

Supervisor



รับรองสำเนาถูกต้อง

Envilab Co. Ltd. ผู้จัดการฝ่ายควบคุม

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 64-400163-2

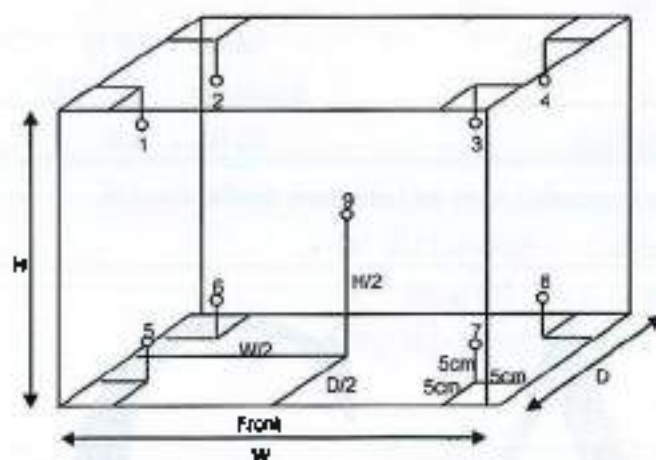
Page : 2 of 2

Result of Calibration : Without Adjustment

UNC 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 = 0.30 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	0.91

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%

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บริษัท ไลน์ เทคโนโลยี จำกัด
ผู้ให้บริการด้วยมาตรฐานสูงที่สุด



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpoo, Pakkred, Nonthaburi 11129

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



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-40049-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkhae7, Bangkhae, 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 : Pentapon Chantpa

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	63-400449-1	28 Mar 2021	National Institute of Metrology Thailand (NIMT)

Approved by :



(Bunjerd Masri)

Supervisor





Envilab Co., Ltd.

รับรองว่าถูกต้อง

ผู้ตรวจสอบ

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

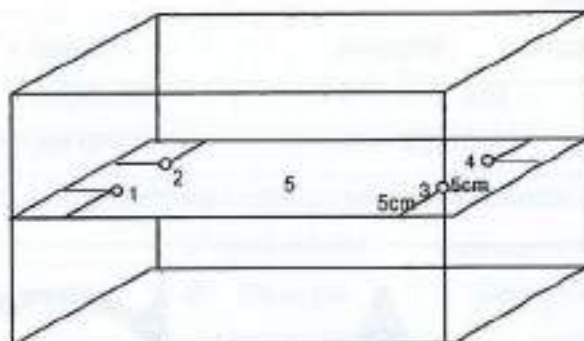
Certificate No. : 64-40049-1

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

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%

- o/o -

Signature



Signature

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บริษัท วิศวกรการวัด จำกัด



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Banggood, Pakkred, 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. : 64-344152-2

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.	Exp. Date	Traceability
241002	63-200378-1	02 Jun 2021	National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Toradee)

Supervisor



The Uncertainties are for a confidence probability of approximately 95%

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Envilab Co., Ltd. บังคับการผ่านระบบคอมพิวเตอร์



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 \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%

- 000 -

D.



บริษัท คาลิเบรทีช จำกัด
ให้บริการฝ่ายเทคนิค



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhaphichai 3 Rd., Banggood, Pathumwan, Bangkok 11120

Tel.(02) 964-0211 Fax.(02) 964-5135, e-mail: calibratech.co.ltd@gmail.com, calibratech.co.ltd@calibratech.co.ltd



NSO-TISI-TS17025
CALIBRATION 0030

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 : 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 :

(Wipat Tavee)

Supervisor



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้ถือการฝ่ายควบคุม

The Uncertainties are for a confidence probability of approximately 95%

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Calibratech Co., Ltd.

7106-7 Moo 2, Sathaprasaeng 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. : 64-340152-6

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	1001.66

Uncertainty of measurement with in \pm 0.17 ml

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

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

• o O o •

D.



Envisco Co., Ltd.

รับรองว่าเพาถูกต้อง
ผู้จัดทำฝ่ายควบคุมคุณภาพ



ประจำเดือนกุมภาพันธ์ พ.ศ. 2565



TSP High Volume Sampler Calibration

Verification Report No.

HO2100092-D006 -TSP 01

☐ PM ☒ Onsite

Site: เทศบาลเมืองหาดใหญ่
UTM : 47P 1524271 N 856054 E
Sampler: HTSP#12
Recorder: ECRAN015315224

Date: 1 Feb 22

Technical: Surakid O

Approval: Sangwut K

CONDITIONS

Barometric Press. (hPa): 1009.3
Temperature (deg C): 30.0
Average Press. (hPa): 1013.0
Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 767.0
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-5028A
Serial#: 1328

Qsd Slope: 1.53857
Qsd Intercept: -0.01202
Date Certified: 19 Jan 22

CALIBRATIONS

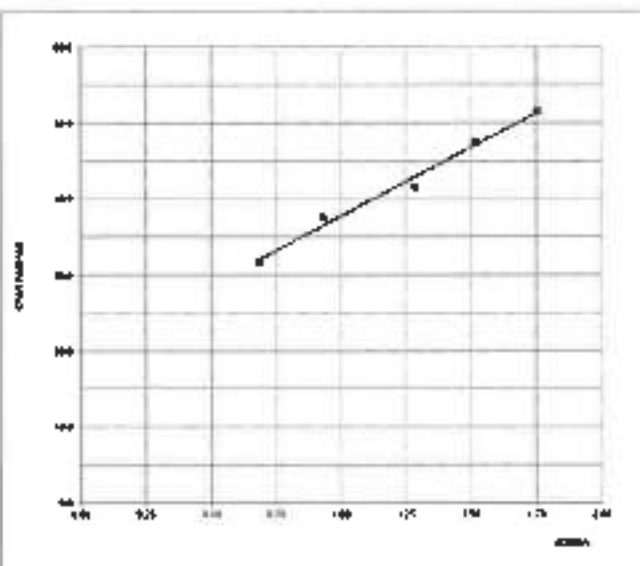
Plate or Test #	H ₂ O (in)	Qsd (m3/min)	I (chart)	IC (corrected)
1	0.36	1.753	52.0	51.47
2	6.26	1.517	48.0	47.51
3	4.51	1.266	42.0	41.57
4	2.36	0.933	38.0	37.61
5	1.28	0.690	32.0	31.67

LINEAR REGRESSION

Slope = 18.1240
Intercept = 19.5586
Corr. coeff. = 0.9928

of Observations: 5

Range of Chart: 40
at 1 : 1.7 m3/min: 50



Calibrated by :

(Surakid Damcholvachit)
1 February 2022

Approved by :

(Sangwut Keamsirul)
1 February 2022

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Environmental responsibility with accuracy measurements

Report ID: HO2100092



บริษัท เอวิลเทสติ้ง จำกัด 340,540/1 หมู่ 11 ต.บางพลีใหญ่ (บางพลี) อ.บางพลี จ.สมุทรปราการ 10160
 Evltest Co., Ltd. 340,540/1 หมู่ 11 ต.บางพลีใหญ่ (บางพลี) อ.บางพลี จ.สมุทรปราการ 10160
 Tel : 02-802-3577-8 Fax: 02-802-3772 E-mail : info@evltesting.com



Transfer to Another work by scanning

TSP High Volume Sampler Calibration

Verification Report No.

HO2100092-D006 -TSP 02

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: กรุงเทพมหานคร เขตหนองจอก	
UTM: 47P 1529602 N 695280 E	
Sampler: HTSP001	
Recorder: ECRAN016315224	
Date: 1 Feb 22	
Technical: Sursak D.	
Approval: Sarawut K.	

CONDITIONS

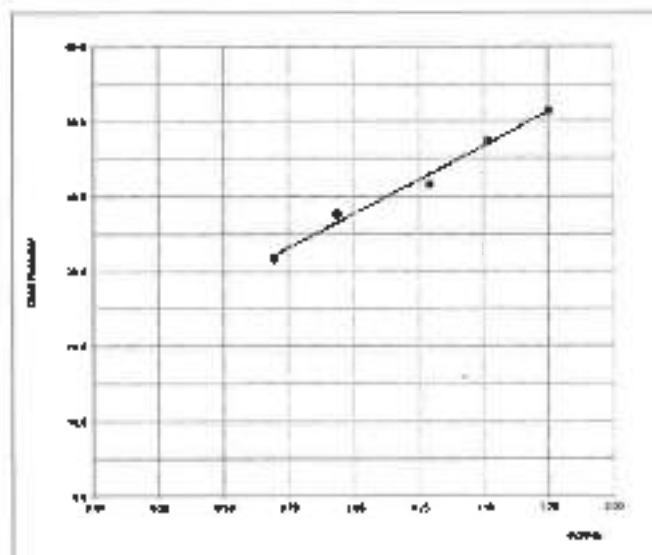
Barometric Press. (hPa): 1009.3	Corrected Pressure (mm Hg): 757.0
Temperature (deg C): 30.0	Temperature (deg K): 303.0
Average Press. (hPa): 1013.0	Corrected Avg Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

CALIBRATION OFFICE

Brand: Tisch Environmental, Inc	Qsd Slope: 1.63957
Model: TE-5028A	Qsd Intercept: -0.01202
Serial: 1328	Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Qsd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION	
1	9.24	1.842	54.0	53.45	Slope = 21.7612 Intercept = 12.0008 Corr. coeff = 0.9916	# of Observations = 5
2	7.42	1.652	48.0	47.51		
3	5.35	1.404	42.0	41.57		
4	3.52	1.140	36.0	35.63		
5	1.54	0.756	30.0	29.69		
					# of Observations	5
					Range of Chart	37
					at 1.1 - 1.7 m3/min	49



Calibrated by: Sursak Damdolkhichai
 (Sursak Damdolkhichai)
 1 February 2022

Approved by: Sarawut Keerwanan
 (Sarawut Keerwanan)
 1 February 2022

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Environmental responsibility with accuracy measurements

RE-AWT 29 Jan 2022/16/21



Asian Environmental Technology Institute (Public) Co., Ltd.
 Environmental Co., Ltd. 500 Sukhvitaya Bopha Road, Bangpoo, Bangpoo District, Chon Buri
 Tel : 02-962-3577 P. Fax: 02-962-3713 E-mail : info@evltesting.com



02-962-3577 P. Fax: 02-962-3713 E-mail : info@evltesting.com

PM10 High Volume Sampler Calibration

Verification Report No.
 HD2100138-0006 -PM 03

L PM E One#6

Site: กรุงเทพมหานคร
 UTM 47P N 1517813 E 687354
 Sampler: NPM008
 Recorder: ECRAN000004599

Date: 1 Feb 22
 Technical: Surakit D
 Approval: Saranrut K

CONDITIONS

Barometric Press. (hPa): 1009.4
 Temperature (deg C): 31.0
 Average Press. (hPa): 1013.0
 Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.1
 Temperature (deg K): 304.0
 Corrected Avg Press. (mm Hg): 759.8
 Average Temp. (deg K): 303.0

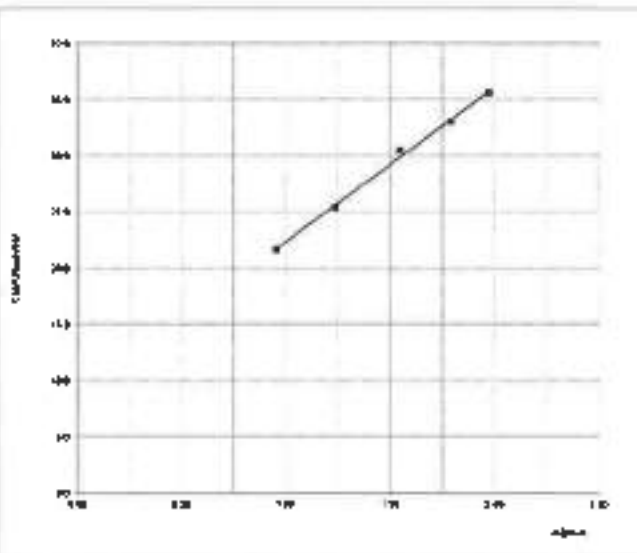
CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc
 Model: TE-502BA
 Serial#: 1328

Slope: 1.02667
 Intercept: -0.00753
 Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	8.14	1.768	52.0	32.95	Slope = 12.7729
2	7.13	1.655	48.0	30.42	Intercept = 9.6921
3	5.32	1.431	44.0	27.88	Corr. coeff = 0.9955
4	3.54	1.189	38.0	24.08	SFR = 1.138
5	1.28	0.700	30.0	19.04	SSP = 39.23
					# of Observations: 5
					Range of Chart: 37
					at SFR ±10%: 40



Calibrated by:

(Surakit Damschochachit)
 1 February 2022

Approved by:

(Saranrut Keerasinual)
 1 February 2022

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Environmental responsibility with accuracy measurements

PM10-01 Rev 01 / 15.04.2016



Verification Report of Ambient Air Sampling

☒ PM ☐ Onsite UTM : Report No : **6502007**
Instrument : PM-2.5 Sampler SINGLE Validation Date: 1-Feb-22
Manufacturer : Tisch Environmental
Model : TE-Wilbur 2.5
Serial/ID No. : EP2RWLBU0480
Environment :
Humidity(%RH) : 58 Temperature (°C) : 33 Pressure (mmHg) : 755

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	32.9	33.0
Filter	-10.0	0.0	20.0	45.0	32.9	33.0

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

Approved By:

Sarawat Keawsrinual

Issu Date:

1-Feb-22

Date:

1-Feb-22

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Neediss Supply Instrument Co., Ltd.

338 หมู่บ้าน 7 แขวงบางพลัด เขตบางพลัด กรุงเทพฯ 10649 338 หมู่ 7 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 : 6502016

Instrument : PM-2.5 Sample Single

Validation Date: 2-Feb-22

Manufacturer : Rupprecht, Patashnick

Model : 200-H

Serial/ID No. : EP2RP200039702

Environment :

Humidity(%RH) : 58

Temperature (°C) : 34

Pressure (mmHg) : 756

Reference Standard:

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

Flow Calibrator: Mesalabs Defender, model : S20-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	34.2	34.4

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
Tanin Huadcharoen

Approve By:

Sarawut
Sarawut Keawsnual

Issu Date:

2-Feb-22

Date:

2-Feb-22

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Envilab Co., Ltd. 340,540/1 Soi Bangkhoe 7 Bangkhoe Bangkhoe Bangkok 10160
Tel : 02-002-3577-8 Fax : 02-002-3773 E-mail : info@evltesting.com



envilab & envilab-test.com

Verification Test Report

Report No.:

HO2100092-D006 -SLM 01

☐ PM ☒ Onsite UTM : 47 P 1529770 N 666269 E

Calibrated Date: 1 February 2022

Site : โรงงานสร้างอาคารพักอาศัยพร้อมสิ่งอำนวยความสะดวกของ สำนักงานผู้ตรวจการโรงกลาโ

Equipment: Sound Level Meter

Manufacturer: ACO

Model: 6226

Serial : 60027

Environment: Temperature 30 °C Humidity 52 %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	93.7	-0.1	93.8

Calibrated By

(Surakit Damchohvit)

Date:

1 February 2022

Approve By

(Sarawat Keavsrinual)

Date:

1 February 2022

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NOx Analyzer Verification Test Report

Calibration Report No.: 6502004

Page:1/2

Calibrated Date: 1-Feb-21

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE12C786372
--	--

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 Expiry Date: Feb 19, 2024 EB0140762

Environment: Temperature 25.0 °C

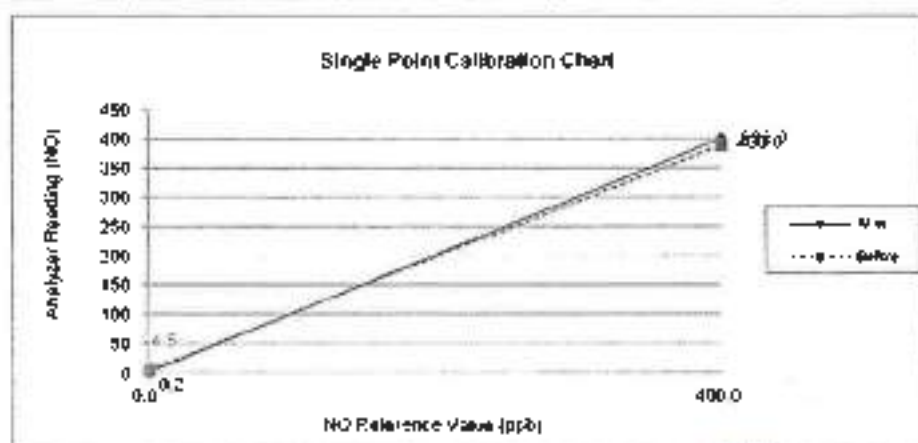
Humidity: 58 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	4.5	0.0	4.5	388	400.0	-1.5
NO ₂	3.8	0.0	3.8	20.0	0.0	2.5
NOx	8.3	0.0	8.3	408	400.0	1.0

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.2	0.0	0.2	400	400.0	0.0
NO ₂	0.3	0.0	0.3	1.0	0.0	0.1
NOx	0.5	0.0	0.5	401	400.0	0.1



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ได้รับการพิจารณาอนุมัติ ✓

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Needliss Supply Instrument Co., Ltd.

MODEL : NOx ANALYZER Model 42C THERMO

DATE : 1-02-2022

S/N : ENOTE42C786372

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -430 - 450 (V)	-473	-478
LAMP VOLTAGE 950 - 1,200 (V)		
INTER TEMP 15 - 45 DEG C	43	43
CHAMBER TEMP 47 - 51 C	49	50
COOLER TEMP -3 - (-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	129.0	129.1
No/Nox Slope	1.000.8	0.900.8

Calibrate By :

Approve By :

Sriraj Poonlakh

Sarawut Keawsamruat

Date:

1-Feb-21

Date:

1-Feb-21

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ผู้จัดจำหน่ายเครื่องมือวัดคุณภาพอากาศ

SO₂ Analyzer Verification Test Report

Page: 1/1

Calibrated Date: 1-Feb-22

☐ PM ☐ Onsite

Instruments information

Analyzer Type: SO2 Analyzer Model: THERMO 43C	Manufacturer THERMO S/N: ESOTE43C102362
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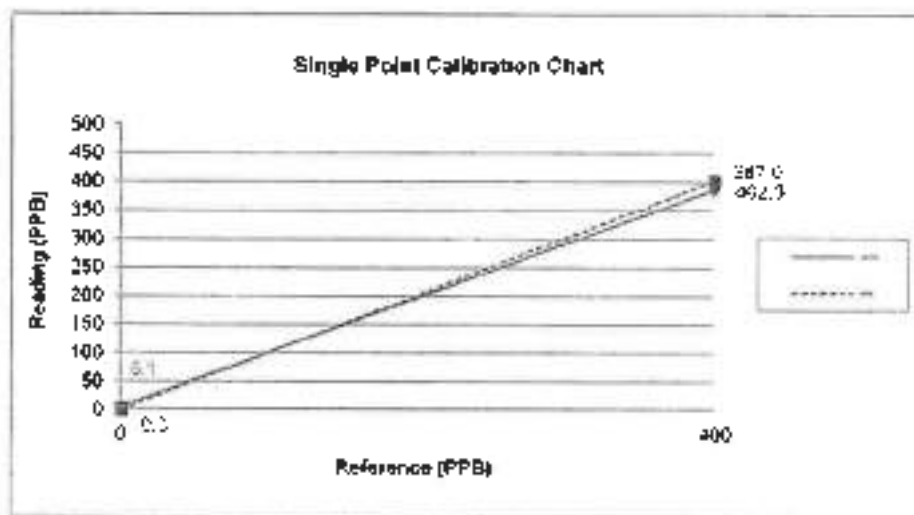
Calibration System

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

Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPM)	Reading (PPM)	Drift (PPM)	Reference (PPM)	Reading (PPM)	Drift%
Before	0.0	6.1	6.1	400.0	397	-3.3
After	0.0	0.3	0.3	400.0	402	0.5



กรมส่งเสริมการค้าระหว่างประเทศ
ศูนย์การค้าและพาณิชย์

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MODEL SO2 ANALYZER Model 43C THERMO

DATE 1-07-2022

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	32548	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 : *David R. Mohr*

Approve By:

Srinial Poodalak

Saratul Keayrnuul

Date: 1-Feb-22

Date: 1-Feb-22

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www.needles.com



Franklin Co. Ltd.

รับรองสำเนาถูกต้อง

[illegible]



NOx Analyzer Verification Test Report

Calibration Report No.: 8502002

Page 1/2

Calibrated Date: 1-Feb-22

☒ PM ☐ On gas

Instruments Information

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

Manufacturer: THEIAO
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: 44.68 PPM SO ₂ Conc: 45.34 PPM CO Conc: 4500 PPM Expire Date: Feb 19, 2024 E60140762

Environment: Temperature 25.1 °C

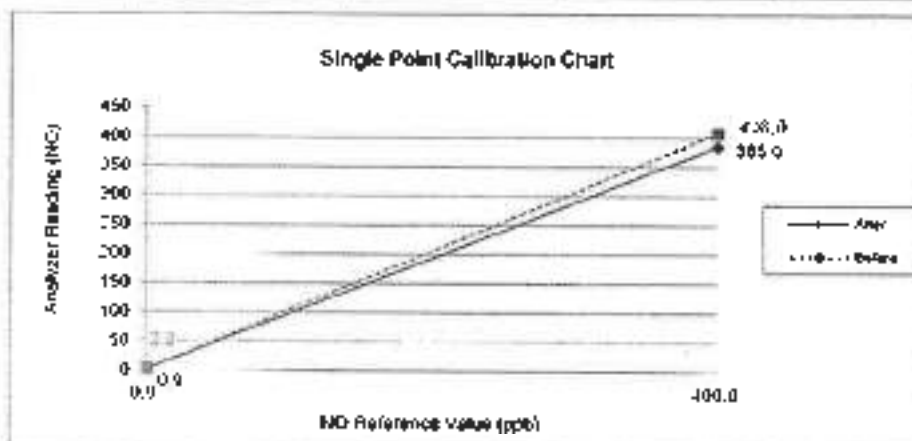
Humidity 59 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	2.2	0.0	2.2	408	400.0	1.0
NO ₂	5.3	0.0	5.3	4.0	0.0	0.5
NO _x	7.5	0.0	7.5	412	400.0	1.5

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.9	0.0	0.9	385	400.0	-1.9
NO ₂	0.3	0.0	0.3	20.0	0.0	2.5
NO _x	1.2	0.0	1.2	405	400.0	0.6



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ผู้จัดการฝ่ายควบคุมคุณภาพ

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MODEL NOx ANALYZER Model 42C THERMO

DATE 1.02.2022

S/N : ENOTE42C704365

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 - 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
NOx/BK0	12/9.0	12/9.1
NOx/BK Slope	1.0/0.3	0.9/0.0

Calibrate By:

Comitatus R. A. C.

Siriraj Poonluek

Date: _____

1-Feb-22

Approve By :

A

Sarawul Karamanli

Date: _____

1.Feb-22

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www.neeliss.com



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ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Calibration Certification Information

Cal. Date: January 13, 2021 Rootmeter S/N: 433320 Ta: 293 °K
Operator: Kim Tisch Pa: 757.9 mm Hg
Calibration Model #: TE-5025A Calibrator S/N: 2067

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4470	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 (m-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (m-axis)	$\sqrt{\Delta H (Ta/Pa)}$ (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 = ΔVol[(Pa-ΔP)/Pstd](Tstd/Ta)	Va = ΔVol[(Pa-ΔP)/Pa]
Qstd = Vstd/ΔTime	Qa = Va/ΔTime
For subsequent flow rate calculations:	
$Qstd = 1/m \left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} - b \right)$	$Qa = 1/m \left(\sqrt{\Delta H (Ta/Pa)} - b \right)$

Standard Conditions

Tstd: 293.15 °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. : 64-200011-1

Page : 1 of 2

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

Equipment : Electronic Balance
Manufacturer : Sartorius Model SECURA224-1S
Serial No. : 0034803270 ID No. : ELABBALANCEN04
Capacity : 220 g Resolution : 0.0001 g

Environment : On site calibration was carried out at the Balance Room, Envilab Co., Ltd.
Ambient Temperature : (22.2 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 verification 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 Premilhong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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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

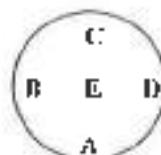
The result of calibration was found accurate as shown on date and place of calibration only.

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

Std. dev. : 0.00005 g

-c00-

Handwritten signature



Certificate of Calibration

Certificate No. : 64-410010-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Digital Thermo-Hygrometer

Manufacturer : elbro

Model : EB1 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 : $(23 \pm 2) ^\circ\text{C}$ Relative Humidity : $(50 \pm 15) \%$

Date of Received : 05 February 2021

Date of Calibration : 11 February to 13 February 2021

Date of Issue : 13 February 2021

Calibrated by : Chonup 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 TISI Calibration No.0268

Approved by

(Bunjerd Masai)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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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%.

• ๐0๐ •

[Signature]



รับรองสำเนาถูกต้อง
ผู้จัดทำ: ฝ่ายควบคุมคุณภาพ





THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-64/0312

MTC No. EE1, BP. 570264

CALIBRATION CERTIFICATE

Submitted by : Envalub Co., Ltd.

Address : 340, 340/1 Soi Bangkhue 7, Bangkhue, Bangkok, 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:

Ambient Environment

Description : Sound Level Calibrator

Temperature : (23 ± 3) °C

Manufacturer : Brüel & Kjær

Relative Humidity : (50 + 15) %

Model : 42140

Ambient Pressure : (101.325 + 1.500) kPa

Serial No. : 1951075

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

2. Measuring Amplifier Druel&Kioe; 2636 S/N 1437484.

3. Programmable Attenuator Tainngawn TPA-303A SN OF 2214.

4. Digital Multimeter Agilent 34401A S/N MY44003560.

5. Pressure Transmitter Vaicalu PTB202AD S/N T0650001

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

7. Condenser Microphone Bruel&Kjaer 4180 S/N 2289271.

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

The results relate only to the three tested as a whole.

Authorizing the Report/Certificate and validity of the results except, in kind are prohibited unless written permission is obtained from the governor of T&T.

FSA-BL-11FC-002 Rev 2

Head Office
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M5T 1A7
Tel: +65-1-879-1642 Fax: +1-416-977-2110
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Fax: (661) 2579 1102 *Ph. 0011*

ชื่อ : นามานะพร ตันต๊ะ

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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 20µPa at 1000 Hz

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

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class I
1/2 inch Brüel&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 I
1/2 inch Brüel&Kjaer 4180	998.3	-1.7	+1.5	±1.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class I
1/2 inch Brüel&Kjaer 4180	0.68	+0.50	+3.0%

Note: 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by:

Tawikiet Jansamran

(Mr. Tawikiet Jansamran)

Approved by:



(Mr. Pongrat Kitayapa)

Acting Director

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&L MTC 002 Rev.3

Head Office:

35 หมู่ 3 ตำบลลำไย อำเภอลำไย จังหวัดลำปาง
Changrai Pathumthani 52130, Thailand
Tel: (66) 0 2577 9000
Fax: (66) 0 2577 9029
Email: runpang@tistr.or.th

Office/Laboratory

Sci. Bld. Bangpra Industrial Estate, 5, Mittrani Road,
Bangpra, Bangpra (Changrai) Suburb, 10280, Thailand
Tel: (66) 0 2323 1672-70 ext: 115, 116
Fax: (66) 0 2323 9145
Email: mtc@tistr.or.th

Office

120 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel: (66) 0 2579 1111 ext: 5225, 5217
Fax: (66) 0 2579 8592
Email: mtc@tistr.or.th

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CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number	E04N199E15A00V3	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,S02,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 2013)" document EPA 600/R-12/031, using the assay procedures listed. Analytical methodology does not require correction for analytical interference. This cylinder has a total gas purity 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 non-hydrocarbon basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	45.00 PPM	44.58 PPM	Q1	+/- 1.4% NIST Traceable	02/12/2021, 02/19/2021
NITRIC OXIDE	45.00 PPM	44.52 PPM	Q1	+/- 1.4% NIST Traceable	02/12/2021, 02/19/2021
SULFUR DIOXIDE	45.00 PPM	45.34 PPM	Q1	+/- 1.1% NIST Traceable	02/12/2021, 02/19/2021
CARBON MONOXIDE	4500 PPM	4500 PPM	Q1	+/- 1.0% NIST Traceable	02/15/2021
NITROGEN -	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	200611-04	CC707988	49.82 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Feb 02, 2025
PRM	12386	0896025	9.81 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	KALD03190	49.67 PPM SULFUR DIOXIDE/NITROGEN	+/- 1.0%	Jun 20, 2022
NTRM	08012341	KALD04718	4057 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

The SRM, PRM or RCM 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 8 N1KD579	NDR	Jan 27, 2021
Nicolet iS50 FTIR AUP2010245 INQ	FTIR	Feb 11, 2021
Nicolet iS50 FTIR AUP2010245 INQ2	FTIR	Jan 21, 2021
Nicolet iS50 FTIR AUP2010245 S02	FTIR	Jan 21, 2021

Trace Data Available Upon Request

NOTES:

Gross Weight: 28.4 Kg
Net Weight: 4.5 Kg
PO# 5221000406



Michael A. Harkins
Approved for Release



Dr. J. J. J.
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Calibration Certificate

Part Number: 721A2601
Description: Micromate with DIN Geophone
Serial Number: UM18213
Calibration Date: MAR 24 2021
Calibration Reference Equipment: 714J7402

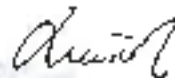
Instantel certifies that the above product was calibrated in accordance with the applicable Instantel procedures. These procedures are part of a quality system that is designed to assure that the product listed above meets or exceeds Instantel specifications.

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



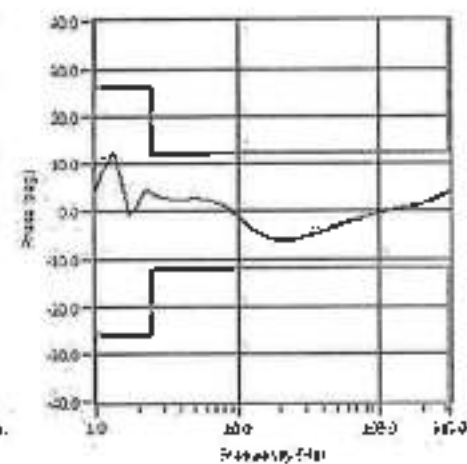
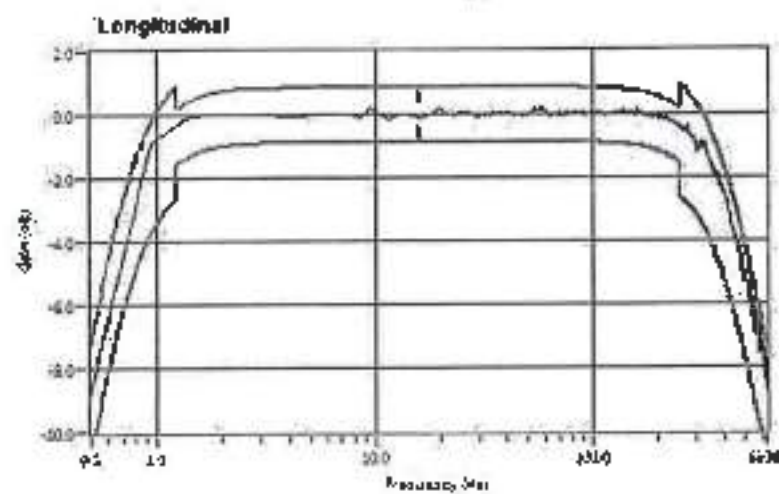
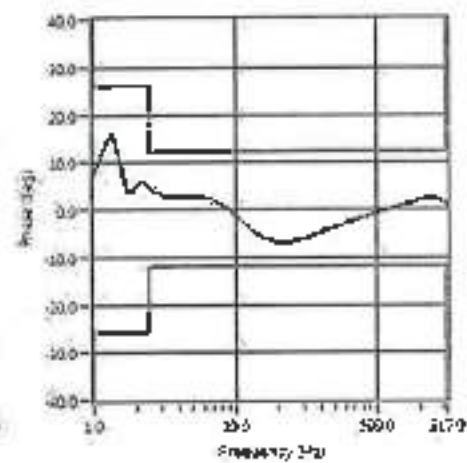
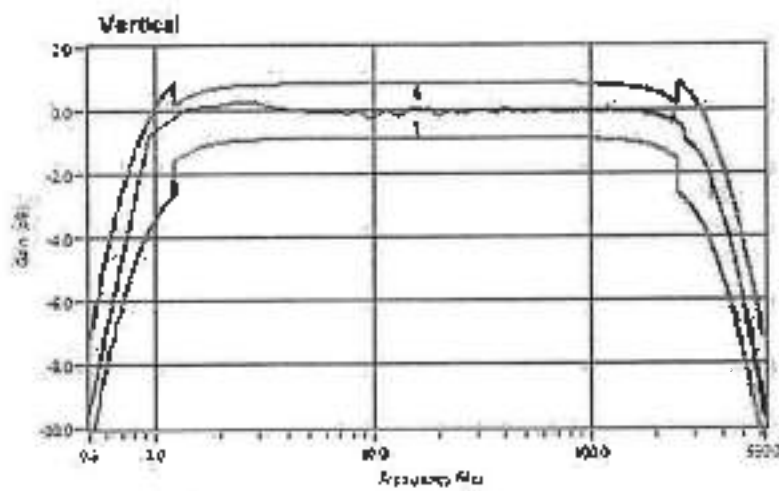
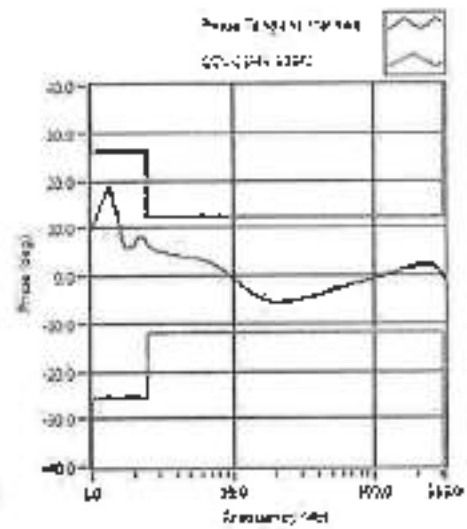
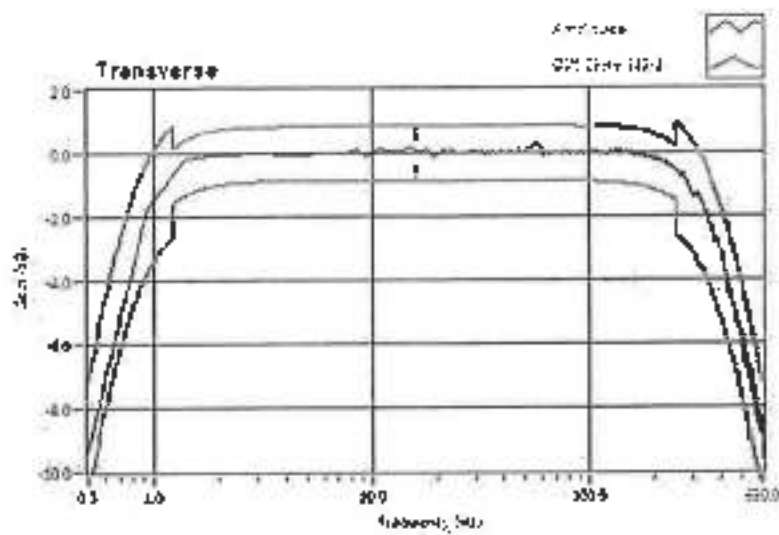
Instantel

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



รับรองสำเนาถูกต้อง
ผู้ตรวจรับงานควบคุมคุณภาพ

Frequency Response of UM18213



Givlab Co., Ltd.

วิบูลย์
บริษัทสำหรับลูกค้า
บริการสำหรับลูกค้า

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-IS

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 Thippiechai

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.	Exp. Date	Traceability
E261-E2624	C02204101	17 Nov 2021	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surichai Promthung)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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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

-000-

Signature



Certificate of Calibration

Certificate No. : 64-410010-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
340,340/1 Soi Bangkhoe7, Bangkhoe, Bangkok 10160

Equipment : Digital Thermo-Hygrometer

Manufacturer :	ebro	Model :	EB1 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 : $(23 \pm 2) ^\circ\text{C}$
Relative Humidity : $(50 \pm 15) \%$

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.	Exp. Date	Traceability
400034 & 400036	SC-H-01041/64	12 Jul 2021	Success Gateway Co., Ltd., Accredited by TISI Calibration No 0268

Approved by

(Bunjeat Masin)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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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%.

• 010 •



Certificate of Calibration

Certificate No. : 64-420055-0 **Page : 1 of 2**

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

Equipment : pH Meter (Pocket)
pH meter
Manufacturer : Eutech **Model :** pHTest 30
Range : -1.00 to 15.00 pH **Resolution :** 0.01 pH
Serial No. : 2856418 **ID No. :** ELA0PHTEST2016

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%

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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 (± 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%.

- 3/16/ -

B





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES


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

TEL. 0-2713-3000 FAX. 0-2719-9444

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 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
Calibrated by :	Waleak Sirikhean
Approved by :	 Approved Signatory
<input checked="" type="checkbox"/> Malee Butkrusa	
<input type="checkbox"/> Saithip Meangmal	
<input type="checkbox"/> Warakorn Lemgaitrakul	
Issue Date :	23 March 2021



Envilab Co.,Ltd.

จำนวนสำเนา 0257191

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

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Make



1047872
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Certificate of Calibration

Certificate No. : 64-400569-1

Page : 1 of 2

Submitted by : Envitab 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. : ELABBODCI40N03

Environment : On site calibration was carried out at the Laboratory, Envitab 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%

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Certificate of Calibration

Certificate No. : 64-400569-J

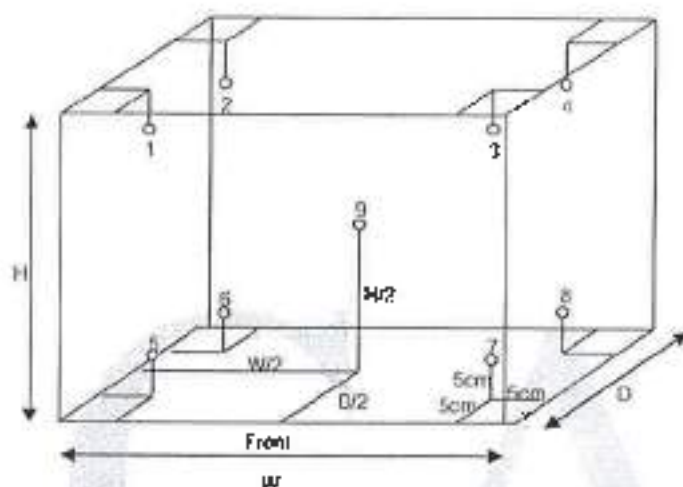
Page : 2 of 2

Result of Calibration : Within Adjustment

UVC 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%.

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[Signature]



[Signature]





CALIBRATION CERTIFICATE

Date of Issue Feb 13, 2021

Cert No. 210323

Site Calibration

Order No. 21020066

Customer Envilab Co., Ltd.

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

Place of Calibration MICRO ROOM (B302)

Description Incubator

Model IF75

Serial No. D319.0066

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-2653.

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. MY49007769, 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. Mi

This certificate is issued in accordance with the conditions of Thermology Laboratory. The traceability to recognised 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.



Dr. Mi
 ธีรพงษ์ งามอุกตอง
 ผู้จัดการฝ่ายควบคุมคุณภาพ



CALIBRATION CERTIFICATE

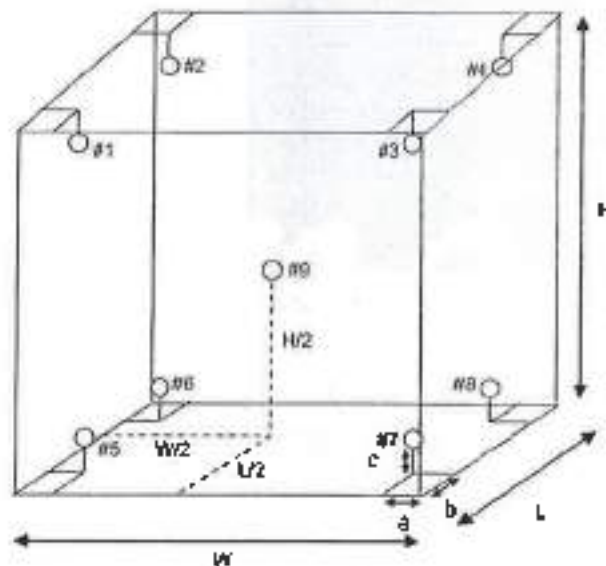
Date of Issue Feb 13, 2021

Cert No. 21/0323

Site Calibration

Order No. 21020066

Results (without adjustment)



Position of reference thermometers were placed

Note.

- 1). Dimension (W x L x H) is 40 x 33 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.





CALIBRATION CERTIFICATE

Date of Issue Feb 13, 2021

Cert No. 21A0323

Site Calibration

Order No. 21020066

Results (without adjustment)

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability \pm (°C)	Uniformity (°C)	Uncertainty \pm (°C)
44.5	44.5	Position 1	44.538	0.048	0.448	0.31
		Position 2	44.593			
		Position 3	44.601			
		Position 4	44.570			
		Position 5	44.532			
		Position 6	44.388			
		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



Thermology Co., Ltd.

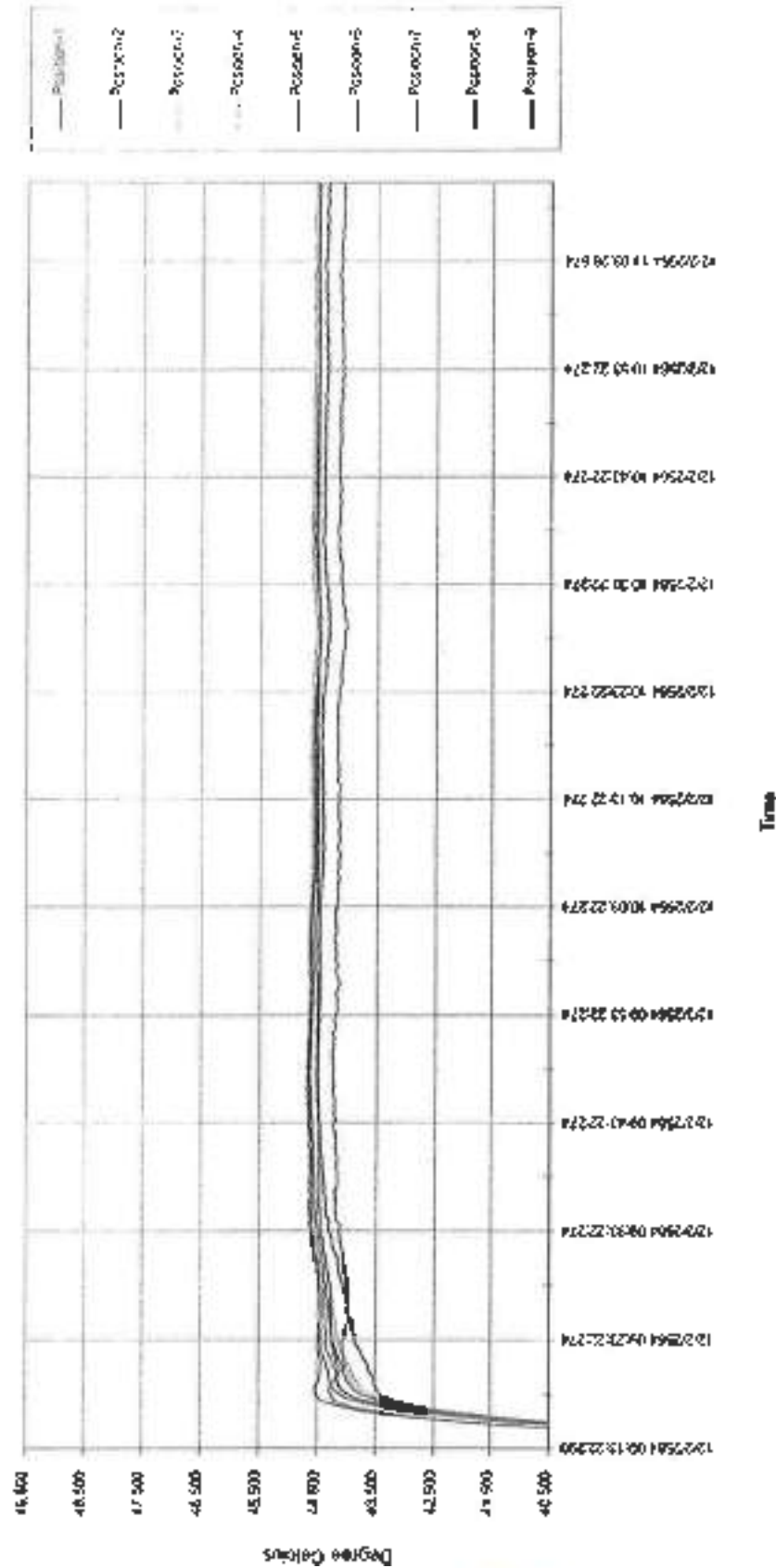
รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

Gen. No. 210323

Incubator

Model SF75 S/N D319-0060 ID No



บริษัท อีโคโนมิค จำกัด
ผู้ให้บริการด้านสิ่งแวดล้อม

CAL

Calibratech Co., Ltd.

7-106/2 Mo 2, Sulaopha, Klong 3 Rd., Bangnae, Pakkret, Nonthaburi 11120

Tel: 029 961 8281 Fax: 029 961 8155, email: cal@calibratech.co.th, www.calibratech.co.th, cal@calibratech.co.th



ISO-TIS-TIS 17025
CALIBRATION 0010

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 : Monmert

Model : UF 75

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 15319 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 : Perinpon Chanpa

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.	Dug Date	Traceability
400029 & 400032	63-400450-1	30 Mar 2021	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Mnsri)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL-T0031-01



รองผู้อำนวยการ
ผู้จัดการระบบคุณภาพ



Certificate of Calibration

Certificate No. : 64-400163-2

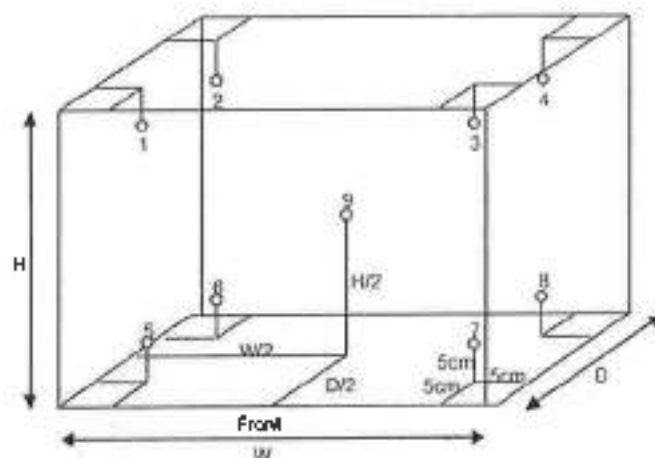
Page : 2 of 2

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	0.60
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	0.5
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%

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Signature



Certificate of Calibration

Certificate No. : 64-40049-1

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 : (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 : Permporn 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 63-400449-1

28 Mar 2021

National Institute of Metrology Thailand (NIMT)

Approved by :



(Banjerd Masri)

Supervisor

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Certificate of Calibration

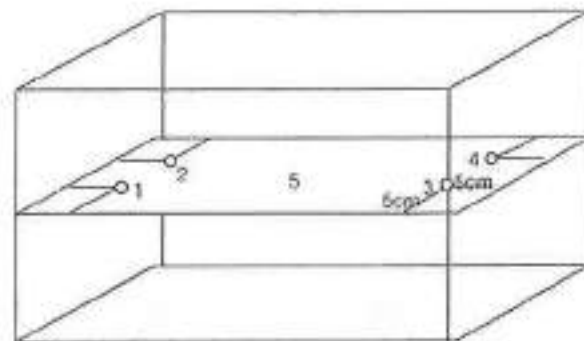
Certificate No. : 64-40049-1

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

Remark: The uncertainty is not combine uniformity of the water bath.

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

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

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Signature



Certificate of Calibration

Certificate No. : 64-300152-2

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Cylinder

Manufacturer : PYREX

Class : A

Capacity : 50 ml

Graduation : 1 ml

ID No. : C-WW-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.

Exp. Date

Traceability

241002

03-200378-1

02 Jun 2021

National Institute of Metrology (Thailand) (NIMT)

Approved by :



(Wipon Tovailee)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

7806-7 Moor 2, Sukhaphachan 3 Rd. (Bangkok), Pathum, Thailand 11120

Tel (02) 964-6218 Fax (02) 964-5155 e-mail : calibratech.co.th@yahoo.com, calibratech@gmail.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 ± 0.054 ml

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

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

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D.



CAL

Calibratech Co.,Ltd.

7/106-1 Alley 7, Sukkheprachuen 3 Rd., Bangpuet, Pathumwan, Bangkok 11120

Tel (02) 064-6211 (ext 102) 064-7155, e-mail : cal@caltech.co, cal@caltech.co.th, cal@caltech.co



ISO-9001:2015
CALIBRATION 0010

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 : 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 : 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 Toomlee)

Supervisor

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CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhagocheran 3 Rd., Bangpuet, Pathumthani, Thailand 11120

Tel: (662) 964-6211 Fax: (662) 964-5435, e-mail : calibratech.co.th@gmail.com, calibratech.co.th@hotmail.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 within \pm 0.17 ml

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

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

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D.





SO₂ Analyzer Verification Test Report

Calibration Report No.: 0502004

Page: 1/1

Calibrated Date: 1-Feb-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO 43C	Manufacturer THERMO S/N: ESOTE43C069865
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Calibration System

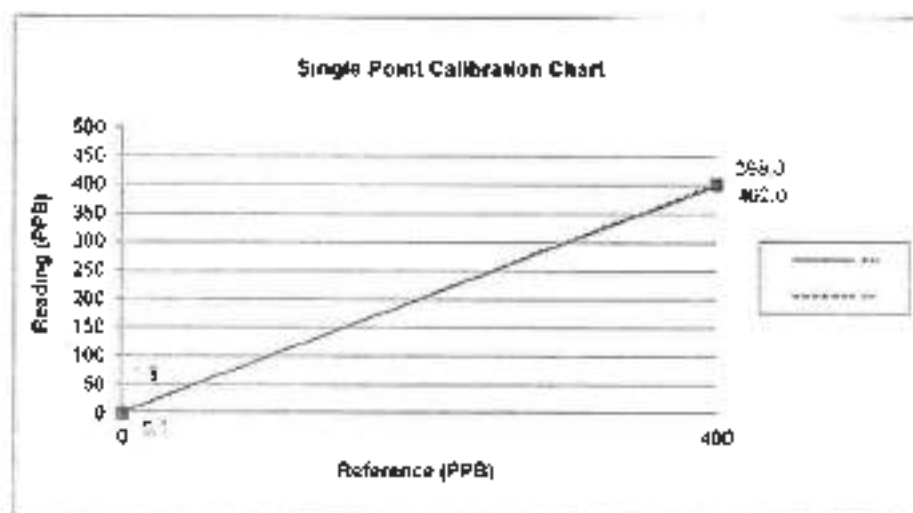
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 192 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc: 44.68 PPM SO ₂ Conc: 45.34 PPM CO Conc: 4500 PPM Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature 23.4 °C

Humidity: 48 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (ppb)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	1.8	1.8	400.0	398	-0.5
After	0.0	0.1	0.1	400.0	402	0.5



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

101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000



MODEL : SO2 ANALYZER Model 430 THERMO

DATE : 1-04-2022

S/N : ESOTE430069865

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -350 (V)	-650	-653
LAMP VOLTAGE 950 - 1,200 (V)	990	985
LAMP INTENSITY 20000 - 30000 Hz	32540	32571
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 : K.

Sirirat Poonlak

Sarawut Keawannual

Date: 1-Feb-22

Date: 1-Feb-22

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ผู้จัดการฝ่ายควบคุมคุณภาพ

ประจำเดือนมีนาคม พ.ศ. 2565



TSP High Volume Sampler Calibration

Verification Report No.
 HQ2100092-0007 -TSP 01

☐ PM ☒ Onsite

Site: เทศบาลเมืองพนาภิรักษ์พัฒนาเมืองพนาภิรักษ์ อำเภอนครหลวง จังหวัดพระนครศรีอยุธยา
 UTM: 47P 1524271 N 666034 E Date: 1 Mar 22
 Sampler: NTSP#12 Technician: Surakit D.
 Recorder: ECRANG15315224 Approval: Sarawul K.

CONDITIONS

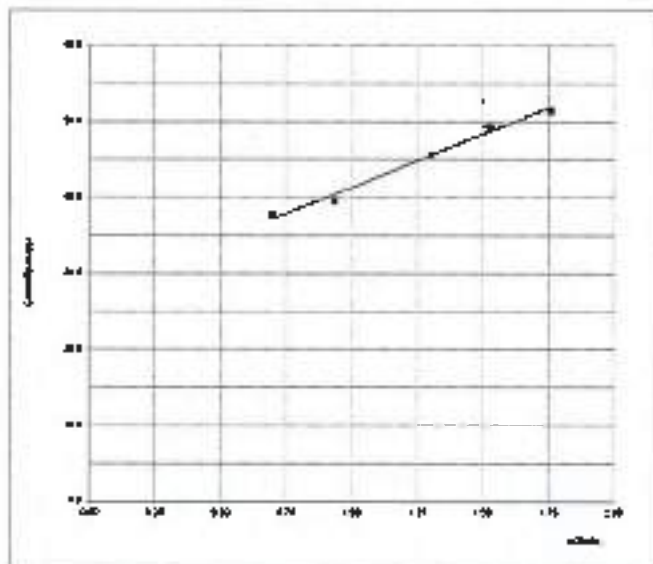
Barometric Press. (hPa): 1010.0 Corrected Pressure (mm Hg): 757.6
 Temperature (deg C): 31.0 Temperature (deg K): 304.0
 Average Press. (hPa): 1013.0 Corrected Avg Press. (mm Hg): 759.8
 Average Temp. (deg C): 30.0 Average Temp. (deg K): 303.0

CALIBRATION OFFICE

Brand: Tisch Environmental, Inc. Qstd Slope: 1.63957
 Model: TE-5028A Qstd Intercept: -0.01202
 Serial#: 1328 Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (h)	Qstd (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	8.43	1.758	62.0	51.40	Slope = 13.9133
2	6.34	1.525	50.0	49.42	Intercept = 27.3793
3	4.62	1.303	48.0	45.47	Corr. coeff = 0.9938
4	2.36	0.934	40.0	39.54	# of Observations: 5
5	1.31	0.697	38.0	37.56	Range of Chart: 44
					at 1.1 - 1.7 m ³ /min: 51



Calibrated by :

(Surakit Darnchoivichit)
 1 March 2022

Approved by :

(Sarawul Keawwinuat)
 1 March 2022

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Envilab Co., Ltd. 343/40/1 Soi Bangkhoe 7 Bangkok Bangkok Bangkok 10110
Tel : 02-832-3577-8 Fax : 02-832-8773 E-mail : info@evltesting.com



Verification Test Report

Report No.:

HO2100092-D007 -SLM 03

☐ PM

☒ Onsite UTM :

47 P 1529770 N 666269 E

Calibrated Date: 1 March 2022

Site : โครงการก่อสร้างอาคารพักอาศัยพร้อมสิ่งอำนวยความสะดวกของ สำนักงานปลัดกระทรวงกลาโหม

Equipment: Sound Level Meter

Manufacturer: ACO

Model: 6226

Serial : 50027

Environment: Temperature 31 °C Humidity 58 %RH

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

Serial No.67098

Date of Calibration : March 21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
94.0	93.9	-0.1	94.0

Calibrated By.

(Surakut Damchohichit)

Date:

1 March 2022

Approve By:

(Sarawut Keawsrinul)

Date:

1 March 2022

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TSP High Volume Sampler Calibration

Verification Report No.

HQ210062-0007 TSP 02

☐ PM

☒ Onsite

Site: โรงเรียนเทศบาลวัดโพธิ์

UTM : 47P 1829602 N 666263 E

Sampler: NTSP#08

Recorder: ECRANG15315224

Date: 1 Mar 22

Technical: Surakit D.

Approval: Sarawut K.

CONDITIONS

Barometric Press. (hPa): 1009.6

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: Tech Environmental, Inc

Model: TE-5023A

Serial#: 1328

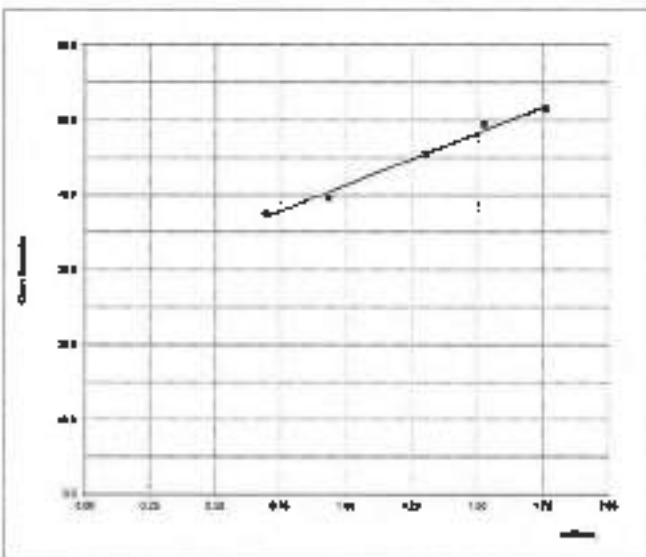
Orif. Slope: 1.63957

Orif. Intercept: -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 Slope = 22.6365 Intercept = 12.8700 Corr. coeff. = 0.9948 # of Observations = 5 Range of Chart at 1.1 - 1.7 m ³ /min = 52
1	0.31	1.844	58.0	55.25	
2	7.43	1.648	50.0	49.33	
3	8.38	1.403	48.0	45.39	
4	3.56	1.143	38.0	37.48	
5	1.72	0.797	32.0	31.57	



Calibrated by :

(Surakit Damcholvichai)

1 March 2022

Approved by :

(Sarawut Keawprinsud)

1 March 2022

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02-5071521-2



EVLS (Pty) Ltd. 543421 10110101 10110101 10110101 10110101
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PM10 High Volume Sampler Calibration

Verification Report No.
 H02100092-0007 -PM 02

<input checked="" type="checkbox"/> PM <input type="checkbox"/> Onsite Site: Tshwane Environmental Engineering UTM: 47P 1529602 N 665283 E Sampler: NPM12 Recorder: ECRD501616124	Date: 1 Mar 22 Technical: Suraki D. Approval: Sengul K.
--	---

CONDITIONS

Barometric Press. (hPa): 1009.8
 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

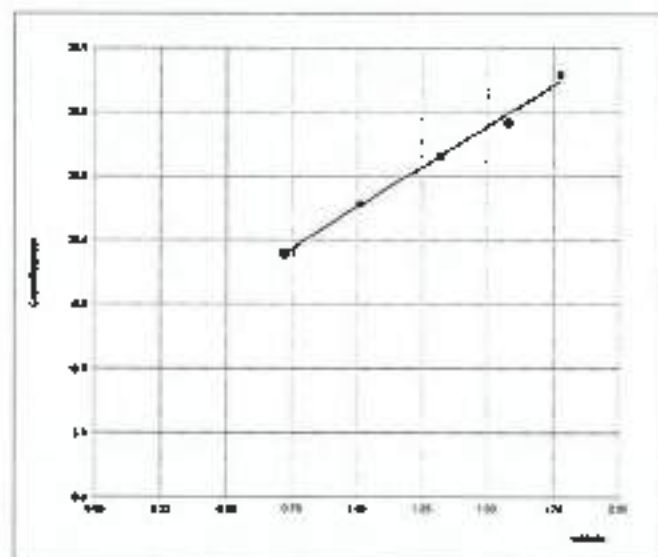
CALIBRATION OFFICE

Brand: Tisch Environmental, Inc
 Model: TE-5028A
 Serial#: 1328

Slope: 1.02667
 Intercept: -0.00753
 Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H2O (in)	Qs (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	9.32	1.894	56.0	35.94	Slope = 14.3965
2	7.45	1.695	50.0	31.73	Intercept = 8.2377
3	5.31	1.432	46.0	29.19	Corr. coeff = 0.9908
4	3.65	1.158	42.0	26.65	SFR = 1.141
5	1.31	0.715	28.0	17.77	SSP = 38.88
					# of Observations: 5
					Range of Chart: 37
					at SFR ±10%: 41



Calibrated by: (Suraki Damphomchai)
 1 March 2022

Approved by: (Sengul Kegannu)
 1 March 2022

This report will serve as a record of the calibration and shall be the property of the client.

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Tel : 02-800-3577-8 Fax : 02-800-3778 E-mail : info@evltesting.com



Verification Test Report

Report No.:

HO2100092-0007 -SLM 04

☐ PM

☒ Onsite UTM :

47 P 1629587 N 666247 E

Calibrated Date: 1 March 2022

Site : โรงพลาสม่าเทคโนโลยี ประถม

Equipment: Sound Level Meter

Manufacturer: ACO

Model: 6226

Serial : 40289

Environment: Temperature 31 °C Humidity 58 %RH

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

Serial No.87096

Date of Calibration : March,21, 2022

Result of Test

Reference Standard (dB)	Instrument reading (dB)	Error (dB)	Adjust (dB)
94.0	94.1	0.1	94.0

Calibrated By:

(Surakit Damchoiwichit)

Date:

1 March 2022

Approve By:

(Sarawut Keawsinnul)

Date:

1 March 2022

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Neediss Supply Instrument Co., Ltd.

151/50110101 หมู่ 11 ต.บ้านใหม่ อ.เมือง จ.นนทบุรี 11000 โทร 02-501-8021-2 โทรสาร 02-501-8022 E-mail: neediss@neediss.com neediss.co.th

**SO₂ Analyzer Verification Test Report**

Calibration Report No.: 6503004

Page:1/1

Calibrated Date: 3-Mar-22

☒ PM ☐ Onsite**Instruments Information**

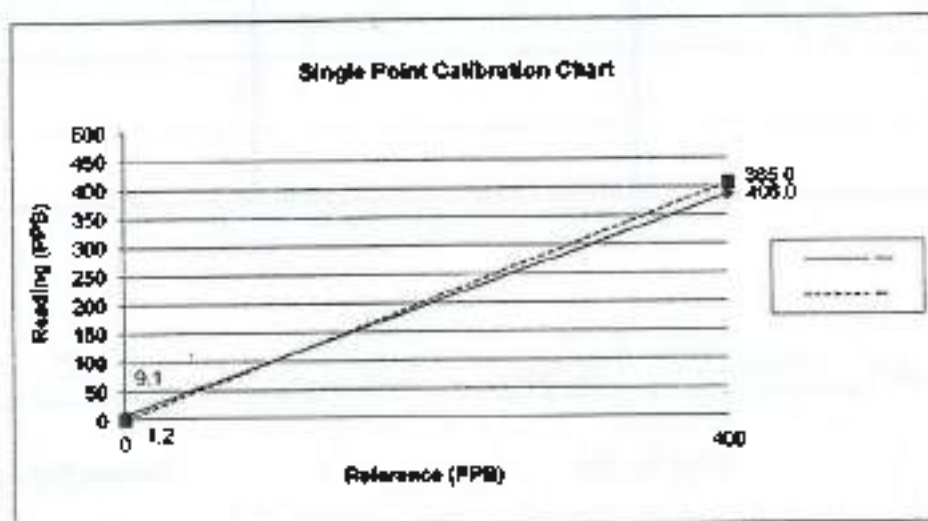
Analyzer Type: SO ₂ Analyzer Model: THERMO_43C	Manufacturer THERMO S/N: ESOTE43C373373
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Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 762 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 25.9 °CHumidity: 55 %RH**Calibration Report**

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Diff (ppb)	Reference (ppb)	Reading (PPB)	Diff%
Before	0.0	9.1	9.1	400.0	385	-3.8
After	0.0	1.2	1.2	400.0	406	1.5



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Neediss Supply Instrument Co., Ltd.
536/100 Moo 10, Bangkhen Subdistrict, Bangkhen District, Bangkok 10710, Thailand
Tel: 02-012-0000 Fax: 02-012-0001 Email: info@neediss.com



MODEL : SO2 ANALYZER Model 43C THERMO

DATE: 3-03-2022

S/N : E90TE43C373373

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 :

Approve By :

Sarat Poonlek

Sarawut Keawsrimul

Date:

3-Mar-22

Date:

3-Mar-22

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neediss

บริษัท เน็ดดิส (ประเทศไทย) จำกัด
Neediss Supply Instrument Co., Ltd.

125 หมู่ 7 ตำบล 7 อำเภอเมือง จังหวัดนนทบุรี 11000 ประเทศไทย
Tel: 02-802-1760-2 Fax: 02-802-1760-3 Email: info@neediss.com



NOx Analyzer Verification Test Report

Calibration Report No.: 6503002

Page: 1/2

Calibrated Date: 3-Mar-22

☒ PM ☐ Ozone

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: 782	NO Conc: 44.88 PPM SO2 Conc: 45.34 PPM CO Conc: 4500 PPM
ZERO AIR Generator ZAG7001 S/N: 644	Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature: 26.7 °C

Humidity: 48 %RH

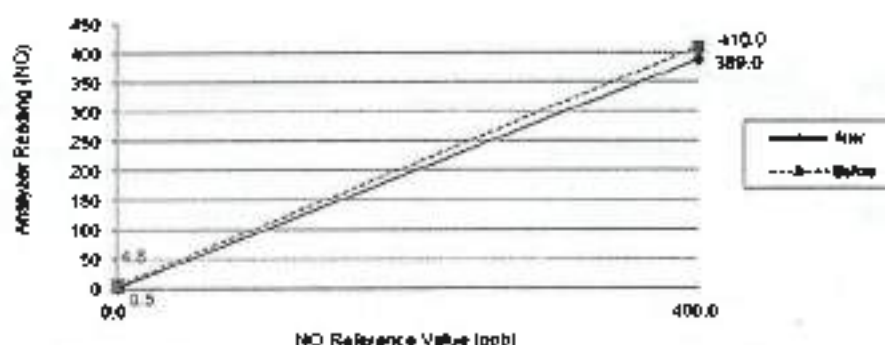
Calibration Check (Before adjust)

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	416	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

Single Point Calibration Chart



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บริษัท นีดิส ซัพพลาย อินสตรูเมนต์ จำกัด
Neediss Supply Instrument Co., Ltd.
Unit 501, 5/F, 145/146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6503009

Page: 1/1

Calibrated Date: 3-Mar-22

☒ PM ☐ Onsite

Instruments Information

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

Calibration System

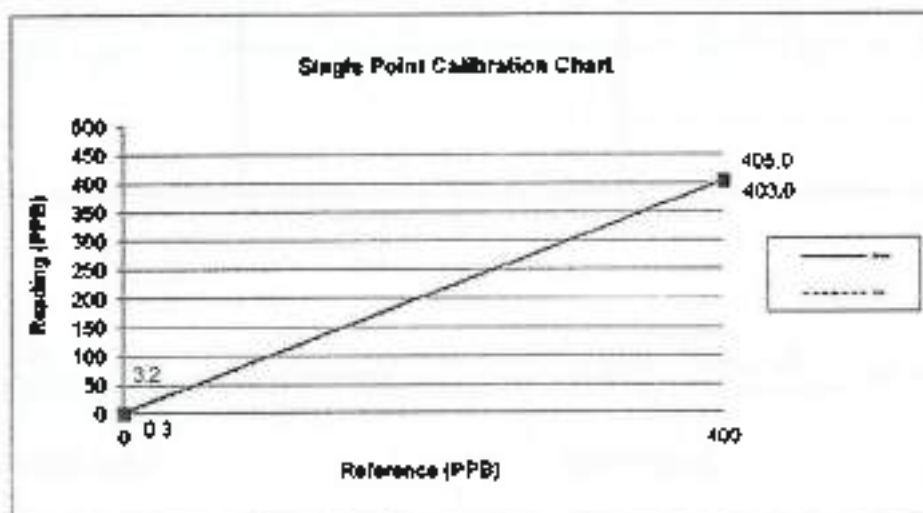
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792	NO Conc 44.68 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM
ZERO AIR Generator ZAG7001 S/N: 844	Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature 26.7 °C

Humidity: 50 %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	405	1.3
After	0.0	0.3	0.3	400.0	403	0.8



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ผู้จัดการฝ่ายควบคุมคุณภาพ



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Neediss Supply Instrument Co., Ltd.

305 ซอยวิภาวดี 7 แขวงวิภาวดี เขตวิภาวดี กรุงเทพฯ 10660 โทรศัพท์ / โทรสาร กรุงเทพฯ
Tel: 02-800-0980 / Fax: 02-800-0983 E-mail: neediss@neediss.co.th



MODEL : SO2 ANALYZER Model 43C THERMO

DATE 3-03-2022

S/N : ES0TE43C103362

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	32563	31377
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 :

Sinra Poonlak

Approve By :

K.

Sinra Poonlak

Sarawut Keawsrinual

Date:

3-Mar-22

Date:

3-Mar-22

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Neediss Supply Instrument Co., Ltd.

514 ถนนพหลโยธิน ตำบลคลองหลวง อำเภอคลองหลวง จังหวัดปทุมธานี 11000 ประเทศไทย
Tel: 02-017-2511 Fax: 02-017-2512 E-mail: info@neediss.com



NOx Analyzer Verification Test Report

Calibration Report No.: 6503067

Page:1/2

Calibrated Date: 3-Mar-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 420	Manufacturer THERMO S/N: ENOTE42C497375
--	--

Calibration System

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

Environment: Temperature 26.8 °C

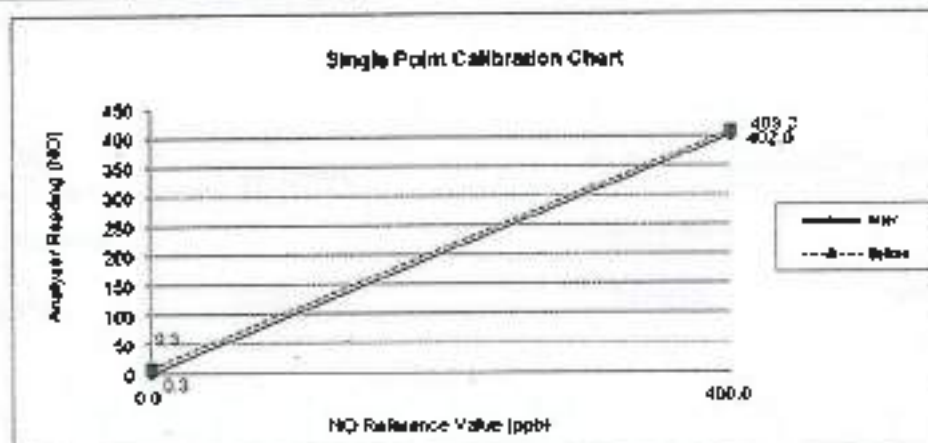
Humidity: 48 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	9.3	0.0	9.3	409	400.0	1.1
NO ₂	3.3	0.0	3.3	3.0	0.0	0.4
NOx	12.6	0.0	12.6	412	400.0	1.5

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.3	0.0	0.3	402	400.0	0.2
NO ₂	0.5	0.0	0.5	4.0	0.0	0.5
NOx	0.8	0.0	0.8	406	400.0	0.7



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Neediss Supply Instrument Co., Ltd.

502 Petchburi 7, 10th Floor, Petchburi Building, 10160 Suk Sot Highway 7 Bangkok Bangkok 10160
Tel: 02-692-19920 Fax: 02-692-19921 Email: info@neediss.com



MODEL : NOx ANALYZER Model 42C THERMO

DATE : 3-03-2022

S/N : ENOTE42C497375

Page:2/2

Test Function Value	Before	After
Range 500 (PPM)	500	500
PMT VOLTS -450--450 (V)	-675	-675
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	350
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	1279.0	1279.1
No/Nox Slope	1.003	0.940.8

Calibrate By :

Sirint Poonlak

Approve By :

Serawul Keawsinual

Sirint Poonlak

Serawul Keawsinual

Date:

3-Mar-22

Date:

3-Mar-22

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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	1.3130	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	0.8580	8.7	3.50
5	9	10	1	0.6630	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=	$1/m \left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} - b \right)$	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.

Certificate of Calibration

Certificate No. : 65-200022-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
540, 340/1 Soi Bangkhao 7, Bangkhao, Bangkok 10160

Equipment : Electronic Balance

Manufacturer : Sartorius Model : SECURA224-JS
Serial No. : 0014803270 ID No. : ELABBALANCE04
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 mmHg

Date of Received : 02 February 2022

Date of Calibration : 02 February 2022

Date of Issue : 09 February 2022

Calibrated by : Atoradai 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.	Con. No.	Due Date	Traceability
E261-E2624	C02213403	18 Jan 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by :



(Surachai Pannikong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

7/106-T Moo 2, Sukhaphrachan 3 Rd., Daengood, Pakong, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 65-200022-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UNC 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

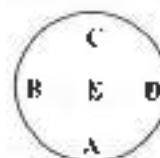
This result of calibration was found accurate as shown on date and place of calibration only.

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%.

Repeatability 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

Stdv : 0.00005 g

- 000 -

1780



CAL

Calibratech Co., Ltd.

7/106-7 block 2, Sukhprachin 3 Rd., Bangpoo, Pakkret, Nonthaburi 11120

Tel (02) 904-6211 Fax (02) 904-5155, e-mail : cal@caltech.co.th, cal@caltech.co.th, cal@caltech.co.th



MSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-200022-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Electronic Balance

Manufacturer : Sartorius

Model : SECURA102-IS

Serial No. : 0014400605

ID No. : FIABBALANCE03

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 : Akaradeh 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.	Cal. No.	Due Date	Traceability
F181-F182	65210044-1	31 Jul 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Sutachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



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Envilab Co., Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachin 3 Rd., Banggood, Pathum Thani 11120

Tel.(02) 964-6211 Fax.(02) 964-3155, e-mail : calibratech.cal@proton.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

Deparative 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	0.0090
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.

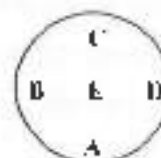
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%.

Repeatability error

Load test : 1000 g

A	B	C	D	E
0.00	0.01	0.02	0.00	0.00

B



Repeatability

Load test : 2000 g

Side : 0.000 g

- 0.00 -





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 Bangkhue 7, Bangkhue, 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.

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FMEL/MTC 002 Rev.4

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 196 Phahonyothin Road Chatuchak, Bangkok 10900,
 Thailand
 Tel. (66) 0 2579 1132-1133 ext. 5219, 5225, 5217
 Fax. (66) 0 2579 8111
 E-mail: mtc@nist.go.th



บริษัท อีวิลแลบ จำกัด
 ผู้ให้บริการทางหลวงควบคุมคุณภาพ



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-64/0406

MTC No. EEL BP. 680364

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 2
1/2 inch Brüel&Kjær 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 Brüel&Kjær 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 Brüel&Kjær 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 :


(Mr. Tawakiat Jamsamran)

Approved by :


(Mr. Prawate Klaiyapa)
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 : 2011264031001119001

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 as full and prohibited unless written permission is obtained from the governor of TISTR.

PM 01.14PC.002 Rev.4

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani : 2120, Thailand
Tel : (66) 0 2577 9000
Fax : (66) 0 2577 9000
E-mail : tumpat@tistr.go.th website:www.tistr.go.th

Office/Laboratory
Box 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang Chongchol Samutprakan 10280 Thailand
Tel : (66) 0 2323 1670 ext. 115, 116
Fax : (66) 0 2323 9165
E-mail : mtc@tistr.go.th

Office
196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel : (66) 0 2579 1121 30 ext. 5219, 5225, 5237
Fax : (66) 0 2579 8592
E-mail : mtc@tistr.go.th



EnviLab Co., Ltd.

รับรองว่าหากถูกต้อง
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: EB0148406 Cylinder Volume: 148.7 CF
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG
PGVP Number: A12022 Valve Outlet: 860
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 600/R-12/534, 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 cylinder. All concentrations are on a molar/basis unless otherwise noted.

Do not use this cylinder below +00 psig, Ls: 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	100.2 PPM	G1	+/- 0.9% NIST Traceable	12/27/2021, 01/03/2022
CARBON MONOXIDE	100.0 PPM	99.02 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	+/- 0.9% 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 18, 2024
NTRM	20061046	CC373475	98.61 PPM NITRIC OXIDE/NITROGEN	+/- 0.6%	Oct 08, 2026
GMIS	124205888119	CC322885	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	09010838	K019200	13.94 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	Jan 30, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multi-point Calibration
Nicolet iS50 FTIR AUP2010245 CO2	FTIR	Dec 02, 2021
SIEMENS ULTRAMAT6E N1-C8-180	NDIR	Dec 09, 2021
Nicolet iS80 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



Mulanka Pandey
Approved for Release

Page 1 of 160-402305646-1



Gvilab Co. Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Calibration Certificate

Part Number: 721A2601

Description: Micromate with DIN Geophone

Serial Number: UM18219

Calibration Date: **MAR 24 2021**

Calibration Reference Equipment: 71407402

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



Instantel

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

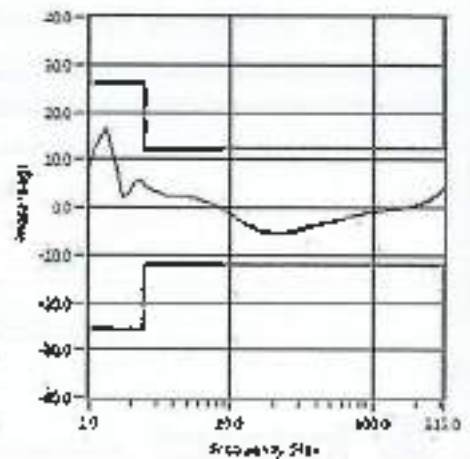
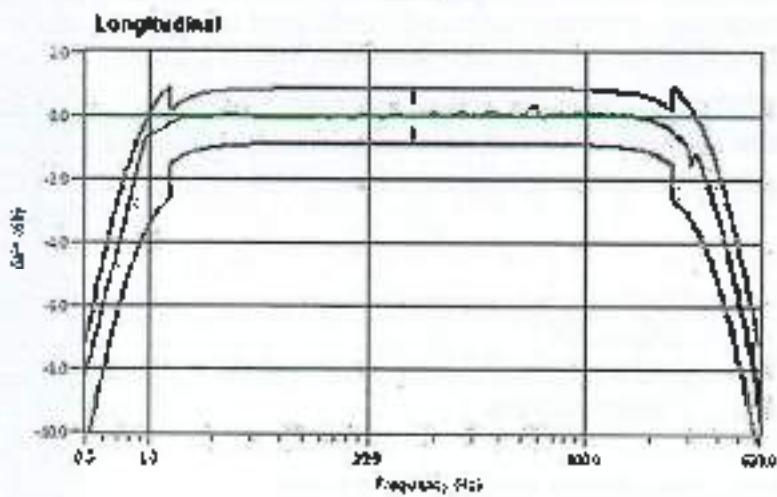
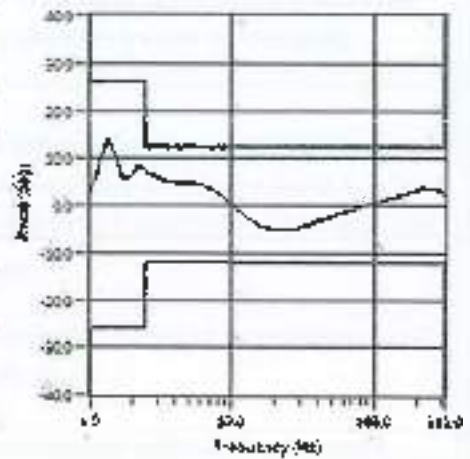
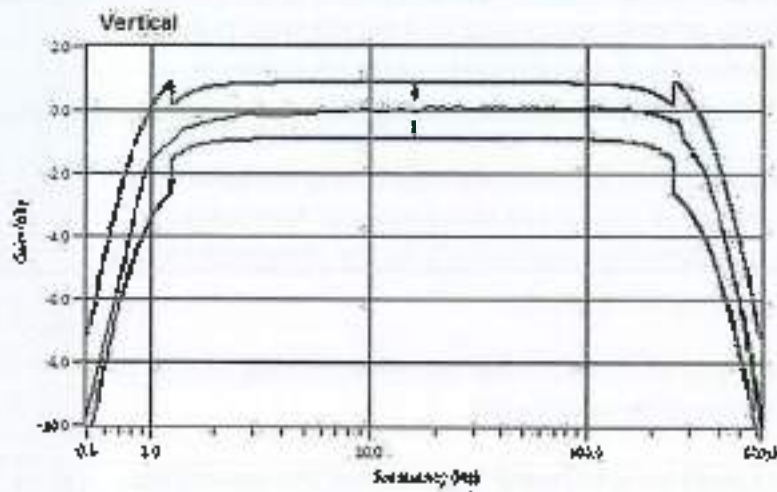
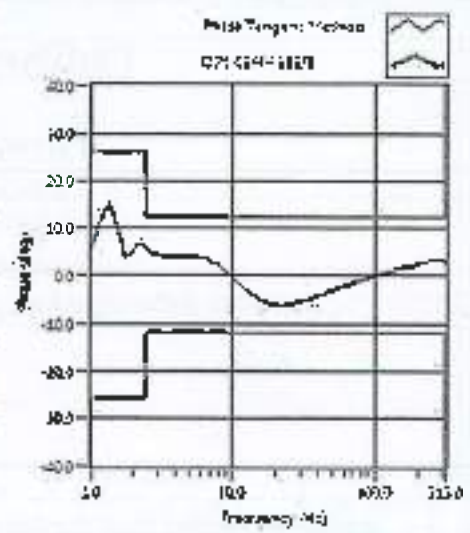
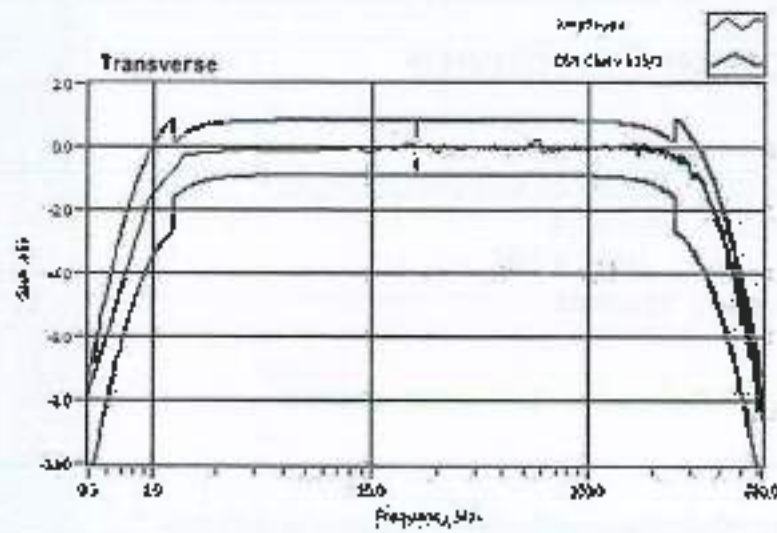


Pwss Co., Ltd.



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Frequency Response of UM18219



Eriyib Co., Ltd.


รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Mettler-Toledo (Thailand) Ltd.
866M - 866/5 Lachin Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10760
+662 723-0362
MT-TH.ServiceSupport@mtl.com



Accuracy Calibration Certificate

Customer

Company: EmuLab Co., Ltd.
Address: 540, 540th Soi Bang Khae 7, Bang Khae
City: Bang Khae Contact: Niranthap Samphanpang
Zip / Postal: 10160
State / Province: Bangkok
Order Number: 

Weighing Device

Manufacturer:	Mettler Toledo	Instrument Type:	Weighing Instruments
Model:	XSR205DU	Asset Number	N/A
Serial No.:	8011380587	Terminal Model	SRAT
Building:	N/A	Terminal Serial No.:	B911060567
Floor:	3	Terminal Asset No.:	N/A
Room:	8004		

Range	Max. Capacity	Readability (d)
1	81 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:

CP/W082/20

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 bullet 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: 68.3 %	End: 69.7 %

As Found Calibration Date:

02-Mar-2022

Calibration:

Niranthap C

As Left Calibration Date:

N/A

Niranthap Chonpratsartuk

Issue Date:

03-Mar-2022

Approved Signatory:



- ☒ Kasakorn Tejanachaisakul
☐ Sank Janyom
☐ Surachet Sukhote



EmuLab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Measurement Results

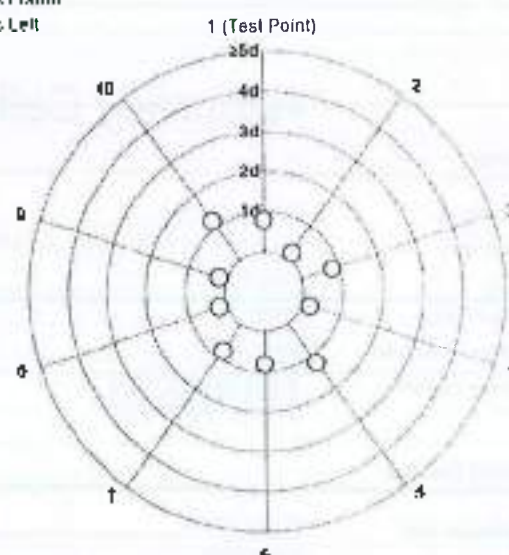
Repeatability

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	0.00006 g	N/A
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○ As Found
◆ As Left



The "10" in the graph represents the repeatability of the range/interval in which the test was performed.

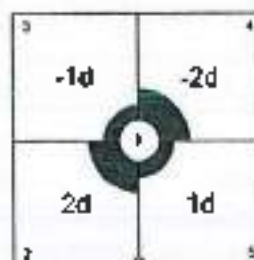
The results of this graph are based upon the absolute values of the difference from the master value.

Eccentricity

Test Load: 100 g

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

Maximum Deviation	0.0002 g	N/A
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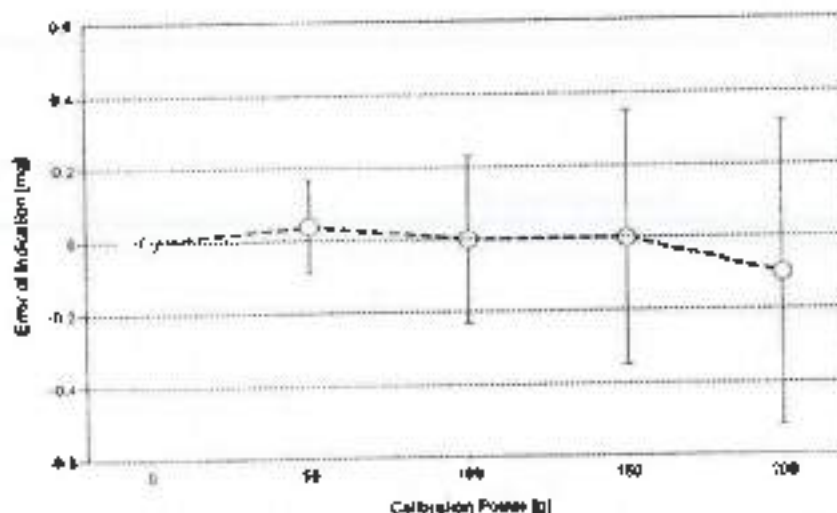
As Found

The "10" in the graph represents the repeatability 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	0.020 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	1.00000 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	0.11 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	199.9998 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 $k=2$ 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 ensuring 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.:	W322	Date of Issue:	06-Jan-2022
Certificate Number:	177006	Calibration Due Date:	01-Jul-2023

Weight Set 2: OIML E2

Weight Set No.	W878	Date of Issue:	31-Jan-2022
Certificate Number:	C205470237	Calibration Due Date:	12-Jul-2023

Thermo Hygrometer

Equipment No.:	IN493	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 as 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: $0 K$

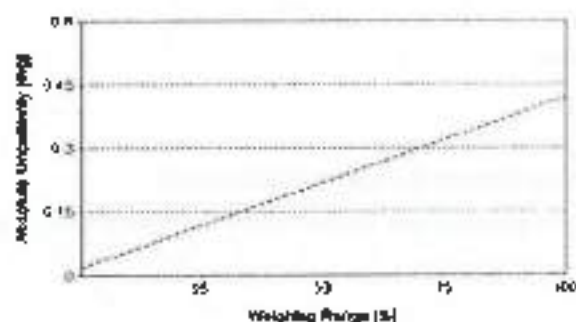
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.00001 g	81 g	$U_1 = 0.018 \text{ mg} + 0.00467 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	220 g	$U_2 = 0.06 \text{ mg} + 0.00492 \text{ mg/g} \cdot R$	N/A

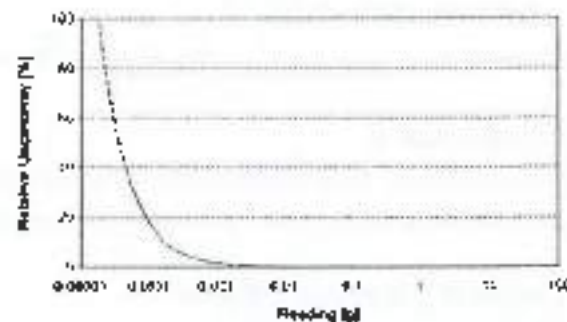
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range of larger are taken for the calculation of the linear equation.

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



As Found



As Left

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





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



Certificate of Calibration

Reference No. : 4182/2202-017 Certificate No. : L2203-290
Customer : Envtlab 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 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	81468576	OR21-0851	13 May 22
2) Digital Thermometer With Probe	GT11	08000089	PSL-T 007285	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. Suphechal Sakri

☐ Mr. Phayak Toolit

☒ Miss Tantaraporn Pettang

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 or other form without approval of S K Sales and Service Company Limited.



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	2.9

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 **



Srinakharinwirot Co., Ltd.

Signature
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Signature
Sp.

Certificate of Calibration

Certificate No. : 64-420055-1

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

540, 540/1 Soi Bangkhae 7, Bangkhae, 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 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 approval 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	0.00	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%

- o O o -

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. 0-2719-9444

Cert.No.: 21TW57

Page: 1 of 2

Certificate of Testing

Equipment :	DO Meter
Manufacturer :	Hanna
Model :	HI 9146
Serial No. :	G0007931
ID No. :	EDOH1914007931
Received Date :	16 March 2021
Test Date :	19 March 2021
Reference :	2103-0869DH-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-GH9 by Comparison Technique with Azide Modification Method
Calibrated by :	Waleak Sirthean
Approved by :	 Approved Signatory
<input checked="" type="checkbox"/> Malee Bulkruea <input type="checkbox"/> Sathip Meangmai <input type="checkbox"/> Warakorn Lemgagrakut	
Issue Date :	23 March 2021



รับรองสำเนาถูกต้อง 0257191
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-

Maki



บริษัท ไพชา จำกัด
ผู้จัดการฝ่ายควบคุมคุณภาพ

a 1047872

CAL

Calibratech Co., Ltd.

3/106-7 Moo 2, Sukbapraditsan 3 Rd., Bangpood, Pongtong, Nonthaburi 11120

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



NSC-Reg-Reg.13025
CALIBRATION (03/30)

Certificate of Calibration

Certificate No. : 64-400527-3

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Air Chamber (Incubator)

Manufacturer : M-LAB

Model : BIC-140

Range : NA °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, TLA5 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%

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CAL-P0031-03



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 64-400527-3

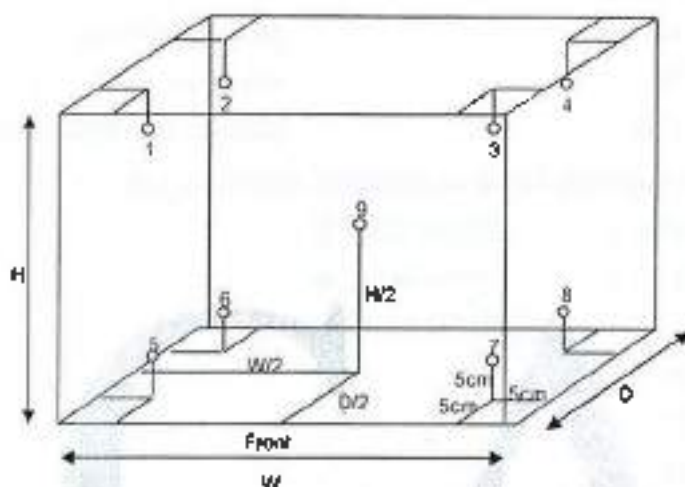
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilating at position 11 (sec)



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%.

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Br



CAL

Calibratech Co.,Ltd.

2106-7 Moo 2, Sukhprachin 3 Rd., Bangkok, Thailand, 10120

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



HSC-TIS-1517025
CALIBRATION 0010

Certificate of Calibration

Certificate No. : 64-400569-1

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Air Chiller (Refrigerator)

Manufacturer : M-LAB

Model : BIC-140

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 1011

ID No. : ELABB0DC140N03

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

Ambient Temperature : (23.0 to 25.8) °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%

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CAL-F0031-03



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ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co., Ltd.

2/190-7 Moo 2, Sukhprakhuan 3 Rd., Bangproed, Pakkret, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 64-400569-1

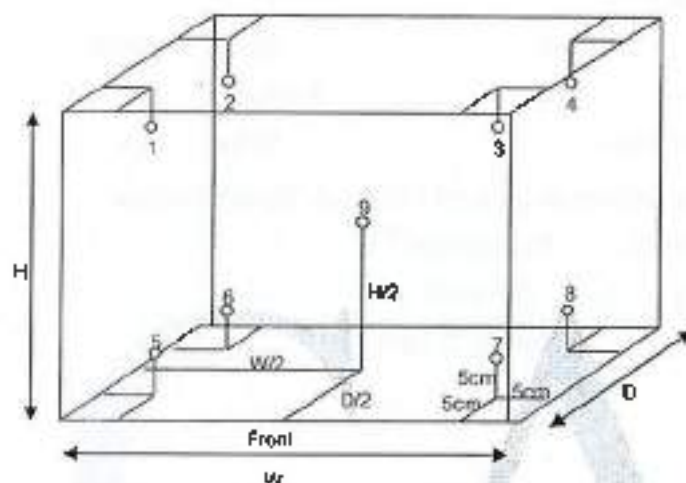
Page : 2 of 2

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	0.57

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%

- ๓0๐ -

Signature



CAL

Calibratech Co., Ltd.

7806-7 Lane 2, Sakthiprasadon V Rd., Bangpoo District, Bangkok 11120

Tel: (02) 064-6211 Fax: (02) 944-5155, e-mail: calibratech.cal@caltech.co.th, calibratech.cal@caltech.co.th



Certificate of Calibration

Certificate No. : 64-400163-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540, 54th St Soi Bangkhao 7, Bangkhao, 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 : Penphon Changru

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%

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CAL-F0031-03



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ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 64-400163-2

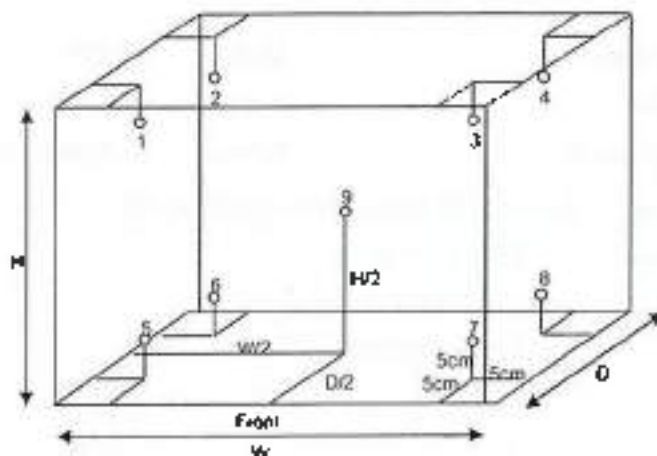
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature Measurement

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



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	0.60
110.0	109.5	109.5	110.0	110.4	110.4	110.2	110.2	109.9	109.6	110.2	110.1	0.60
130.0	129.0	129.0	129.0	130.1	130.2	130.2	130.3	130.0	129.0	130.4	130.3	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
130.0	129.0	129.0	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.

The 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%

- nDo -

Signature



CAL

Calibratech Co., Ltd.

2106-7 Mile 2, Sukhaphrachan 3 Rd., Bangpaed, Pathum Thani 11120

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



NAC-TISI-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 Bangkhoe7, 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 : 02 February 2022

Calibrated by : Pempon 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 64-400588-1

24 May 2022

National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

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CAL-F0031-03



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ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

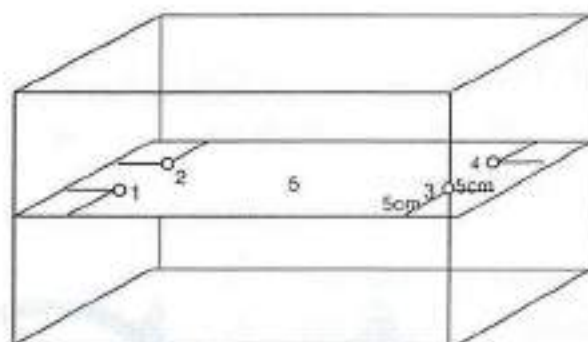
Certificate No. : 65-400453-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor 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	95.46	95.36	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%.

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B.



Chai

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co., Ltd.

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



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-300152-2

Page : 1 of 2

Submitted by : Envihab 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-002/1

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.

Exp. Date

Traceability

741003

63-300378-1

02 Jun 2021

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wajit Tetradee)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



Envihab Co., Ltd.

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%.

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D.



CAL

Calibratech Co.,Ltd.

7106-7 Moo 2, Sukhprachin 3 Rd., Bangpud, Prachin, Nonthaburi 11120

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



NSQ-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-300152-6

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

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

Equipment : Cylinder

Manufacturer : Wieg

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 : Arceval 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.

Exp. Date

Traceability

241002

63-200378-1

02 Jun 2021

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipha Tawullee)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL-F0031-03



Envilab Co.,Ltd.

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ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukkaprachasri 3 Rd., Bangpoo, Pakkret, 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. : 64-300152-6

Page : 2 of 2

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

UVC Condition As-Received : Good

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

Uncertainty of measurement within \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 -

D.



Dr. An

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ



ประจำเดือนเมษายน พ.ศ. 2565



TSP High Volume Sampler Calibration

Verification Report No.
 HO2200025-D003 -TSP-01

☐ PM ☒ Onsite

Site: โครงการ/โรงงาน/อาคาร/สถานที่/หน่วยงาน/สถานที่งาน/โครงการ/งาน/โครงการ
 UTM: 47P 1524271 N 666034 E Date: 1 Apr 22
 Sampler: NTSPH12 Technical: Surakit O.
 Recorder: ECRANG15315224 Approval: Saravut K.

CONDITIONS

Barometric Press. (hPa): 1009.5 Corrected Pressure (mm Hg): 757.2
 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

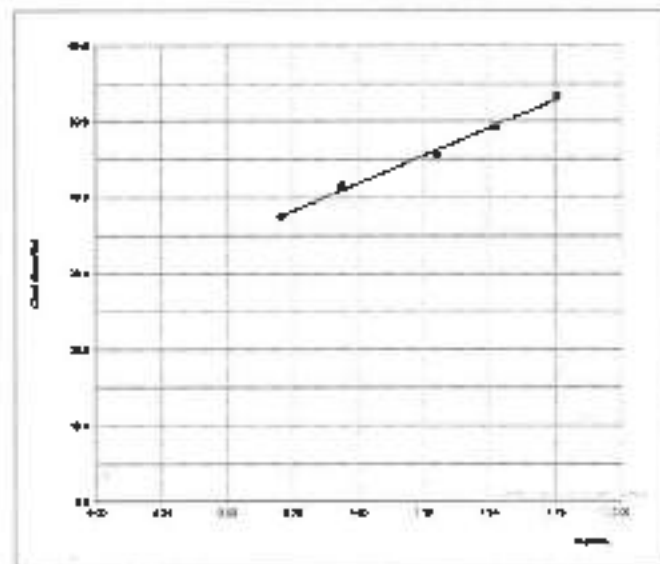
CALIBRATION OFFICE


Brand: Tech Environmental, Inc
 Model: TE-5026A
 Serial: 1328


Qoid Slope: 1.63957
 Qoid Intercept: -0.01202
 Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H2O (in)	Qoid (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	8.45	1.757	54.0	53.28	Slope = 14.5387
2	6.35	1.524	50.0	49.33	Intercept = 27.2928
3	4.63	1.302	46.0	45.38	Corr. coeff = 0.9961
4	2.39	0.936	42.0	41.44	# of Observations: 5
5	1.34	0.704	38.0	37.49	Range of Chart: 44
					at 1.1 - 1.7 m3/min: 52



Calibrated by: 
 (Surakit Damchohachai)
 1 April 2022

Approved by: 
 (Saravut Kedwinnual)
 1 April 2022

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TSP High Volume Sampler Calibration

Verification Report No.

HO22000025.D003.TSP 02

☐ PM☒ Onsite

ទីស្តី: វិទ្យាស្ថានបណ្តុះបណ្តាលបេតិកភណ្ឌ ប្រចាំឆ្នាំ

UTM: 47P 1529602 N 566283 E

Sampler NTSP10-1

Recorder: ECRANG15315224

Date: 1 Apr 22

Technical: Surakil D.

Approval: Sereyut K.

CONNOTATIONS

Barometric Press. (hPa): 1009.6

Temperature (deg C). 31.0

Average Press. (in²/g) 1013.0

Average Temp. (deg C): 30.0

Contracted Pressure (mm Hg): 757.3

Temperature (deg K): 304.0

Corrected Avg Press. (mm Hg): 75.9 ± 0.4

Average Temp. (deg K): 303.0

CALIBRATION OFFICE

Brand: Tisch Environmental, Inc.

Model TE502BA

Serial# 1328

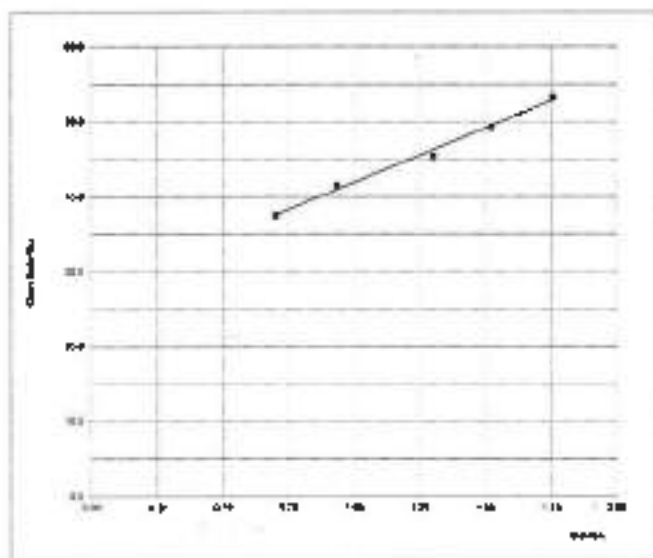
Ostd Slope: 1.63957

Quad Intercept: -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	9.34	1.850	56.0	55.34	Slope =	22.8207
2	7.45	1.663	52.0	51.39	Intercept =	12.9370
3	5.41	1.409	44.0	43.49	Corr. coeff =	0.9952
4	3.68	1.148	40.0	39.53		
5	1.76	0.807	32.0	31.63	# of Observations	5
					Range of Chart at 1.1 - 1.7 m ³ /min	39 52



Calibrated by

(Surakil Darmaharicht)

1 April 2022

Approved by _____

(Sardani Kerasius)

1 April 2022

This manuscript was prepared using L^AT_EX and the *amstex* and *amsmath* packages.

www.ecstia.com

● 本報記者 陳曉明 專訪



Environmental Engineering Laboratory
EVL Testing Co., Ltd. 10/20/16 Sukhumvit 11 Road, Bangkok 10110
Tel: 02-006-0073-6 Fax: 02-006-0073-7 Email: info@evltesting.com



PM10 High Volume Sampler Calibration

Verification Report No.
HQ2200025-D003-PM 01

☒ PM ☐ Onsite

Site: 1. วนอุทยานแห่งชาติเขาหินสอ อำเภอเมือง จังหวัดสุพรรณบุรี
UTM: 47P 1524271 N 666054 E Date: 1 Apr 22
Sampler: NPM#11 Technician: Surakit O.
Recorder: ECRD501618124 Approval: Sarawut K.

CONDITIONS

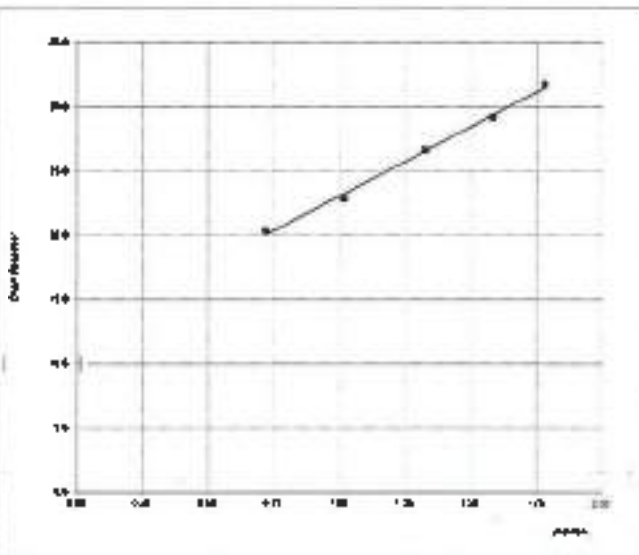
Barometric Press. (hPa): 1009.5 Corrected Pressure (mm Hg): 757.2
Temperature (deg C): 32.0 Temperature (deg K): 305.0
Average Press. (hPa): 1013.0 Corrected Avg Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0 Average Temp. (deg K): 303.0


CALIBRATION ORFICE


Brand: Tech 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	8.26	1.783	50.0	31.73	Slope = 10.8102
2	6.51	1.585	46.0	28.19	Intercept = 12.2479
3	4.56	1.328	42.0	26.86	Corr. coeff = 0.9982
4	2.66	1.016	36.0	22.85	SFR = 1.141
5	1.33	0.720	32.0	20.31	SEP = 38.74
					# of Observations: 5
					Range of Chart: 38
					at SFR $\pm 10\%$: 40



Calibrated by: 
(Surakit Damchohichit)
1 April 2022

Approved by: 
(Sarawut Keeruwat)
1 April 2022

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www.evltesting.com

Environmental Engineering Laboratory with the Ministry of Natural Resources

Revised: 14 Apr 2021/0003



บริษัท อีวีแอล จำกัด (มหาชน) 345/346 ถนนสุขุมวิท แขวงคลองเตยเหนือ เขตวัฒนา กรุงเทพฯ 10110
Evnlab Co., Ltd. 345/346/1 Soi Bangkhuaewong Bangkhen Bangkok 10110
Tel. : 02-6295774-9 Fax : 02-6295773 E-mail : info@evltesting.com



Verification Test Report

Report No.:

HO2200025-D003 -SLM 01

☒ PM

☐ Onsite UTM :

47 P 1529770 N 666289 E

Calibrated Date: 1 April 2022

Site : โครงการก่อสร้างอาคารพักอาศัยพร้อมสิ่งอำนวยความสะดวกของ สำนักงานปลัดกระทรวงกลาโหม

Equipment: Sound Level Meter

Manufacturer: ACO

Model: 6226

Serial : 50027

Environment: Temperature 31 °C Humidity 53 %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	93.40	-0.26	93.66

Calibrated By:

(Surakit Damcholvichit)

Date

1 April 2022

Approve By

(Sarawat Keawsinual)

Date

1 April 2022

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บริษัท อีวีแอล จำกัด (มหาชน) 500/10/1 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110
Tel : 02-862-0777-8 Fax : 02-862-1773 E-mail : info@evltesting.com



Verification Test Report

Report No.:

HO2200025-D003 -SLM 02

☒ PM

☐ Onsite UTM :

47 P 1529587 N 666247 E

Calibrated Date: 1 April 2022

Site : โรงพยาบาลเกษมราษฎร์ ประทับใจ

Equipment: Sound Level Meter

Manufacturer: ACO

Model: 6226

Serial : 40289

Environment: Temperature 31 °C Humidity 53 %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	93.70	0.04	93.66

Calibrated By:

(Surakit Damcholvichit)

Date:

1 April 2022

Approve By:

(Sarawut Keawsrinual)

Date:

1 April 2022

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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: ES0TE43C103362
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Calibration System

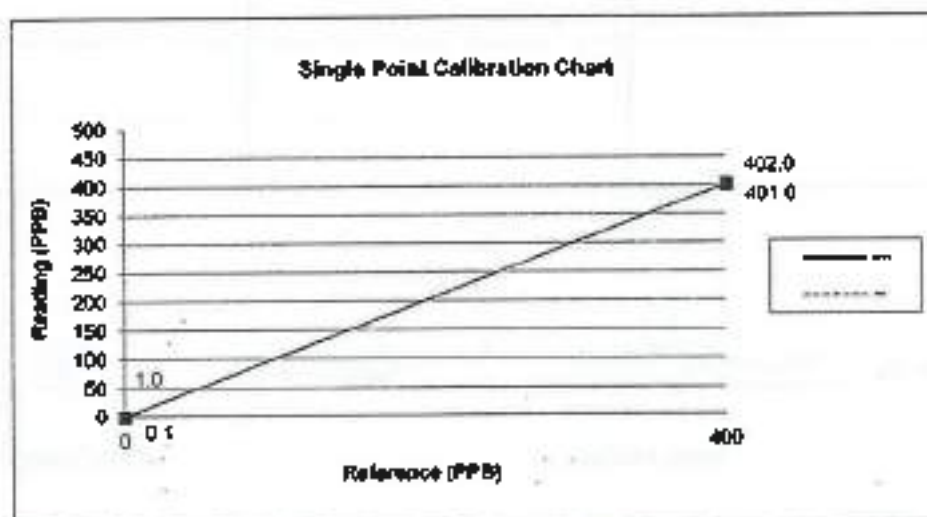
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO ₂ Conc 46.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 27.6 °C

Humidity: 50 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPM)	Reading (PPM)	Drift (PPM)	Reference (PPM)	Reading (PPM)	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



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530 ซอยนาฬิกา 7 แขวงปทุมวัน กรุงเทพมหานคร 10330 530 So Naenghae 7 Bangkhae Bangkok
Tel: 02-84244500-2 Fax: 02-84244508 Email: gpr@neediss.com



MODEL : S02 ANALYZER Model43C THERMO

DATE 1-04-2022

S/N : ES0TE43C103382

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	32548	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 Poontak

Approve By : Tanin Huadcharoen

Sirirat Poontak

Tanin Huadcharoen

Date: 1-Apr-22

Date: 1-Apr-22



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224 หมู่ 11 แขวง 2 เขตปทุมธานี ถนนพหลโยธิน กิโลเมตรที่ 11-13 ถนนรังสิต-ปทุมธานี กรุงเทพมหานคร 10170
Tel: 02-015-1546 Fax: 02-015-1547 E-mail: neediss@neediss.com



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6504008

Page:1/1

Calibrated Date: 1-Apr-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO_430	Manufacturer THERMO S/N: ES0TE430053884
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Calibration System

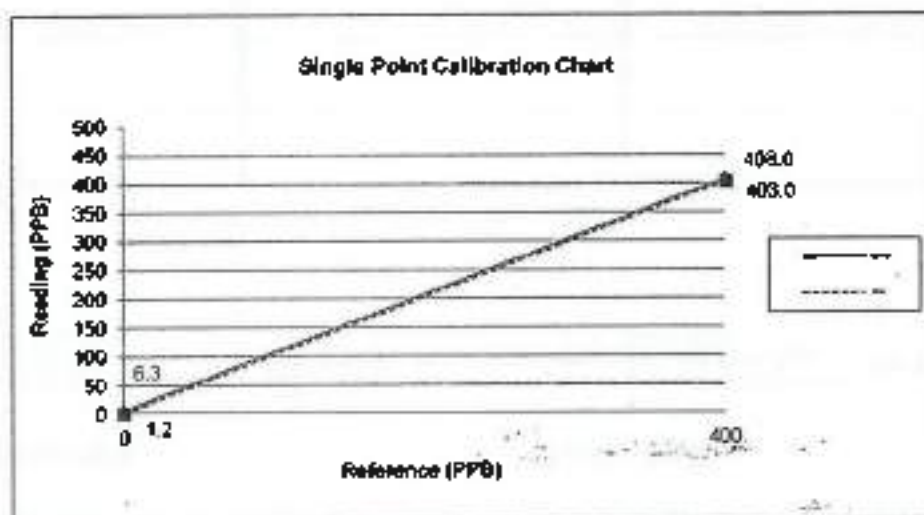
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 844	NO Conc 44.66 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 27.6 °C

Humidity: 47 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Unit (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	6.3	6.3	400.0	403	2.0
After	0.0	1.2	1.2	400.0	403	0.8



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MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 1-04-2022

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	32548	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	746
FLOW 0.350 - 0.650 LPM	0.42	0.4

Calibrate By : Sirint Poonlak

Approve By : Tanin Huadcharoen

Sirint Poonlak

Tanin Huadcharoen

Date: 1-Apr-22

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SO₂ Analyzer Verification Test Report

Calibration Report No.: 6504007
 Calibrated Date: 1-Apr-22

Page:1/1

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO 43C	Manufacturer: THERMO S/N: ESOTE43C703317
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Calibration System

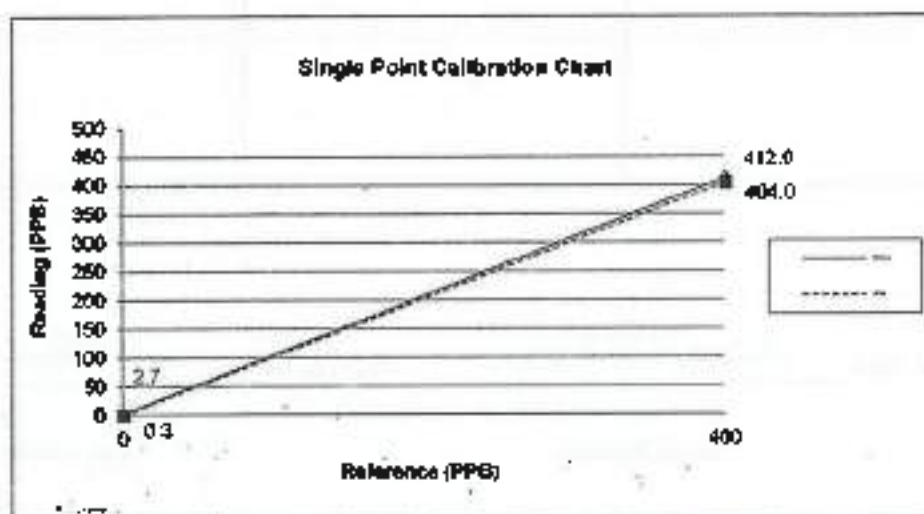
Calibrator Unit	Standard Gas
Dilutor Model: ESA MGC101 S/N: 792 ZERO AIR Generator: ZAG7001 S/N: 644	NO Conc: 44.88 PPM SO₂ Conc: 45.34 PPM CO Conc: 4500 PPM Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature 27.9 °C

Humidity: 47 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPM)	Reading (ppm)	Drift (PPM)	Reference (PPM)	Reading (ppm)	Drift%
Before	0.0	2.7	2.7	400.0	412	3.0
After	0.0	0.3	0.3	400.0	404	1.0



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20, Sanit Road 1, Sanit Road, Sanit Road, Bangkok 10110 - 230 Sanit Road 7 Bangkok Bangkok Bangkok
Tel: 02-012-1234567890 Fax: 02-012-1234567890 Email: info@needliss.com



MODEL : SO2 ANALYZER Model 430 THERMO

DATE : 1-04-2022

S/N : ESOTE43C703317

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 ~ +850 (V)	-650	-653
LAMP VOLTAGE 950 ~ 1200 (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 Poonlak

Approve By :

Tanin

Sirint Poonlak

Tanin Huadcharoen

Date:

1-Apr-22

Date:

1-Apr-22



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Tel: 02-500-7980 Fax: 02-801-1399 Email: neediss@neediss.com



SO₂ Analyzer Verification Test Report

Calibration Report No.: 8504008

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
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Calibration System

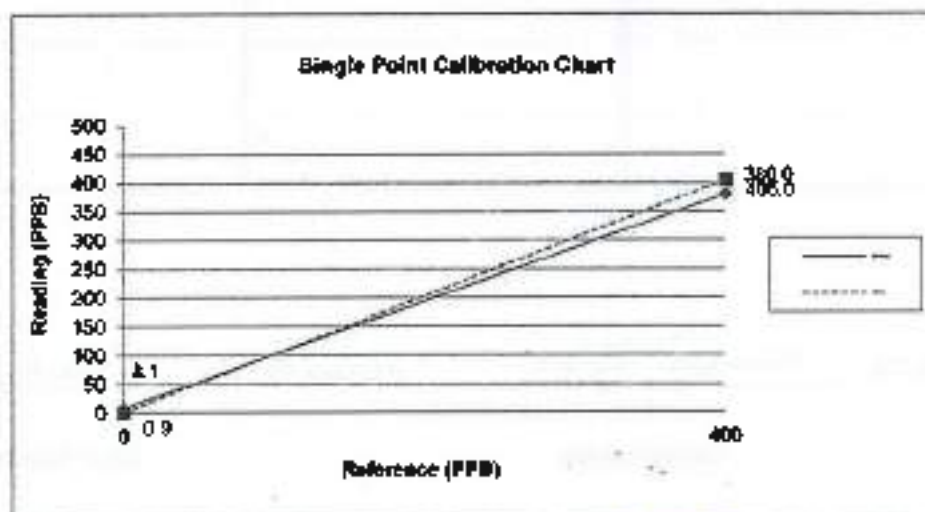
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature 28.1 °C

Humidity: 47 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPM)	Reading (PPM)	Drift (PPM)	Reference (PPM)	Reading (PPM)	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



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Tel: 02-8527-0743-0744 Fax: 02-8527-0745 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)	994	925
LAMP INTENSITY 20000 ~ 50000 Hz	32568	32577
INTER TEMP 15 ~ 45 DEG C	37	37
CHAMBER TEMP 47 ~ 31 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 : Sinrat PoonlekApprove By : Tanin

Sinrat Poonlek

Tanin Muecharoen

Date: 1-Apr-22

Date: 1-Apr-22

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Tel: 02-6071111-32600-3 Fax: 02-6071111-32600-3 Email: info@neediss.com**NOx Analyzer Verification Test Report**

Calibration Report No.: 6504006

Page: 1/2

Calibrated Date: 1-Apr-22

☒ PM ☐ Onsite**Instruments Information**

Analyzer Type: NO/NO ₂ /NO _x Analyzer Model: 42C	Manufacturer: THERMO S/N: ENOTE42CD75279
---	---

Calibration System

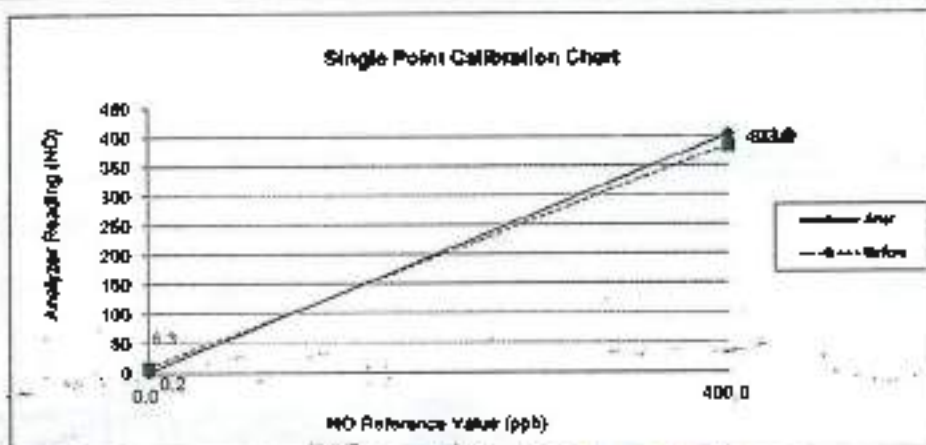
Calibrator Unit	Standard Gas
Dilutor Model: ESA MGC101 S/N: 792 ZERO AIR Generator: ZAG7001 S/N: 644	NO Conc: 44.68 PPM SO ₂ Conc: 45.34 PPM CO Conc: 4500 PPM Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature 27.4 °CHumidity: 49 %RH**Calibration Check (Before adjust)**

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	6.3	0.0	6.3	385	400.0	-1.9
NO ₂	3.8	0.0	3.8	26.0	0.0	3.3
NO _x	12.1	0.0	12.1	411	400.0	1.4

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.2	0.0	0.2	403	400.0	0.4
NO ₂	0.6	0.0	0.6	1.0	0.0	0.1
NO _x	0.8	0.0	0.8	404	400.0	0.5

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MODEL : NOx ANALYZER Model 42C THERMO

DATE : 1-04-2022

SN : ENOTE42CD7527B

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	-1
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	1279.0	1279.1
No/Nox Slope	1.00E-5	0.99E-5

Collaborate By: *Conrad T. Nelson*

APPROVE BY: Tavin

Skript Punkt 4

Tanin Hwadcharoen

Order:

1-Apr-22

Date:

1-Apr-22



Neediss Supply Instrument Co., Ltd.



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ผู้จัดทำ: ภาณุพงศ์ วัฒนศิริ

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

53/3811, VACH 7 VACH 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6504002

Page: 1/1

Calibrated Date: 1-Apr-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO_43C	Manufacturer THERMO S/N: ESOTE43C069065
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Calibration System

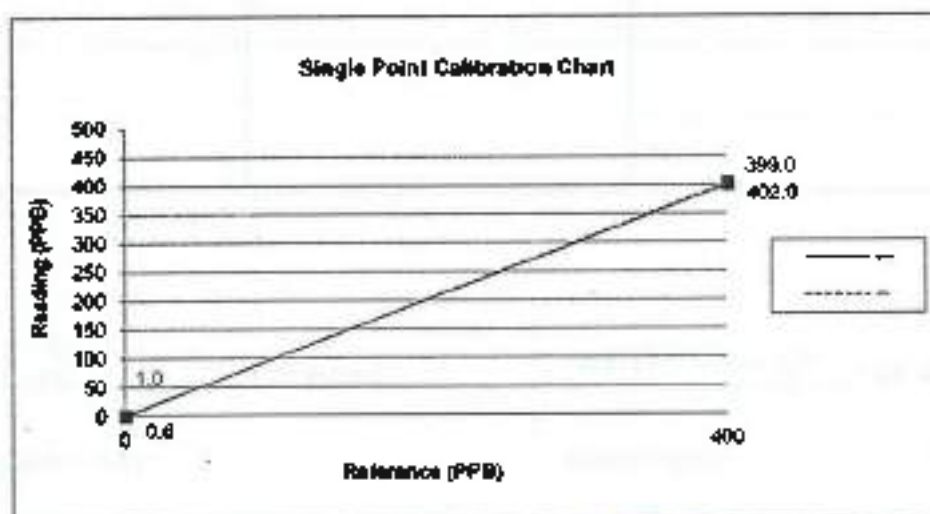
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 844	NO Conc 44.68 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature 26.2 °C

Humidity: 55 %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	399	-0.3
After	0.0	0.8	0.8	400.0	402	0.5



Erylab Co., Ltd.

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ผู้จัดการฝ่ายควบคุมคุณภาพ

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12/04/2022/1/1



MODEL : **SO2 ANALYZER Model 43C THERMO**

DATE : 1-04-2022

S/N : **E30TE43C060005**

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	32563	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

Sirirat Poonlak

Tanin Huadcharoen

Date: 1-Apr-22

Date: 1-Apr-22



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NOx Analyzer Verification Test Report

Calibration Report No.: 6503401

Page: 1/2

Calibrated Date: 1-Apr-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: ENOTE42C412226
--	--

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 28.4 °C

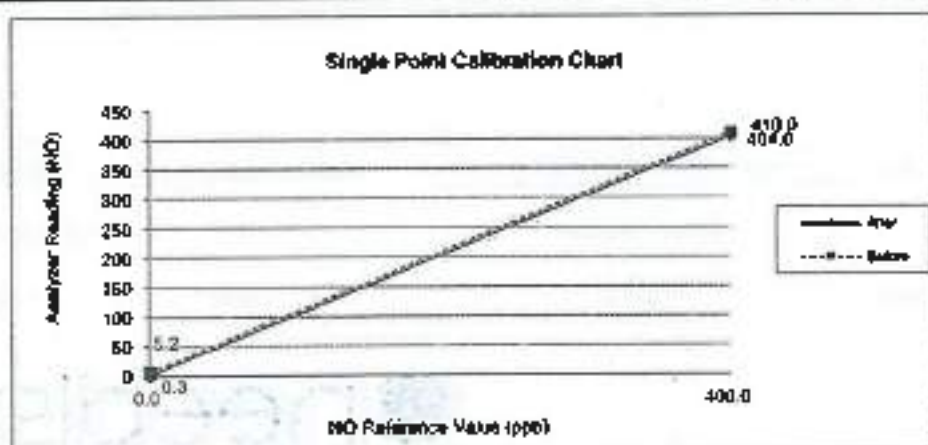
Humidity: 50 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	5.2	0.0	5.2	410	400.0	1.2
NO ₂	5.0	0.0	5.0	5.0	0.0	0.6
NOx	10.2	0.0	10.2	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	0.3	0.0	0.3	404	400.0	0.5
NO ₂	0.5	0.0	0.5	-2.0	0.0	-0.2
NOx	0.8	0.0	0.8	402	400.0	0.2



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ผู้จัดการฝ่ายควบคุมภาค

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We thank you for choosing to use our instrument



MODEL NOx ANALYZER Model 42C THERMO

DATE 1-04-2022

S/N : ENOTE42C41222B

Page:2/2

Test Function Value	Before	After
Range 100 (PPB)	500	500
PMT VOLTS -450 - +850 (V)	-675	-675
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 - 1,000.0 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/Max BKG	12/9.0	12/9.1
No/Max Slope	1.0/0.0	0.9/0.3

Calibrate On

Capt. B. M. B.

Approve By :

Tami

Suairat Poontrak

Tarin Huchareon

Dunbar

14 APR-22

Date:

1-Apr-22



Needle Supply Instrument Co., Ltd.



รับรองว่านางถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ ฯ

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We know the best thing to give our children and

Certificate of Calibration

Calibration Certification Information

Cal. Date: January 19, 2022 Rootsrameter 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	1.0651
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 = $Vstd / \Delta Time$	Qa = $Va / \Delta Time$
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: rootsrameter manometer reading (mm Hg)
 Ta: actual absolute temperature (°K)
 Pa: actual barometric pressure (mm Hg)
 b: intercept
 m: slope

RECALIBRATION

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

CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Banggood, Pathum Thani, 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. : 65-200027-1

Page : 1 of 2

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

Equipment : Electronic Balance
Manufacturer : Sartorius **Model :** SECURA224-IS
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 : Akarajith 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
0261-02624	002213-003	16 Nov 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by:

(Sunchai Promthong)

Laboratory Manager



รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co., Ltd.

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

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

Certificate of Calibration

Certificate No. : 65-200022-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UNC Condition As-Received : Good

Departure of indication from nominal value

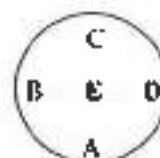
Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.01	0.0001	0.00011
0.1	0.0001	0.00011
1	0.0000	0.00011
2	0.0001	0.00011
5	0.0000	0.00012
10	0.0001	0.00012
20	-0.0001	0.00013
50	0.0000	0.00014
100	-0.0002	0.00020
200	-0.0004	0.00038

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%.

Exemption 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 -



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukkaprachasri 3 Rd., Banggood, Phraek, Nonthaburi 11120

Tel 1021 964 6211 Fax 1021 964 5135, e-mail : calibratech.co@citynet.com, calibratech.cal@hotmail.com



ISO-TISA-TS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-20022-2

Page : 1 of 2

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

Equipment : Electronic Balance
Manufacturer : Sartorius Model : SECURA 102-15
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 : 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
F1X1-F1821	65-210044-1	31 Jul 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Thongkang)

Laboratory Manager



รับรองว่าถูกต้อง

Envilab Co., Ltd.

ผู้จัดการฝ่ายควบคุมคุณภาพ

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

7/106-7 Moo 1, Sukhaphruekhan 3 Rd., Bangpoo, Prakkong, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 65-200072-2

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	0.021

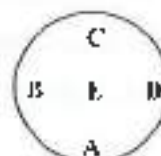
This result of calibration was found accurate as shown on date and place of calibration only.

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



Repeatability

Load test : 2000 g

Stdev. : 0.000 g

- 000 -



Calibratech Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ





THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-64/0406

MTC No. EEL BP. 68/0364

CALIBRATION CERTIFICATE

Submitted by : Envitab Co., Ltd.

Address : 540, 540/1 Soi Bangkhoe 7, Bangkhoe, Bangkok, 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
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FMEL.MFC.002 Rev.4

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Thailand
Tel. (66) 0 2619 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2572 8592
E-mail : sumalee@tistr.or.th

บริษัท อีนิแทบ จำกัด
ผู้จัดการฝ่ายควบคุมคุณภาพ



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 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 2
1/2 inch Brüel&Kjær 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 Brüel&Kjær 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 Brüel&Kjær 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 :


(Mr. Tawikiat Iamsamran)

Approved by :


(Mr. Prawan Klunypa)
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 : 2011264031001119001

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.

FIABL.MTC.002 Rev.4

Head Office

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

Office/Laboratory

Soi 10, Bangpoo Industrial Estate, Subhummak Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mto@tistr.or.th

Office

101 Prachayothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 1121
E-mail : tump@tistr.or.th



Envirob Co., Ltd. บริการการวิเคราะห์คุณภาพ

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer:	AIR LIQUIDE (THAILAND) LTD	Reference Number:	160-402306648-1
Part Number:	E05NI91E15A0003	Cylinder Volume:	148.7 CF
Cylinder Number:	EB0146408	Cylinder Pressure:	2015 PSIG
Laboratory:	124 - Plymouthville - PA	Valve Outlet:	560
PGVP Number:	A12022	Certification Date:	Jan 03, 2022
Gas Code:	CO, CO2, NO, NOX, SO2, BALN		

Expiration Date: Jan 03, 2030

Certification performed in accordance with "EPA Traceability Protocol for Analysis and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800R-12-021, using the assay procedures listed. Analytical methodology does not require correction for analytical interference. The 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 the calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 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	99.02 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	9.000 %	7.967 %	G1	+/- 0.8% NIST Traceable	12/27/2021
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No.	Concentration	Uncertainty	Expiration Date
NITRM	02010241	KAL004894	99.45 PPM CARBON MONOXIDE/NITROGEN	+/- 0.5%	Oct 15, 2024
NITRM	200610-58	CC733475	99.61 PPM NITRIC OXIDE/NITROGEN	+/- 0.6%	Oct 06, 2025
QMS	124206689119	CC322885	4.294 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Sep 03, 2024
NITRM	11010419	KAL004813	99.6 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Jul 28, 2023
NITRM	05010830	K018200	13.94 % CARBON DIOXIDE/NITROGEN	+/- 0.8%	Jan 30, 2024

ANALYTICAL EQUIPMENT		
Instrument/Manufacturer/Model	Analytical Principle	Last Multi-point Calibration
Nicolet iS50 FTIR AUP2010245 CO2	FTIR	Dec 02, 2021
SIEMENS ULTRAMAT6E N1-C8-180	NDIR	Dec 08, 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

Test Data Available Upon Request

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

UF 0X5CX



Melinda Miller
Approved for Release

Page 1 of 160-402306648-1



OK
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Calibration Certificate

Part Number: 721A2601

Description: Micromate with DIN Geophone

Serial Number: UM18213

Calibration Date: MAR 26 2021

Calibration Reference Equipment: 714J7402

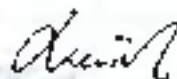
Instantel certifies that the above product was calibrated in accordance with the applicable Instantel procedures. These procedures are part of a quality system that is designed to assure that the product listed above meets or exceeds Instantel specifications.

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

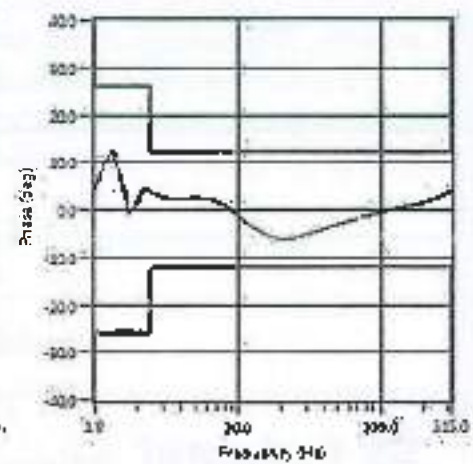
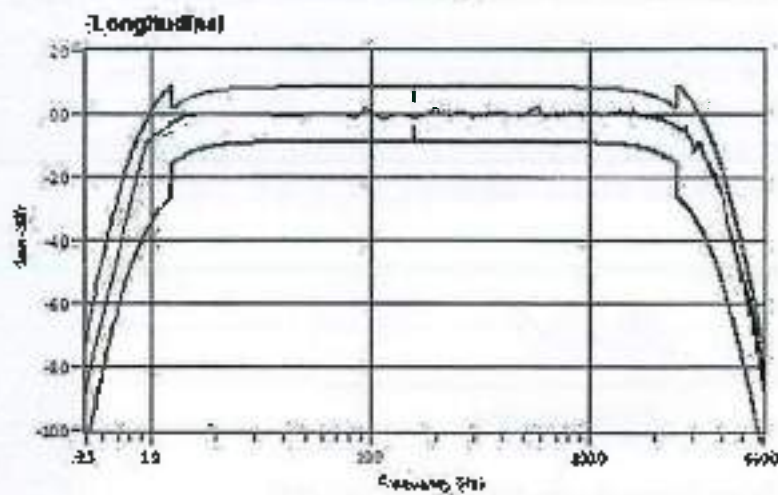
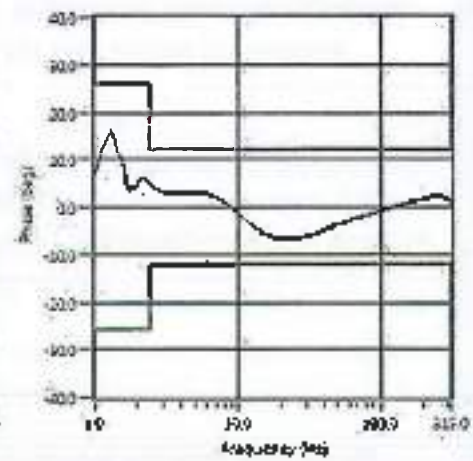
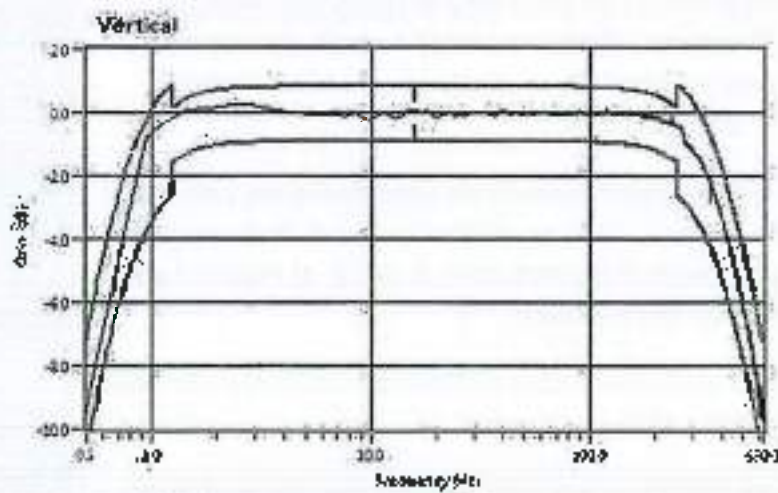
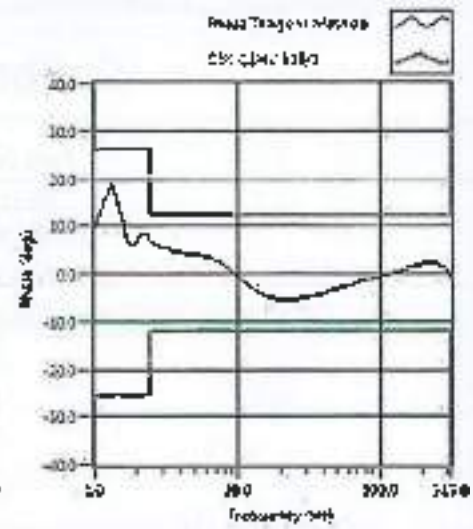
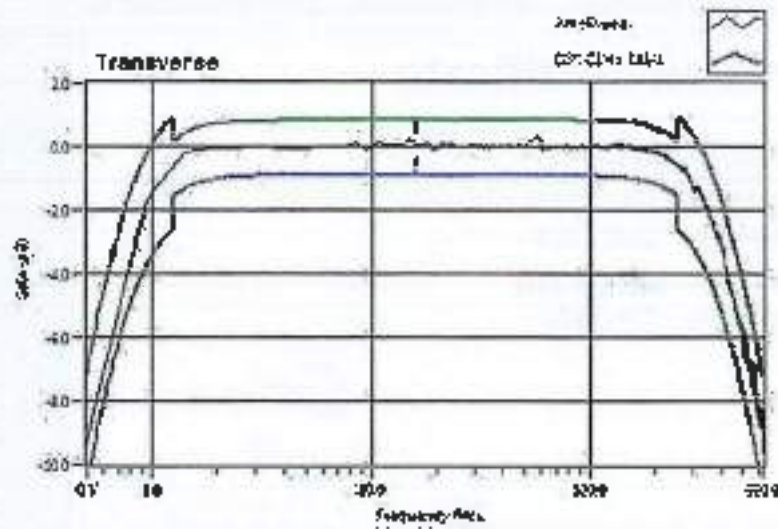


309 Legget Drive, Ottawa, Ontario, K2K 3A3, (613) 592-4642



วัดชล
วิศวกรรมสถานแห่งประเทศไทย
ผู้จัดการฝ่ายควบคุมคุณภาพ

Frequency Response of UM18213



UMT Logo

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพฯ

Mettler Toledo (Thailand) Ltd.
346/4 - 846/5 Laksale Rd., Bangna Tai Sub-Center
Bangna District, Bangkok 10260
+662 721 0382
MT+TH.ServiceSupport@mtl.com



Accuracy Calibration Certificate

Customer

Company: Envisab Co., Ltd.
Address: 540, 540/1 Soi Bang Khao 7, Bang Khao
City: Bang Khao Contact: Ngarmhip Sampangruang
Zip / Postal: 10169
State / Province: Bangkok
Order Number: 

Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: XSR205DU Asset Number: N/A
Serial No.: B911383567 Terminal Model: SPAT
Building: N/A Terminal Serial No.: B911383567
Floor: 3 Terminal Asset No.: N/A
Room: 0304

Range	Max. Capacity	Readability (g)
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:

CPM002/20

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/linearity 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: 38.7 %	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 Chaoanantakul



- ☒ Naruephon Chaoanantakul
☐ Sant Jinyom
☐ Surachet Sukhate



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Measurement Results

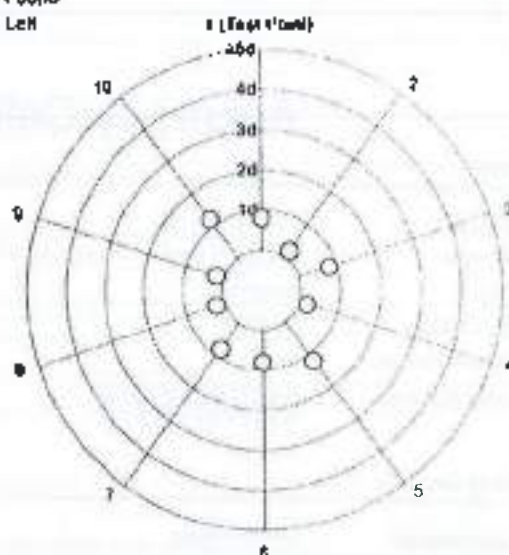
Repeatability

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	0.000008 g	N/A
--------------------	------------	-----

○ As Found
→ As Left



The "10" in the graph represents the readability of the range interval in which the test was performed.

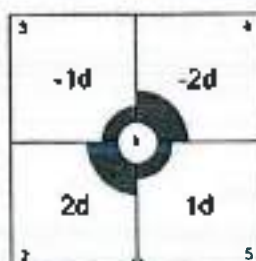
The results of this graph are based upon the absolute values of the differences from the mean value.

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	99.9996 g	N/A
5	100.0001 g	N/A

Maximum Deviation	0.0002 g	N/A
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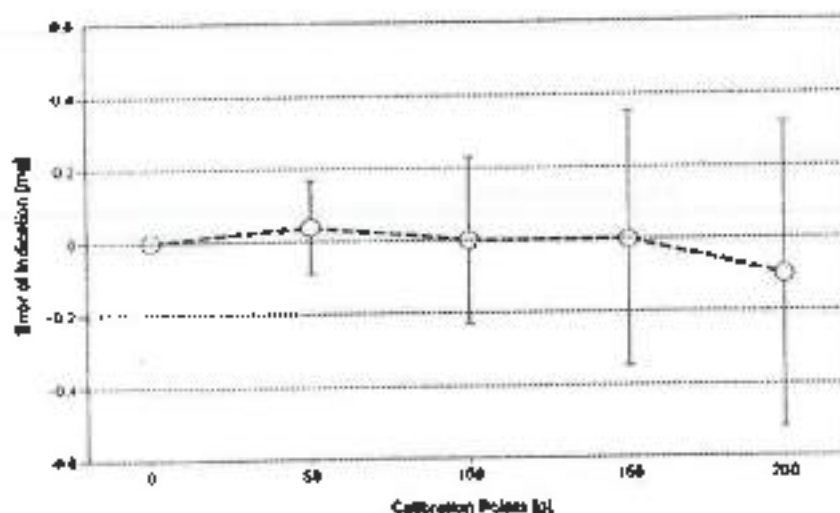
As Found

The "1" 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	0.020 mg	2
3	0.5000 g	0.5000 g	0.0000 g	0.026 mg	2
4	0.9999 g	0.9999 g	0.0000 g	0.032 mg	2
5	1.9999 g	2.0000 g	0.0000 g	0.040 mg	2
6	5.0000 g	5.0000 g	0.0000 g	0.048 mg	2
7	10.0000 g	10.0000 g	0.0000 g	0.062 mg	2
8	49.9999 g	50.0000 g	0.0000 g	0.115 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	199.9999 g	-0.0001 g	0.42 mg	2



○ As Found

● As Left

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

The uncertainty stated is the expanded uncertainty of 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.:	WS22	Date of Issue:	06-Jan-2022
Certificate Number:	177038	Calibration Due Date:	06-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

Thomas Hygrometer

Equipment No.:	W193	Date of Issue:	14-Jan-2021
Certificate Number:	21H1221	Calibration Due Date:	01-Jun-2022

Remarks

EACF 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 as 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: $1.5 \cdot 10^{-5} / K$

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

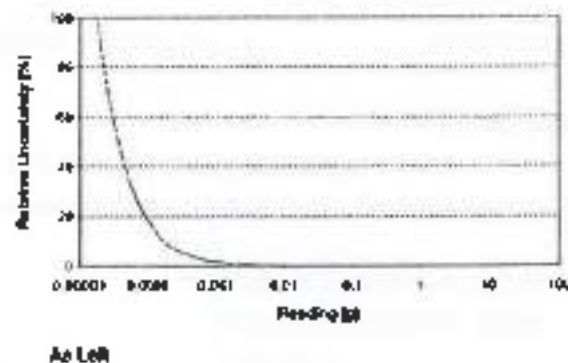
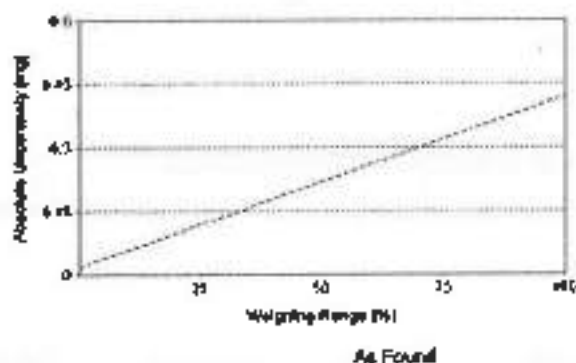
Linearization of Uncertainty Equation

	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	$U_2 = 0.06 \text{ mg} + 0.00482 \text{ mg/g} \cdot R$	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	0.028 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 ranges of the device.



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



Certificate of Calibration

Reference No. : 4182/2202-01/ Certificate No. : L2203-290
Customer : EnviLab Co., Ltd. (Head Office)
640, 640/1 Soi Bangkhao 7, Bangkhao,
Bangkhao Bangkok 10160
Equipment : Digital Thermo-Hygrometer
Manufacturer : Testo
Model : 608-H1
Serial No. : 83363807
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	06000089	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. Supachai Sakai

☐ Mr Phayak Tothit

☒ Miss Tanleraporn Petlong

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 %



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ใบรับรองการสอบเทียบ
ผู้จัดทำ: ฝ่ายควบคุมคุณภาพ

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 **



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Sp.

Certificate of Calibration

Certificate No. : 65-420020-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkline 7, Bangkluang, 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	61221875	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



Envilab Co., Ltd.

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ



The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 65-420024-1

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	0.046
	-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	0.0044
	6.935	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



รับรองว่าแม่นยำถูกต้อง
ผู้จัดทำ : วิศวกรชำนาญการพิเศษ





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. :	ELAB00HI914701
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 Bangkhee 7, Bangkhee, Bangkhee, 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 :	Walelak Sirithean

Approved by :

Malu
Approved Signatory

- (/) Malee Butkruea
() Saithip Meangmal
() Warakorn Lemgatrakul

Issue Date :

22 March 2022



Chwathai
รับรองสำเนาถูกต้อง
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

-o-o-

Mdu



EnviLab Co., Ltd.

Mdu
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

a 1100969

Certificate of Calibration

Certificate No. : 64-400527-3

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540, 540/1 Soi Bangkhao 7, Bangkhao, 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. : ELABREPRIG140L

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%

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Certificate of Calibration

Certificate No. : 64-400527-3

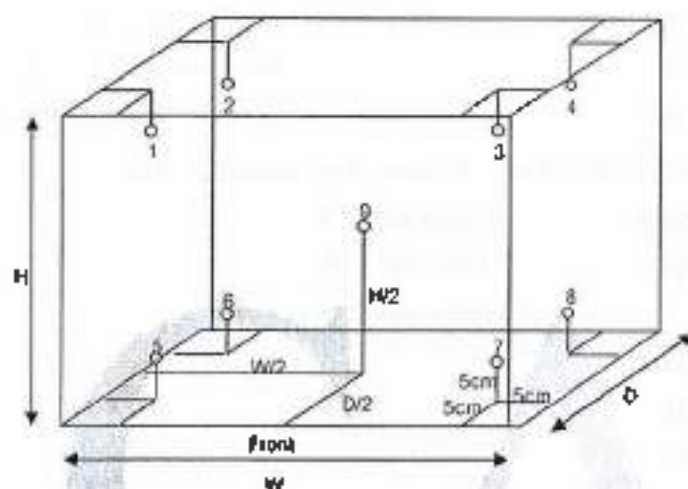
Page : 2 of 2

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	10	
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%

- 0/0 -

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ผู้จัดการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co., Ltd.

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

Tel: 021 964-6211 Fax: 021 964-3155, e-mail: calibratech.ent@yahoo.com, calibratech.co.th@gmail.com



MSC-TISI-TIS17025
CALIBRATION 0430

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 : Bunjerd Masri

Calibration Method : CAL-M4004, TLAS G-20

The temperature source 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%

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CAL-FR0011-03



รับรองสำเนาถูกต้อง
บริษัท เวิลแลบ จำกัด
ผู้ให้บริการฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co.,Ltd.

7106 7 Moo 2, Sukhaphrachan 3 Rd., Bangpood, Pakkret, Nonthaburi 11120

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

Certificate of Calibration

Certificate No. : 64-400569-1

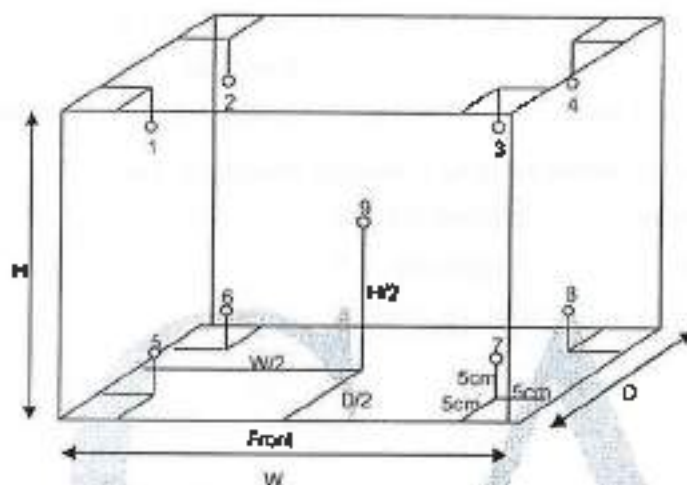
Page : 2 of 2

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	0.57	

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
ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 65-400155-2

Page : 1 of 2

Submitted by : Envlab 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, Envlab 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 : Penphon Chaipai

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%

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Certificate of Calibration

Certificate No. : 65-450155-2

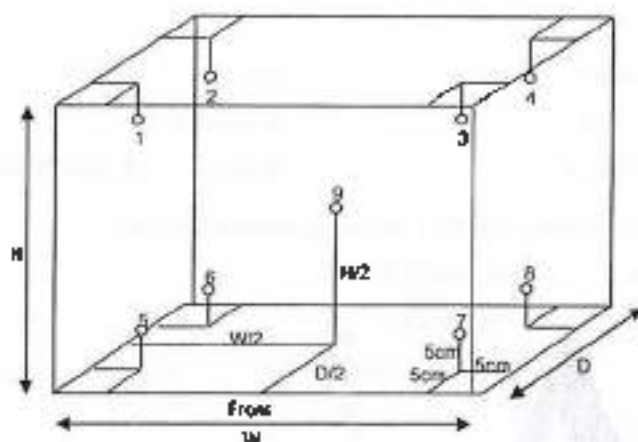
Page : 2 of 2

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 combining uniformity of the air chamber

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

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

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B



Ok

รับรองสำเนาถูกต้อง

Calibratech Co., Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 65-400053-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

340,540/1 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 Champu

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%

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Certificate of Calibration

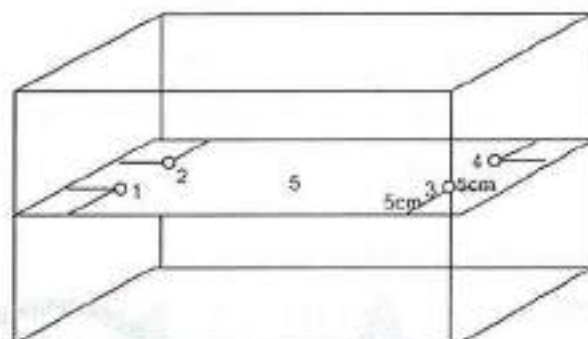
Certificate No. : 65-40053-1

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%

- o/o -

B ✓



Old label

รับรองสำเนาถูกต้อง
ผู้ตรวจรับมอบงาน: คุณสุภากร



Certificate of Calibration

Certificate No. : 65-300146-10

Page : 1 of 2

Submitted by : Buwila 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-02013

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

Relative Humidity : (50 ± 15) %

Air Pressure : 1002.0 mbar

Date of Receipt : 09 March 2022

Date of Calibration : 21 March 2022

Date of Issue : 21 March 2022

Calibrated by : Aréont Sombun

Calibration Method : In-house method CAL-M300 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

210102

64-200354-1

02 Jun 2022

National Institute of Metrology (Thailand) (NIMT)

Approved by :



(Wipa Tondee)

Supervisor

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CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhaphrasan 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. : 65-300146-10

Page : 1 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%

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D.



Signature

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 65-300147-4

Page : 1 of 2

Submitted by : Envitab Co.,Ltd.

540, 540/1 Soi Bangkhao 7, Bangkhoe, 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 : Arceerit Sombun

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

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

Electronic Balance

ID No.

Cert. No.

Due Date

Traceability

741007

64-200054-1

02 Jun 2022

National Institute of Metrology (Thailand) (NIMT)

Approved by :



(Wipat Tavee)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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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

DUC Condition As-Received : Good

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

Uncertainty of measurement within \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



Ch. Chai

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



ประจำเดือนพฤษภาคม พ.ศ. 2565



TSP High Volume Sampler Calibration

Verification Report No.

HO200025-D004 -TSP 01

☐ PM ☒ Onsite
 Site: โรงเรียนอัสสัมชัญคอนแวนต์ กรุงเทพมหานคร สำนักงานเขตคลองสามวา กรุงเทพมหานคร
 UTM: 47P 1524271 N 866054 E Date: 1 May 22
 Sampler: HTSP#12 Technical: Surakol D.
 Recorder: ECORANG15315224 Approval: Sarawul K.

CONDITIONS

Barometric Press. (hPa) 1010.0

Temperature (deg C): 33.0

Average Press. (hPa), 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg), 757.6

Temperature (deg K) 306.0

Corrected Avg. Press. (mm Hg) 759.8

Average Temp. (deg K) 303.0

CALIBRATION OFFICE

Beardt. Tisch Environmental, Inc.

Model TE-5028A

Serial# 1328

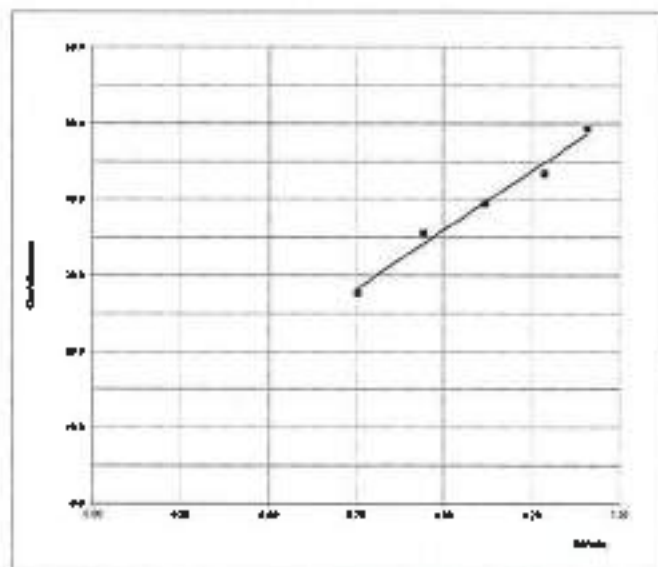
Qstd Slope	1.63957
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Gold Interest	-0.01202
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Date Certified: 18 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Q _{std} (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION	
1	5.42	1.408	50.0	49.26	Slope = 30.9614 Intercept = 4.9271 Corr. coeff = 0.9910	
2	4.52	1.285	44.0	43.35		
3	3.42	1.119	40.0	39.41		
4	2.42	0.942	36.0	35.47		
5	1.54	0.753	28.0	27.59		
					# of Observations	5
					Range of Chart at 1.1 - 1.7 m ³ /min	40 58



Calibrated by:

(5urkill DarnchoyMehil)

1 May 2022

Approved by:

(Sarbajit Karmasrma)

1 May 2022

But, mean them not as Homages & adulations, without the written approbation of the said Co. J. M.

www.evltesting.com

Environ Monit Assess (2008) 141:139–149

PLANT 28: *Samolus* (2003)



Envilab Co., Ltd.

วิธีร้องเรียนหากถูกละเมิด

ผลิตภัณฑ์จากยางพารา



TSP High Volume Sampler Calibration

Verification Report No.
 HQ2200025-D004 -TSP-02

☐ PM ☒ Onsite

Site: กรุงเทพมหานคร/กรุงเทพฯ

UTM : 47P 1529602 N 686283 E

Sampler: NTSP#01

Recorder: ECRANG16315224

Date: 1 May 22

Technical: Surakul D.

Approval: Sarinul K.

CONDITIONS

Barometric Press. (hPa): 1009.6

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 737.4

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#: 1326

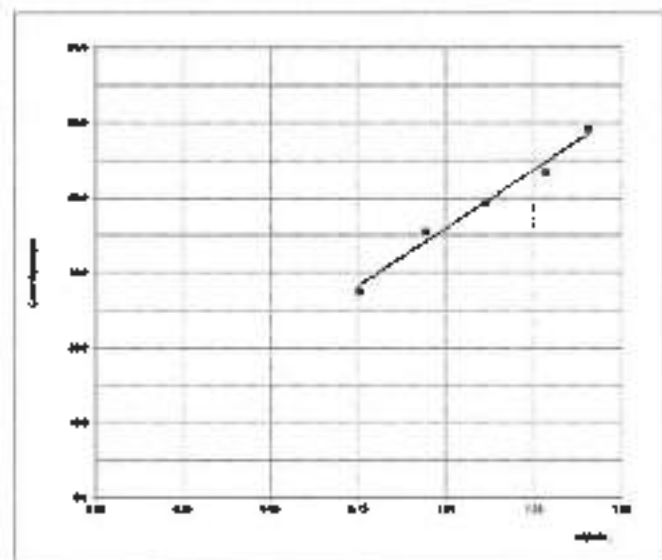
Qstd Slope: 1.63957

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
1	8.21	1.732	54.0	63.29	
2	6.35	1.524	48.0	47.37	Slope = 22.8634 Intercept = 12.9243 Corr. coeff. = 0.9976 # of Observations: 5 Range of Chart at 1.1 - 1.7 m3/min: 30 52
3	4.51	1.285	42.0	41.44	
4	2.62	0.982	36.0	35.52	
5	1.38	0.714	30.0	29.60	



Calibrated by:

(Surakul Darndehichai)
 1 May 2022

Approved by:

(Sarinul Keswanul)
 1 May 2022

This report shall be rendered null and void without the approval of EnviLab Co., Ltd.

www.evltesting.com



บริษัท อีวีแอล จำกัด (มหาชน) 15/151 หมู่ 7 ต.บ้านใหม่ อ.เมือง จ.นนทบุรี 11000
 Evl-Gen Co., Ltd. 15/151 หมู่ 7 ต.บ้านใหม่ อ.เมือง จ.นนทบุรี 11000
 Tel: 02-552-8771-8 Fax: 02-552-2772 E-mail: info@evltesting.com



www.evltesting.com

PM10 High Volume Sampler Calibration

Verification Report No.

HQ2200025-0004 -PM 01

L PM G OnSite

Site: โครงการก่อสร้างอาคารพักอาศัยพร้อมสิ่งอำนวยความสะดวกของ สำนักงานปลัดกระทรวงมหาดไทย

UTM: 47P 1524271 N 686054 E

Date: 1 May 22

Sampler: HPMH1

Technician: Sunakot D.

Recorder: ECRDS01618124

Approval: Sarawut K.

CONDITIONS

Barometric Press. (hPa): 1010.0

Corrected Pressure (mm Hg): 757.6

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: Tech Environmental, Inc

Slope: 1.02657

Model: TE-5028A

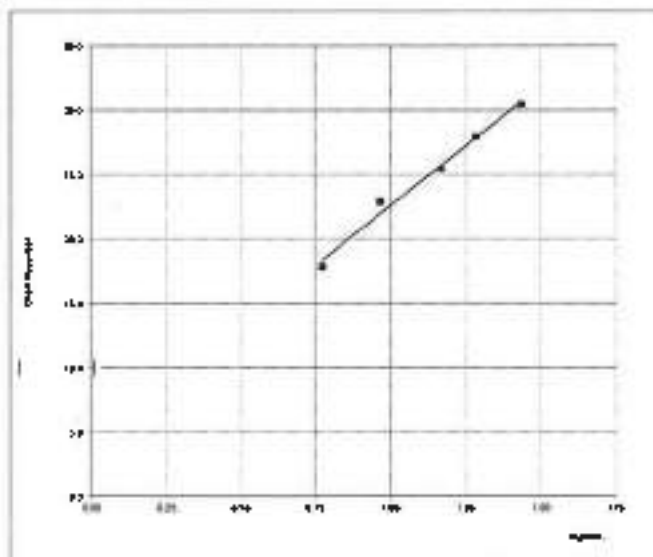
Intercept: -0.00753

Serial: 1328

Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Q ₀ (m ³ /min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	5.32	1.435	48.0	30.51	Slope = 18.6271
2	4.26	1.285	44.0	27.96	Intercept = 3.9382
3	3.52	1.169	40.0	25.42	Corr. coeff = 0.9936
4	2.41	0.969	36.0	22.88	SFR = 1.145
5	1.53	0.773	28.0	17.80	SSP = 39.74
					# of Observations: 5
					Range of Chart: 37
					at SFR ±10%: 42



Calibrated by:

(Sunakot Damcholvichit)

1 May 2022

Approved by:

(Sarawut Keawsthuai)

1 May 2022

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www.evltesting.com



รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ



บริษัท อีวีแล็บ จำกัด (EVL) มีสำนักงานใหญ่ตั้งอยู่ที่
EVL Co., Ltd., 595/201 ซ. บางปะกอก 15 แขวง บางปะกอก เขต บางปะกอก 10130
Tel : 02-062-7111-0 Fax : 02-062-7111-1 E-mail : info@evltesting.com



www.evlab.co.th

PM10 High Volume Sampler Calibration

Verification Report No.

HO2200025-D004 -PM 02

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: กรุงเทพมหานคร เขต บางพลัด	
UTM : 47P 1529602 N 656283 E	
Sampler: NPM802	
Recorder: ECRDS01610124	
Date: 1 May 22	
Technical: Surakul D.	
Approval: Saranul K.	

CONDITIONS

Barometric Press. (hPa): 1008.8
Temperature (deg C): 32.0
Average Press. (hPa): 1013.0
Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.4
Temperature (deg K): 305.0
Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg K): 303.0

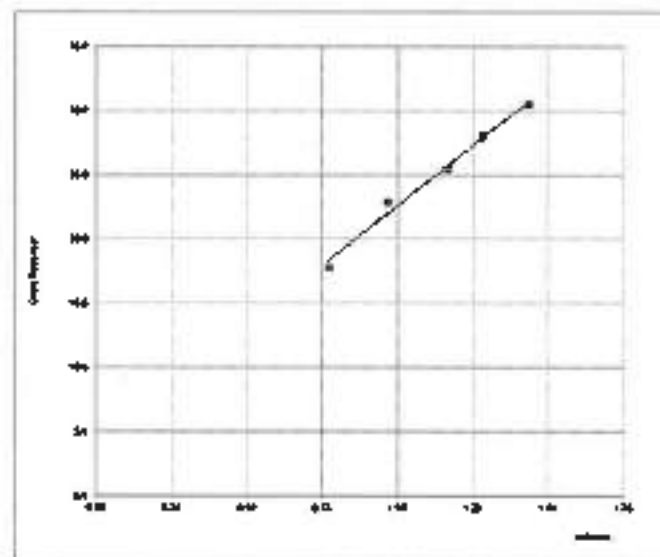
CALIBRATION ORIFICE


Brand: Tish Environmental, Inc
Model: TE-5028A
Serial#: 1328

Slope: 1.02867
Intercept: -0.00753
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	8.20	1.777	52.0	39.00	Slope = 14.4910
2	6.90	1.559	48.0	30.46	Intercept = 7.6898
3	4.40	1.304	42.0	25.65	Corr. coeff. = 0.9958
4	2.50	0.985	36.0	22.84	SFR = 1.141
5	1.10	0.856	26.0	16.50	SSP = 38.17
					# of Observations: 5
					Range of Chart: 36
					at SFR ±10%: 40



Calibrated by: 
(Surakul Damchornichai)
1 May 2022

Approved by: 
(Saranul Kesornthaisri)
1 May 2022

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บริษัท อีวีแอล จำกัด 5403401, 7 Bangkhoei T. Bangkok Bangkok 10300
Evinlab Co., Ltd. 5403401, 7 Bangkhoei T. Bangkok Bangkok 10300
Tel: 02-206-3577-8 Fax: 02-807-9779 E-mail: info@evltesting.com



Download Evinlab App on App Store

Verification Test Report

Report No.:

HO2200025-D004 -SLM 01

☒ PM

☐ Onsite UTM:

47 P 1529770 N 666269 E

Calibrated Date: 1 May 2022

Site : โครงการก่อสร้างอาคารพักอาศัยพร้อมสิ่งอำนวยความสะดวก ตามโรงงานแปรรูปกระเทียมกลีบใหญ่

Equipment: Sound Level Meter

Manufacturer: ACO

Model: 6226

Serial : 50027

Environment: Temperature 29 °C Humidity 56 %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 Damchohichil)

Date:

1 May 2022

Approve By:

(Tanin Huadcharoan)

Date:

1 May 2022

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บริษัท เอวิเทสติ้ง จำกัด 340/540/1 ซอยบางพลี 7 แขวง/ตำบล บางพลีใหญ่ เขตภาษีเจริญ กรุงเทพฯ 10180
EVL Co., Ltd. 340/540/1 Soi Bangkhoe 7 Bangkhoe Bangkok Bangkok 10180
Tel : 02-802-3577-8 Fax : 02-802-3773 E-mail : info@evltesting.com



Setting Standard Support in detail

Verification Test Report

Report No.:

HO2200025-D004 -SLM 02

☒ PM

☐ Onsite UTM :

47 P 1529587 N 666247 E

Calibrated Date: 1 May 2022

Site : โรงพ่นยาสูบกรมราชทัณฑ์

Equipment: Sound Level Meter

Manufacturer: ACO

Model: 6226

Serial : 40289

Environment: Temperature 29 °C Humidity 50 %RH

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

Serial No.1351076

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:

(Surakrit Darnchohichit)

Date:

1 May 2022

Approve By:

(Tanin Huadcharoan)

Date:

1 May 2022

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Neediss Supply Instrument Co., Ltd.
535 ซอยบางพลี 7 แขวงบางพลี เขตบางพลี กรุงเทพฯ 10160 535 Soi Bangkhoe 7 Bangkhoe Bangkok
Tel: 02-802-0980-2 Fax: 02-802-3988 E: info@neediss.com



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6505009

Page: 1/1

Calibrated Date: 1-May-22

☒ PM ☐ Ozone

Instruments Information

Analyzer Type: SO ₂ Analyzer	Manufacturer THERMO
Model: THERMO_43C	S/N: ESOTE43C103362

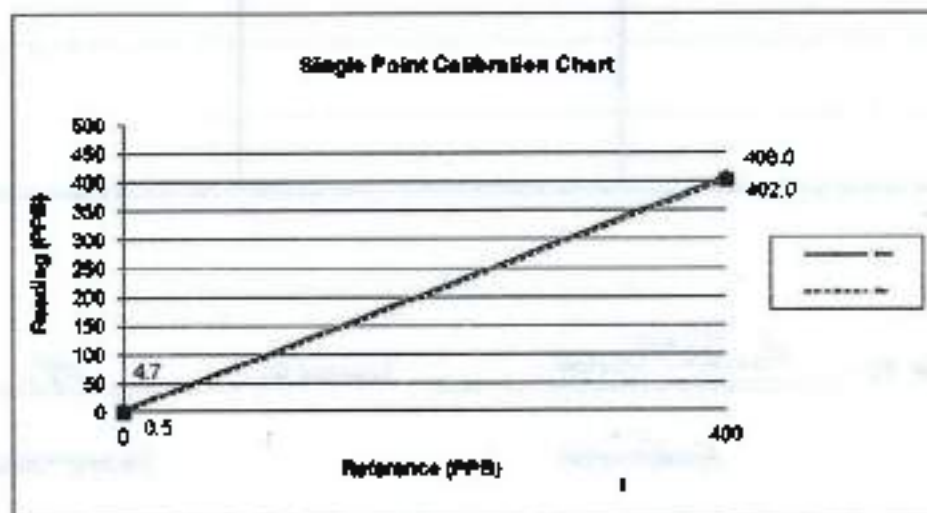
Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101	NO Conc 44.88 PPM
S/N: 792	SO ₂ Conc 46.34 PPM
ZERO AIR Generator ZAG7001	CO Conc 4500 PPM
S/N: 844	Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature 26.9 °CHumidity: 47 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPM)	Reading (ppm)	Drift (PPM)	Reference (PPM)	Reading (ppm)	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



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Envilab Co., Ltd.

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Neediss Supply Instrument Co., Ltd.

536 หมู่ 7 ตำบลบางพลาย อำเภอบางพลาย จังหวัดสุพรรณบุรี 32100 536 Soi Bangkhao 7 Bangkhao Bangkhao Bangkok
Tel: 02-802-0980-2 Fax: 02-802-0986 E: info@neediss.com



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 cm Hg	764	765
FLOW 0.350 - 0.650 LPM	0.42	0.4

Calibrate By :

Sirirat Poonlak

Approve By :

Sarawut Keewarinusol

Sirirat Poonlak

Sarawut Keewarinusol

Date:

1-May-22

Date:

1-May-22

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NOx Analyzer Verification Test Report

Calibration Report No.: 6505008

Page: 1/2

Calibrated Date: 14-May-22

☒ PM ☐ Onsite

Instruments Information

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

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model: ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc: 44.68 PPM O2 Conc: 45.34 PPM CO Conc: 4900 PPM Expire Date: Feb 19, 2024 EB0140782

Environment: Temperature 26.8 °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	7.4	0.0	7.4	406	400.0	1.1
NO ₂	4.1	0.0	4.1	3.0	0.0	0.4
NOx	11.5	0.0	11.5	412	400.0	1.5

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.2	0.0	0.2	404	400.0	0.5
NO ₂	0.3	0.0	0.3	2.0	0.0	0.2
NOx	0.5	0.0	0.5	406	400.0	0.7



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Tel. 02-602-3960-2 Fax. 02-602-3968 E:info@neediss.com

MODEL : NOx ANALYZER Model 42C THERMO

DATE : 1-05-2022

SN : ENOTE42C671356

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 ~ -850 (V)	-675	-676
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	358	360
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	1279.0	1279.1
Nox/Nox Slope	1.00/0.8	0.9/0.8

Calibrate By : Sinrat PoonlekApprove By : K.

Sinrat Poonlek

Sarinut Keawwattana

Date: 1-May-22

Date: 1-May-22

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Model

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Tel. 02-802-3788-2 Fax: 02-802-3788 E-mail: neediss.com



SO₂ Analyzer Verification Test Report

Calibration Report No.: 8505007

Page:1/1

Calibrated Date: 1-May-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO_43C	Manufacturer THERMO S/N: ESOTE43C703317
--	--

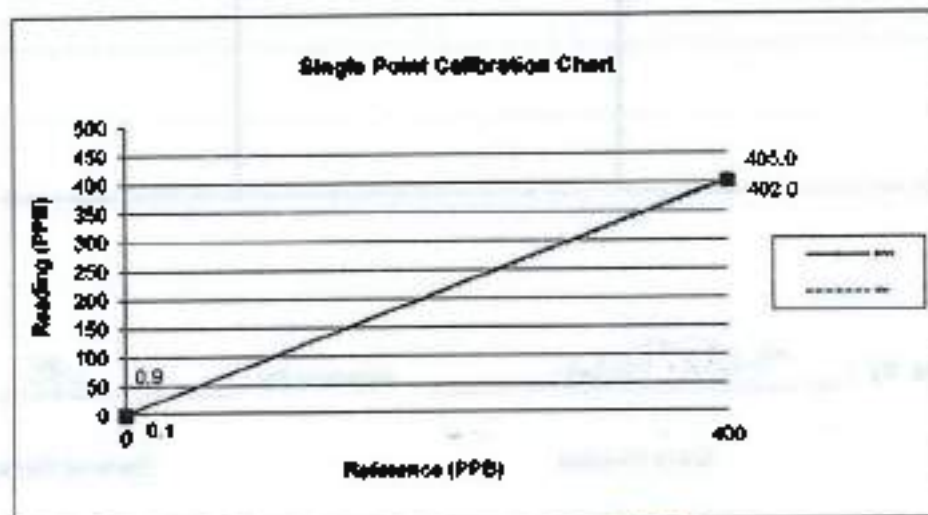
Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.88 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EB0140762

Environment: Temperature 28.8 °CHumidity: 47 %RH

Calibration Report

Status	Zero			Span		
	Reference (ppm)	Reading (ppm)	Drift (ppm)	Reference (ppm)	Reading (ppm)	Drift%
Before	0.0	0.9	0.9	400.0	406	1.3
After	0.0	0.1	0.1	400.0	402	0.5



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Date: 2022/05/01



MODEL : S02 ANALYZER Model 43C THERMO

DATE : 1-05-2022

S/N : ESOTE43C703317

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 0.150 ~ 0.650 LPM	0.42	0.4

Calibrate By : Sirrat Poonlek

Approve By : MC

Sirrat Poonlek

Saranut Keawwinkul

Date:

1-May-22

Date:

1-May-22



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Environmental

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NOx Analyzer Verification Test Report

Calibration Report No.: 8506005
Calibrated Date: 1-May-22

Page:1/2

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO ₂ /NO _x Analyzer Model: 42C	Manufacturer: THERMO S/N: EN0TE42C789390
---	---

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.88 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19, 2024 EB0140762

Environment: Temperature 25.4 °C

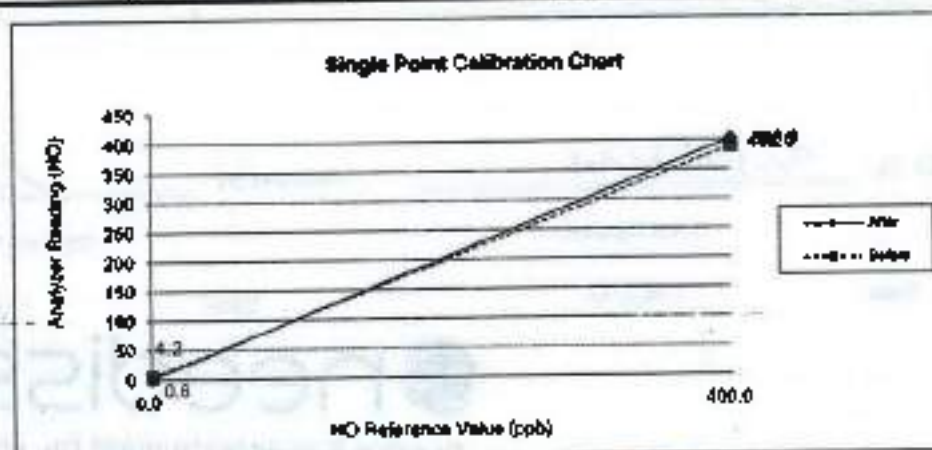
Humidity: 52 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	4.2	0.0	4.2	389	400.0	-1.4
NO ₂	3.1	0.0	3.1	19.0	0.0	2.4
NO _x	7.3	0.0	7.3	408	400.0	1.0

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.8	0.0	0.8	402	400.0	0.2
NO ₂	0.4	0.0	0.4	3.0	0.0	0.4
NO _x	1.0	0.0	1.0	405	400.0	0.8



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Tel. 02-807-1780-2 Fax. 02-802-3988 E-mail: info@neediss.com

MODEL : NOx ANALYZER Model 420 THERMO

DATE : 1-05-2022

SN : ENOTE420789390

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	300
SAMPLE FLOW 0.350 ~ 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.035 ~ 0.075 LPM	0.05	0.05
No/Nox BEG	1279.0	1279.1
No/Nox Slope	1.0/0.8	0.9/0.8

Calibrate By : Sirrat PoonlakApprove By : K

Sirrat Poonlak

Sarewul Kaswanngul

Date: 1-May-22

Date: 1-May-22

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Envilab Co., Ltd.

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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. Inlet (mL)	Vol. Final (mL)	ΔVol. (mL)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H ₂ O)
1	1	2	1	1.3190	3.7	1.50
2	3	4	1	1.0230	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 (mL)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H (Ta/Pa)}$ (y-axis)
0.9941	0.7536	1.2241	0.9951	0.7544	0.7673
0.9907	0.9694	1.5809	0.9917	0.9704	0.9906
0.9890	1.0646	1.7312	0.9900	1.0666	1.0851
0.9874	1.1495	1.8889	0.9884	1.1506	1.1721
0.9793	1.4996	2.4463	0.9802	1.5011	1.5346
QSTD	ms	1.43957	QA	ms	1.02667
	bs	-0.01262		bs	-0.08753
	rs	0.99999		rs	0.99999

Calculations

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

For subsequent flow rate calculations:

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

Standard Conditions

Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH:	calibrator manometer reading (in H ₂ O)
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 Bangkhuae 7, Bangkhuae, 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 : Akaradeth Thippolehai

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

Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	Q12213103	18 Nov 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surasak Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhasprachasan 3 Rd., Banggood, 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

MUC 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. : 0.00015 g

- o O o -

110



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บริษัท เคาบเทค จำกัด
ผู้ให้บริการมาตรฐานตามข้อกำหนด



CAL

Calibratech Co., Ltd.

7/101-7 Moo 2, Sukhaphrathan 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

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

Equipment : Electronic Balance
Manufacturer : Santorius Model : SECURA3102-JS
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 : 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
FIR1-FIR21	65-210044-1	31 Jul 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

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.

02 FEB 2022 10:31



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sakthaprasaan 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



Repeatability

Load test : 2000 g

Sidev. : 0.000 g

• 000 •



Signature

รับรองสำเนาถูกต้อง
ผู้ตรวจการฝ่ายควบคุมคุณภาพ





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 Bangkhac 7, Bangkhac, Bangkhac, 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 :	Ambient Environment
Description : Acoustic Calibrator	Temperature : $(23 \pm 3) ^\circ\text{C}$
Manufacturer : Bruel&Kjaer	Relative Humidity : $(50 \pm 15) \%$
Model : 4230	Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$
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 Voisaln 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 TEC 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

FMABL/MTC/002 Rev.0

Head Office
 35 Mu 3 Tambon Klongkhe, Amphoe Klong Luang,
 Changwat Pathumthani 12120, Thailand
 Tel. (66) 0 2577 9000
 Fax. (66) 0 2577 9009
 E-mail : kumpu@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
 136 Phahonyothin Road, Chatuchak, Bangkok 10700,
 Thailand
 Tel. (66) 0 2579 1121-30 ext. 519, 523, 527
 Fax. (66) 0 2579 1121-14
 E-mail : tistr@tistr.or.th

Envilab Co., Ltd. ผู้ให้บริการสอบเทียบและตรวจวัด



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-6580383

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 I
1/2 inch Bruel&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 I
1/2 inch Bruel&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 I
1/2 inch Bruel&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. Woerachai Doechaiyao)

Approved by :

(Mr. Prawit Kiatyapa)
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 are prohibited unless written permission is obtained from the governor of TISTR

EASL/MTC.002 Rev.4

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
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Office/Laboratory

Sol. 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Mueang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672 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 ext. 5219, 5225, 5217
E-mail : sun@tistr.or.th



CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: AIR LIQUIDE (THAILAND)
LTD
Part Number: E05N01E15A0003
Cylinder Number: E80148406
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12022
Gas Code: CO, CO2, NO, NOX, SO2, BALN
Reference Number: 150-402305646-1
Cylinder Volume: 148.7 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 800
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 890/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 listed 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. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	100.2 PPM	G1	+/- 0.9% 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	± 000 %	7.982 %	G1	+/- 0.9% NIST Traceable	12/27/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRL	09010241	KAL004804	98.48 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Oct 18, 2024
NTRL	200610-98	CC733475	98.61 PPM NITRIC OXIDE/NITROGEN	+/- 0.6%	Oct 06, 2026
ONE	124206889119	CC322885	4.284 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Sep 03, 2024
NTRL	11010419	KAL004813	99.6 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.6%	Jul 28, 2023
NTRL	08010626	K019200	13.94 % CARBON DIOXIDE/NITROGEN	+/- 0.5%	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 08, 2021
Nicolet iS60 FTIR AUP2010245 NO	FTIR	Dec 16, 2021
Nicolet iS50 FTIR AUP2010245 NO2	FTIR	Dec 29, 2021
Nicolet iS60 FTIR AUP2010245 SO2	FTIR	Dec 23, 2021

Test Data Available Upon Request

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

UF0X5CX



Michael A. Anderson
Approved for Release



รับรองสำนักงานถูกต้อง
ผู้ให้บริการมาตรฐานคุณภาพสูง



CALIBRATION LABORATORY CO., LTD.

210-11, 14, 55 So Prasert Manulak 28 Yaek 4, Prasert Manulak Rd., Ladprao, Bangkok 10230
Tel. 02-518-0353-4 Fax: 02-518-2672 www.ccllaboratory.com E-mail: sale@ccl-laboratory.com



Supplement to Calibration Certificate No. Q22008276

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE	:	VIBRATION METER
MANUFACTURER	:	INSTANTEL
MODEL / TYPE	:	721A2601/721A3301
SERIAL NO.	:	UM14631/UM14631 EVMINMMATE4631
CLID. NO.	:	253200218
JOB CONTROL NO.	:	220125008276

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

Calibrated By :

Sarwit Phuanbusabong
Calibration Engineer

Approved By :

Mongkol Yotsoontorn
Authorized Signatory
04 February 2022



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

Certificate No. Q22008276A.1

F3-012-04/01-12

page 1 of 3



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



02022008276A.1



CALIBRATION LABORATORY CO., LTD.

2118-11-14, 55 Soi Prasert Manuabli 29 Yaek 4, Prasert Manuabli Rd., Ladphrae, Bangkok 10230
Tel: 02-578-0353-4 Fax: 02-578-2672 www.cal-lab.co.th E-mail: info@cal-lab.co.th



REPORT OF CALIBRATION

FOR

NOMENCLATURE	:	VIBRATION METER
MANUFACTURER	:	INSTANTEL
MODEL / TYPE	:	721A2601/721A3301
SERIAL NO.	:	UM14631/UM14631(EVMINMMATE4631)
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. EB-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. Q12009276

E3-011-0401-12

page 2 of 3



รับรองสำเนาถูกต้อง
ผู้จัดทำ: ฝ่ายควบคุมคุณภาพ





CALIBRATION LABORATORY Co., LTD.

2710-17, 14, 55 Soi Prasert Manukul 28 Yask 4, Prasert Manukul Rd., Ladphrao, Bangkok 10230
Tel: 02-878-0363-4 Fax: 02-878-2872 www.cal-laboratory.com E-mail: sales@cal-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)	± (% of rdg.)
1	50 Hz	peak	1.000	1.044	-0.044	1.1
2	50 Hz		2.000	2.069	-0.069	1.0
3	50 Hz		3.000	3.088	-0.088	1.0

2. VELOCITY RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
(mm/s)	(frequency)		(mm/s)	(mm/s)	(mm/s)	± (% of rdg.)
10	50 Hz	peak	10.000	10.089	-0.089	2.3
20	50 Hz		20.000	20.097	-0.097	1.8
30	50 Hz		30.000	30.157	-0.157	1.0

*3. DISPLACEMENT RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
(mm)	(frequency)		(mm)	(mm)	(mm)	± (% 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	0.030	0.000	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. Q31003176

P3-011-04/01-12

page 3 of 3



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ




@calibration

Mettler-Toledo (Thailand) Ltd.
845/1 - 845/5 Latkai Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+662 723 0382
MT-TH.ServiceSupport@mt.com



Accuracy Calibration Certificate

Customer

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

Weighing Device

Manufacturer:	Mettler Toledo	Instrument Type:	Weighting Instrument
Model:	XSR205CU	Asset Number:	N/A
Serial No.:	0911383567	Terminal Model:	SRAT
Package:	N/A	Terminal Asset No.:	0911383567
Floor:	3	Terminal Asset No.:	N/A
Room:	B304		

Range	Max. Capacity	Readability (d)
1	51 g	0.0001 g
2	220 g	0.001 g

Procedure


Calibration Outline: EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CPMW02120

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/linearity 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 specifications of the weighing division or its associated specific calibration conditions.

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

As Found Calibration Date:	02-Mar-2022	Calibrator:	Maruephon C.
As Left Calibration Date:	N/A		Maruephon Chomprasitkul
Issue Date:	03-Mar-2022	Approved Signatory:	
			<input checked="" type="checkbox"/> Kasakorn Teesarakulakul <input type="checkbox"/> Santi Jitayon <input type="checkbox"/> Surachai Sakthong



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Measurement Results

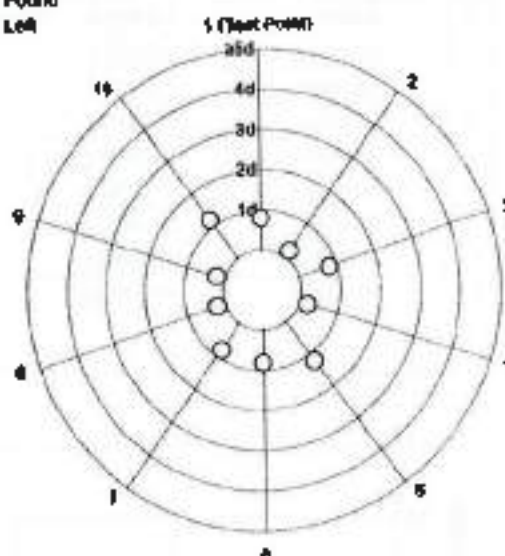
Repeatability

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	70.00000 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	0.00004 g	N/A
--------------------	-----------	-----

○ As Found
● As Left



The "d" in the graph represents the repeatability 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 weight 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
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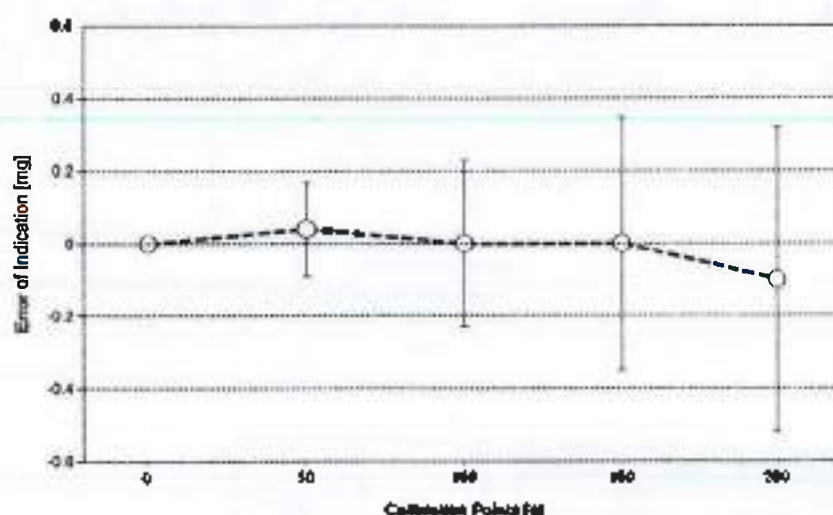
As Found

The "d" in the graph represents the repeatability 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	0.048 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	0.38 mg	2
11	199.9999 g	199.9999 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 of calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET ag-18. The value of the measured 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
ผู้จัดการฝ่ายควบคุมคุณภาพ

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:	177096	Calibration Due Date:	03-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.:	IM193	Date of Issue:	1d-Jan-2021
Certificate Number:	21H1221	Calibration Due Date:	01-Jan-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

Speed is the expanded uncertainty with $k=2$ in use. The formulae shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the real 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: $3 K$

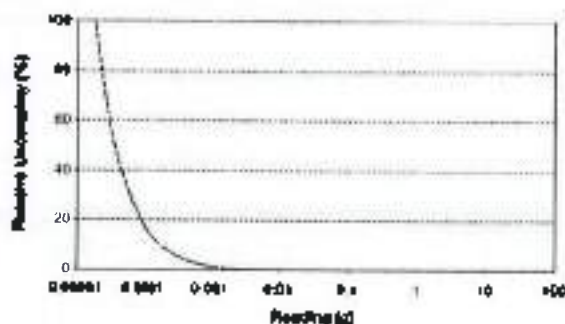
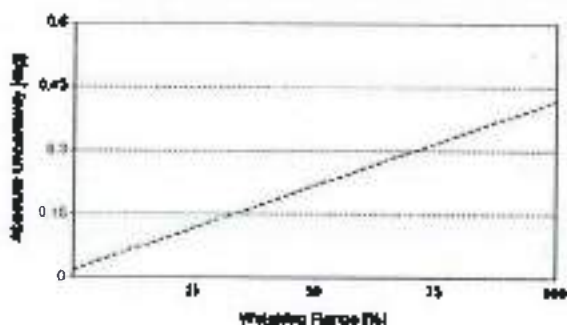
Uncertainties of Uncertainty Equation

	Range		As Found	As Left
	d	Mur		
1	0.00001 g	51 g	$U_1 = 0.018 \text{ mg} + 0.00487 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	228 g	$U_2 = 0.06 \text{ mg} + 0.00482 \text{ mg/g} \cdot R$	N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a load 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 (Example)

Net Indication	As Found		As Left	
0.00220 g	0.018 mg	0.82%	N/A	N/A
0.02280 g	0.018 mg	0.082%	N/A	N/A
0.22080 g	0.019 mg	0.0087%	N/A	N/A
2.20080 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 full interval range of the device.



Signature
รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



SK SALES AND SERVICE CO., LTD.

184/256, 194/256, 194/256, 194/256, 194/256, 194/256

Bangkok, Thailand 10110

Tel : 02-614-2144 Fax : 02-614-2155



MEMBER OF THE
INTERNATIONAL
FEDERATION OF
METROLOGICAL
ORGANIZATIONS (IFM)

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	61468576	QR21-0851	13 May 22
2) Digital Thermometer With Probe	GT11	06000089	P3L-T-007265	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. Suphachai Sakri

☐ Mr. Phayak Tothit

☒ 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 %



Ep.

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Envilab Co., Ltd.

ผู้จัดทำรายงานผลการสอบเทียบ

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	0.36

Resolution : 0.1 (°C) , 0.1 % RH

STD= Standard

UUC= Unit Under Calibration

** End of Calibration Report **



Englab Co., Ltd.

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ

Sp.

Certificate of Calibration

Certificate No. : 65-420020-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkhue7, Bangkhue, 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

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ

The Uncertainties are for a confidence probability of approximately 95%

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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 as pH (4,7,10)

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (± mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	177.5	0.0	0.12
	0.0000	7	7.00	0.0	0.0	0.086
	-177.4800	10	10.00	-177.5	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	0.0034
	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%

- ๐๕/๑๐ -



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 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. :	ELABDOH-R914701
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 Bangkhee 7, Bangkhee, Bangkhee, 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 :	Waijalak Sirithan

Approved by :

Approved Signatory

- (☒) Males Builuee
(☐) Sathip Meangmai
(☐) Wasekorn Lemgatrakul

Issue Date :

22 March 2022



Envilab Co., Ltd.
บริการสอบเทียบและ
จัดการฝ่ายควบคุมคุณภาพ

B 0284369



Cert.No.: 22TW70

Page: 2 of 2

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: KC3N0839K

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

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บริษัท อีพีเอส จำกัด
ผู้ให้บริการด้านความปลอดภัย

Mulu

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CAL

Calibratech Co., Ltd.

7/105-7 Moo 2, Sukhaphrachasan 3 Rd., Banggood, Pakkred, Nonthaburi 11120

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



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-440527-3

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540, 540/1 Soi Bangkhao 7, Bangkhao, 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



รับรองสำเนาถูกต้อง
ผู้จัดทำรายชื่อบุคคลที่
ได้รับอนุญาต

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Certificate of Calibration

Certificate No. : 64-400527-3

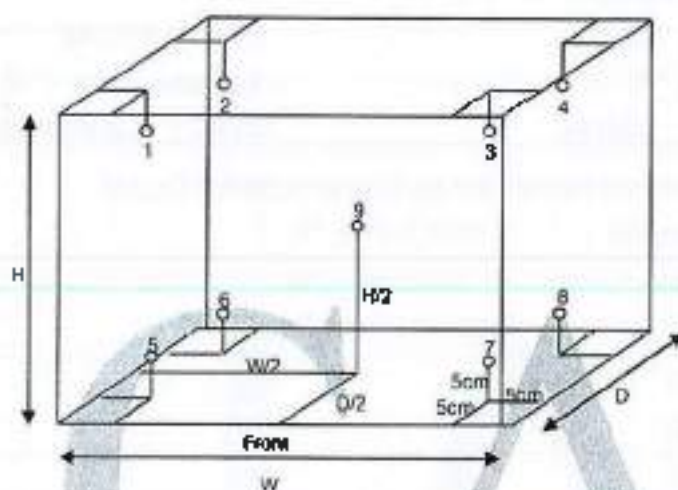
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Parameter : Temperature measurement

The 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 Pts.									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%

- 006 -



Envisat Co., Ltd.

รับรองสำเนาถูกต้อง

ผู้จัดการฝ่ายควบคุมคุณภาพ



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



NSO-TSI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-400569-1

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

540, 540/1 Soi Bangkhae 7, Bangkhae, 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



รับรองค่าพิกัด

ผู้จัดการฝ่ายควบคุมคุณภาพ

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Certificate of Calibration

Certificate No. : 64-400569-1

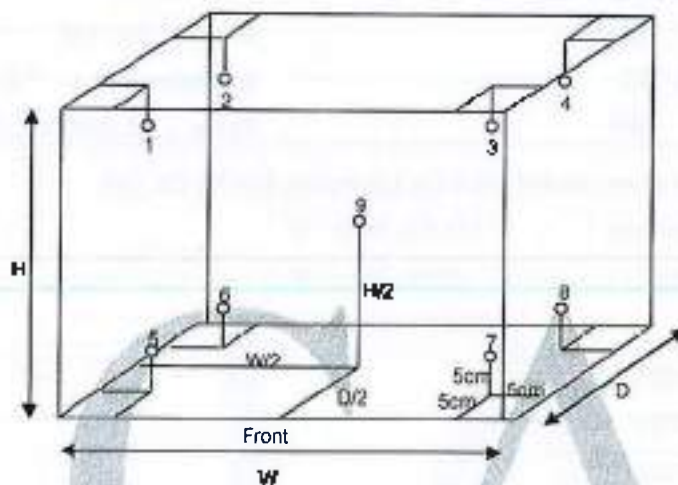
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air velocity 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%

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EnviLab Co., Ltd.

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ผู้จัดทำฝ่ายควบคุมคุณภาพ



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Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhaphrasan J Rd., Bangpoo, Pakkred, Nonthaburi 11120

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



NSC-TISI-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 Bangkhai 7, Bangkhai, 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 : Permporn Chanyu

Calibration Method : CAL-M4004, TLAS Q-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

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การคัดลอกโดยไม่ได้รับอนุญาต



Certificate of Calibration

Certificate No. : 65-440155-2

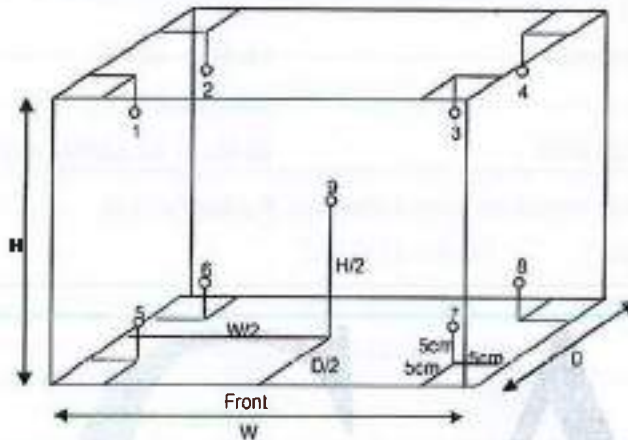
Page : 2 of 2

Result of Calibration : Without Adjustment

UAC Condition As-Received : Good

Function : Temperature measurement

This instrument was settling 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)	Settling 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	0.91

Test Point (°C)	Settling 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%.

- 010 -



Calibratech Co., Ltd.

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ผู้จัดการฝ่ายควบคุมคุณภาพ



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



Certificate of Calibration

Certificate No. : 65-40053-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkhae7, Bangkhae, 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



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Certificate of Calibration

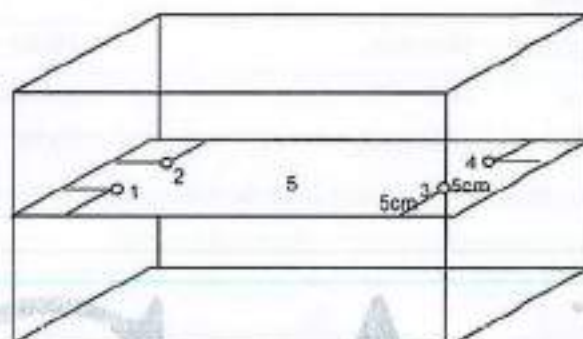
Certificate No. : 65-40053-1

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%.

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Envia Co., Ltd.

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ผู้จัดการฝ่ายควบคุมคุณภาพ



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Calibratech Co., Ltd.

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NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-300146-10

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Cylinder

Manufacturer : PYREX

Class : A

Capacity : 50 ml

Graduation : (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 : Areechai 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	64-200154-1	02 Jun 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipo Tavadee)

Supervisor



The Uncertainties are for a confidence probability of approximately 95%

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Envilab Co., Ltd. จัดการฝ่ายควบคุม



CAL

Calibratech Co.,Ltd.

7/105-7 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

Certificate of Calibration

Certificate No. : 65-J00146-10

Page : 2 of 2

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

UNC 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%

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Calibratech Co., Ltd.

D.
ได้รับรองสำเนาถูกต้อง
ผู้จัดทำรายงานความถูกต้อง กศ



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Calibratech Co.,Ltd.

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

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



NSO-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-340147-4

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-M3001 based on ASTM E 542-01

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

Economic Balance

ID No.	Cert. No.	Due Date	Traceability
241002	64-200354-1	02 Jun 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipat Tovadee)

Supervisor



The Uncertainties are for a confidence probability of approximately 95%

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รับรองสำเนาถูกต้อง
Envilab Co., Ltd. หักการนำความคุ้มครอง



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	500.84
1000	1001.39

Uncertainty of measurement with \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.

Chatchai
โปรดส่งสำเนาเอกสารนี้
เพื่อการดำเนินงานของคุณ



ประจำเดือนมิถุนายน พ.ศ. 2565



TSP High Volume Sampler Calibration

Verification Report No.

HO220025-0005 - TSP 01

☐ PM ☒ Onsite

Site: โครงการพัฒนาระบบการปลูกป่าเพื่อฟื้นฟูป่าชุมชนและสวนสาธารณะ สวนป่าปลูกป่าชุมชน

UTM: 47P 1524271 N 666054 E

Date: 1 Jun 22

Sampler: NTSP#12

Technical: Vign R.

Recorder: ECRANG15315224

Approval: Sarawul K.

CONDITIONS

Barometric Press. (hPa): 1009.7

Corrected Pressure (mm Hg): 757.3

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: Tech Environmental, Inc.

Qstd Slope: 1.63957

Model: TE-5026A

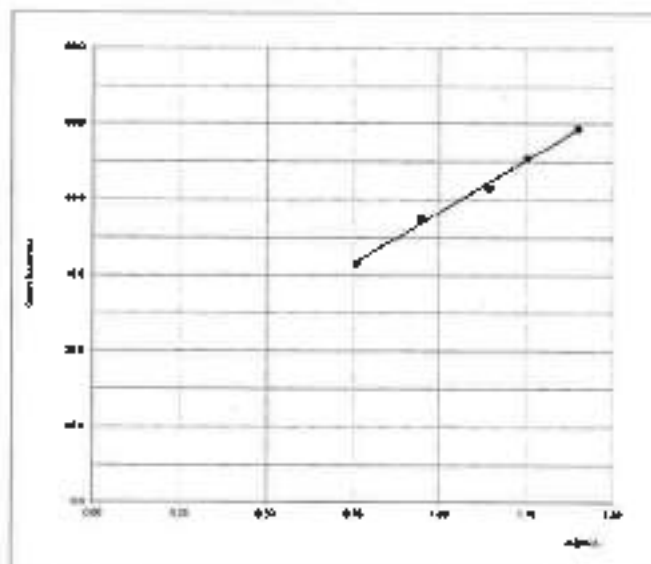
Qstd Intercept: -0.01202

Serial: 1328

Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	5.36	1.401	50.0	49.34	
2	4.27	1.251	46.0	45.39	Slope = 27.2473 Intercept = 11.0713 Corr. coeff. = 0.9972
3	3.58	1.143	42.0	41.44	
4	2.44	0.947	38.0	37.50	
5	1.56	0.759	32.0	31.58	# of Observations: 5
					Range of Chart at 1.1 - 1.7 m3/min: 42 58



Calibrated by:



(Vign R.)

1 June 2022

Approved by:



(Sarawul Keawwut)

1 June 2022

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www.evltesting.com

Calibration shall be performed by qualified personnel only.



PM10 High Volume Sampler Calibration

Verification Report No.

HO2200025-D006 PM 01

1 PM

☐ Onsite

Site: โครงการสร้างงานอาชีพให้กับเกษตรกรผู้ว่างงานและความยากจน - สำนักงานโครงการหลวงเชียงใหม่

UTM: 47P 1524271 N 686034 E

Date: 1 Jun 22

Sampler, 14P14111

Technical: Wilson R

Recorder ECRDS01618124

Approval: Saravani K

CONDITIONS

Barometric Press. (hPa): 1009.7

Corrected Pressure (mm Hg): 757.3

Temperature (deg C), 32.0

Temperature (deg K): 305.0

Average Press. (hPa): 1013.0

Connected Avg Press. (mm Hg): 75.9 ±

Average Temp. (deg C): 30.0

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc.

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

Model TE-5028A

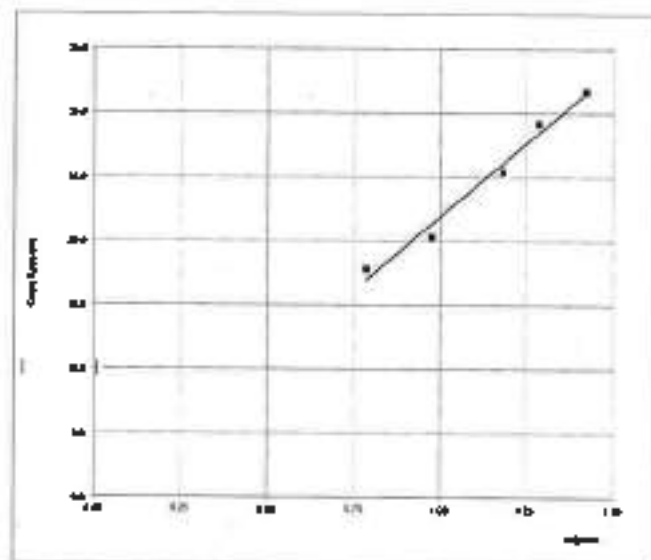
Intercept	-0.00753
-----------	----------

Serials: 1328

Date Certified 19 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Q _a (m ³ /min)	I (ohm)	K _c (corrected)	LINEAR REGRESSION
1	5.24	1.422	50.0	31.73	Slope = 22.9213
2	4.28	1.286	46.0	29.19	Intercept = -1.0213
3	3.61	1.182	40.0	25.38	Corr. coeff. = 0.9900
4	2.45	0.975	32.0	20.31	SFR = 1.141
5	1.58	0.784	28.0	17.77	SSP = 38.61
					# of Observations: 5
					Range of Chart at SFR ±10% 36
					41



Calibrated by:

4. Was ist ein Pötkerbaumchen?

1 June 2022

Approved by:

4. **Satz von L. Kronecker**

1 June 2022

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www.evtesting.com

RECEIVED: 29 SEP 2004 / 2005



TSP High Volume Sampler Calibration

Verification Report No.

HO2200025-0005 -TSP 02

☐ PM

☒ Onsite

Site: Iskandar Puteri, Johor Bahru

UTM : 47P 1820602 N 666280 E

Sampler: NTSP#01

Recorder: ECRANG15315224

Date: 1 Jun 22

Technical: Wisan R

Approval: Saravul K

CONDITIONS

Barometric Press. (hPa): 1009.7

Temperature (deg C): 33.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.3

Temperature (deg K): 306.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tech Environmental, Inc.

Model: TE-5028A

Serial#: 1328

Qstd Slope

1.63957

Qstd Intercept

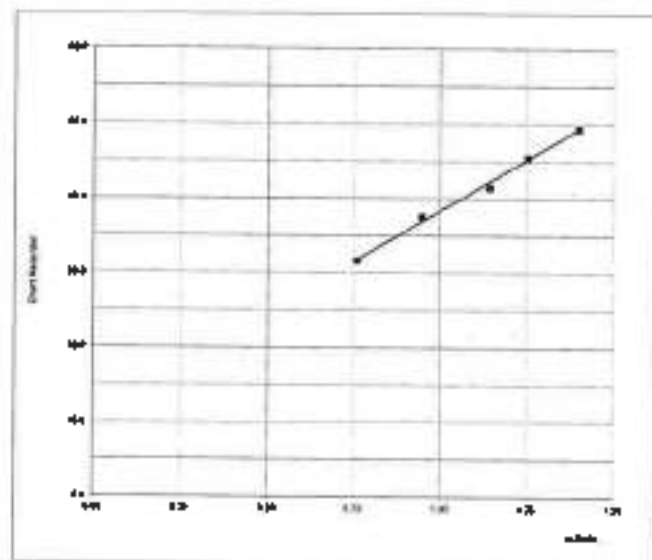
-0.01202

Date Certified

18 Jan 22

CALIBRATIONS

Plate or Test #	H ₂ O (in)	Qstd (m ³ /min)	I (ohm)	IC (corrected)	LINEAR REGRESSION Slope = 18.2651 Intercept = 18.5954 Cor. coeff. = 0.9921 # of Observations 6 Range of Chart at 1.1 - 1.7 m ³ /min. 40 50
1	8.23	1.731	52.0	51.23	
2	6.36	1.523	46.0	45.32	
3	4.52	1.285	42.0	41.97	
4	2.63	0.982	38.0	37.43	
5	1.38	0.716	32.0	31.52	



Calibrated by:

(Wisan Rithikamon)

1 June 2022

Approved by:

(Saravul Keerthiraj)

1 June 2022

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 50542/1 ซ. บางใหญ่ 7 บางใหญ่ บางเขน กรุงเทพฯ 10900
 Tel : 02-010-0116 Fax : 02-010-0117 E-mail : info@evltesting.com



PM10 High Volume Sampler Calibration

Verification Report No.

HO2200025-0005-PM 02

L PM

E Onsite

Site: กรุงเทพมหานคร กรุงเทพมหานคร

UTM: 47P 1529602 N 866283 E

Sampler: HPM02

Recorder: ECRDS01818124

Date: 1 Jun 22

Technician: Wisan R

Approval: Sarawut K.

CONDITIONS

Barometric Press. (hPa): 1009.7

Temperature (deg C): 33.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.3

Temperature (deg K): 306.0

Corrected Avg Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5028A

Serial#: 1328

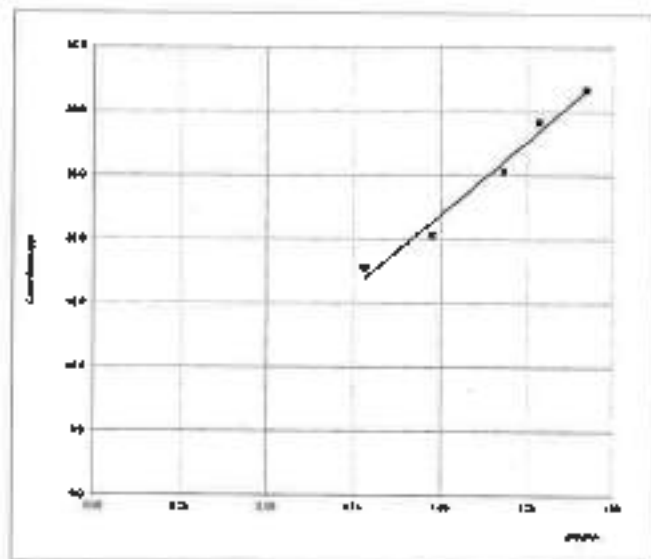
Slope: 1.02667

Intercept: -0.00753

Date Certified: 19 Jan 22

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	8.19	1.779	52.0	33.05	Slope = 12.6680
2	6.28	1.559	48.0	29.24	Intercept = 9.4109
3	4.39	1.305	40.0	25.43	Corr. coeff. = 0.9923
4	2.49	0.984	34.0	21.61	SFR = 1.145
5	1.23	0.694	30.0	19.07	SSP = 37.99
					# of Observations: 5
					Range of Chart: 36
					@ SFR ±10%: 40



Calibrated by:

(Wisan Rajithakarnon)

1 June 2022

Approved by:

(Sarawut Ketavongchai)

1 June 2022

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PM10 High Volume Sampler Calibration

EV-PM10-HV-0001/06/22



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EVL Testing Co., Ltd. 345/240/1 ซ.บางลำภ้อย 2 แขวงบางลำภูล่าง กรุงเทพฯ 10110
Tel : 02-202-0577-8 Fax : 02-202-05773 E-mail : info@evltesting.com



Thailand's Standard Agency

Verification Test Report

Report No.:

HO2200026-D005 -SLM 01

☒ PM

☐ Onsite UTM:

47 P 1629770 N 666269 E

Calibrated Date: 1 June 2022

Site : โรงงานหรือสำนักงานอาคารพักอาศัยหรือสิ่งอำนวยความสะดวกของ สำนักงานปศุสัตว์จังหวัดกาฬ

Equipment: Sound Level Meter

Manufacturer: ACO

Model: 6226

Serial : 60027

Environment: Temperature 33 °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	93.70	0.04	93.66

Calibrated By:

(Wisan Rithkamon)

Date:

1 June 2022

Approve By:

(Sarawut Keawsirunai)

Date:

1 June 2022

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EnviLab Co., Ltd. 60/200/1 Sukhumvit Road, Klongtey Suburb, Bangkok 10110
Tel: 02-602-5874-8 Fax: 02-602-5113 E-mail: info@evltesting.com



Verification Test Report

Report No.:

HO2200025-D005 -SLM 02

☒ PM

☐ Onsite UTM:

47 P 1529587 N 666247 E

Calibrated Date: 1 June 2022

Site : โรงพืชมูลนิธิเกษตรกรรมยั่งยืน

Equipment: Sound Level Meter

Manufacturer: ACO

Model: 6226

Serial : 40289

Environment: Temperature

33 °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)	Adjusted (dB)
93.66	93.40	-0.26	93.66

Calibrated By:

(Wisan Ritthikarnon)

Date:

1 June 2022

Approve By:

(Sarawat Keawsrnnual)

Date:

1 June 2022

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Neediss Supply Instrument Co., Ltd.
336 ซอยบงกช 7 แขวงบงกช เขตบึงกุ่ม กรุงเทพฯ 10160 336 Soi Bongkhoe 7 Bongkhoe Bangkok Bangkok
Tel. 02-502-1980-2 Fax 02-502-3988 E:info@neediss.com



SO₂ Analyzer Verification Test Report

Calibration Report No.: 6506005

Page:1/1

Calibrated Date: 1-Jun-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: THERMO, 43C	Manufacturer: THERMO S/N: ESOTE43C668327
---	---

Calibration System

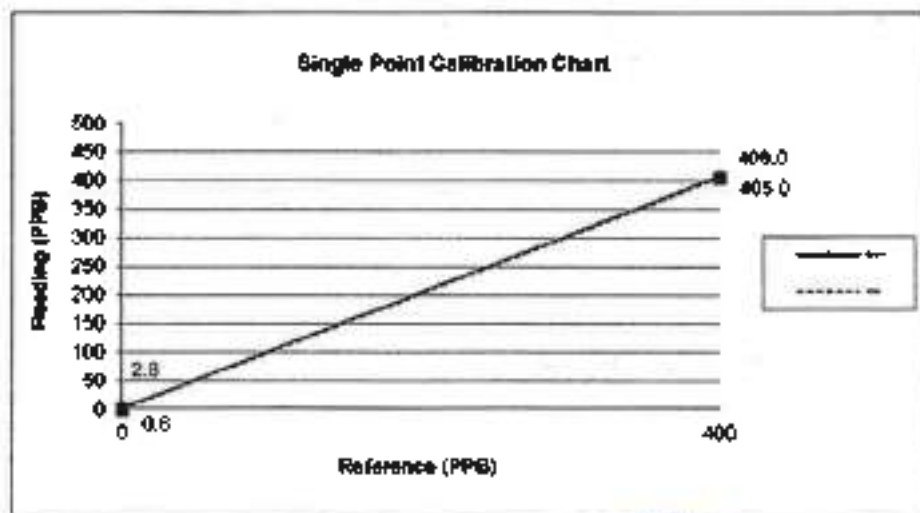
Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.68 PPM SO ₂ Conc 45.34 PPM CO Conc 4500 PPM Expire Date: Feb 19,2024 EBO140762

Environment: Temperature 28.5 °C

Humidity: 48 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPM)	Reading (PPM)	Drift (PPM)	Reference (PPM)	Reading (PPM)	Drift%
Before	0.0	2.8	2.8	400.0	408	2.0
After	0.0	0.6	0.6	400.0	405	1.3



22109901

336 ซอยบงกช 7 แขวงบงกช เขตบึงกุ่ม กรุงเทพฯ 10160



EnviLab Co., Ltd.

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ผู้จัดการฝ่ายควบคุมคุณภาพ

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6/22/2022



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Neediss Supply Instrument Co., Ltd.

536 ซอยบางkhoe 7 แขวงบางkhoe เขตบางkhoe 10500 536 Soi Bangkhoe 7 Bangkhoe Bangkok
Tel: 02-802-3960-2 Fax: 02-802-3968 E: info@neediss.com



MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 1-06-2022

S/N : ESOTE430688327

Test Function Value	Before	After
Range 500 (PPM)	500	500
PMT VOLTS -450 - -850 (V)	-650	-653
LAMP VOLTAGE 950 - 1,200 (V)	990	985
LAMP INTENSITY 20000 - 50000 Hz	32569	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 : K

Sirirat Poonlak

Sirawat Keawsirirual

Date: 1-Jun-22



Date: 1-Jun-22
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Neediss Supply Instrument Co., Ltd.
530 หมู่ 10 ต.บางพลีใหญ่ อ.บางพลี จ.สมุทรปราการ 10540 โทร: 02-802-1940-7 Fax: 02-802-0788 E: info@neediss.com



NOx Analyzer Verification Test Report

Calibration Report No.: 6506001

Page: 1/2

Calibrated Date: 1-Jun-22

☒ PM ☐ Ozone

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer THERMO S/N: EMOTE42C412226
--	--

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model ESA MGC101 S/N: 792 ZERO AIR Generator ZAG7001 S/N: 644	NO Conc 44.98 PPM SO2 Conc 45.34 PPM CO Conc 4500 PPM Expiry Date: Feb 19, 2024 EB0140762

Environment: Temperature 29.4 °C

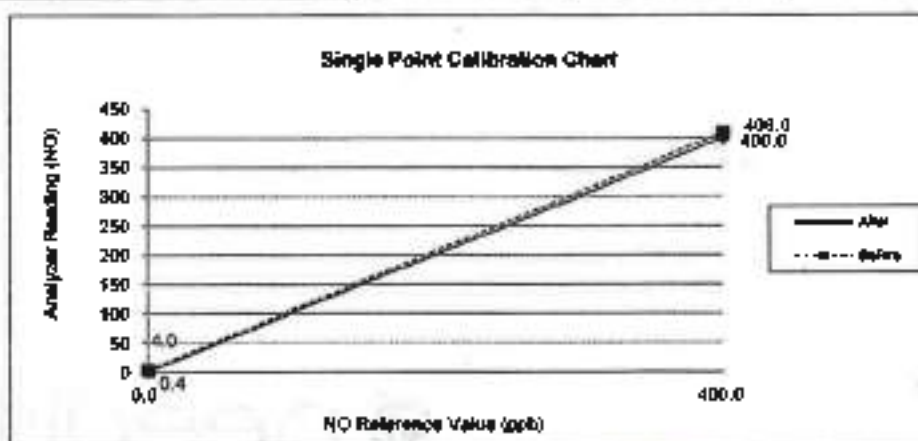
Humidity 47 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	4.0	0.0	4.0	408	400.0	1.0
NO ₂	4.4	0.0	4.4	7.0	0.0	0.9
NOx	8.4	0.0	8.4	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	0.4	0.0	0.4	400	400.0	0.0
NO ₂	0.5	0.0	0.5	2.0	0.0	0.2
NOx	0.9	0.0	0.9	402	400.0	0.2



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ผู้จัดการฝ่ายควบคุมคุณภาพ

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Neediss Supply Instrument Co., Ltd.

505 ซอยสุขุมวิท 21 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110
Tel: 02-802-0900-2 Fax: 02-802-0900 E-mail: info@neediss.com



MODEL : NOx ANALYZER Model 42C THERMO

DATE 1-06-2022

S/N : ENOTE42C412226

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 ~ -850 (V)	-475	-678
LAMP VOLTAGE 950 ~ 1,200 (V)		
INTER TEMP 15 ~ 45 DEG C	43	43
CHAMBER TEMP 47 ~ 51 C	49	50
COOLER TEMP -3 ~ (-2) DEG C	-2	-2
PRESSURE 400 ~ 1000 0 mm Hg	350	300
SAMPLE FLOW 0.330 ~ 0.900 LPM	0.45	0.46
OZONEATOR FLOW 0.035 ~ 0.075 LPM	0.05	0.05
NoxNox BKG	12/9.0	12/9.1
NoxNox Slope	1.0/0.2	0.9/0.2

Calibrate By: Sirint Poonlek

Approve By: K

Sirint Poonlek

Sirint Poonlek

Date: 1-Jun-22

Date: 1-Jun-22



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Neediss Supply Instrument Co., Ltd.



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

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附錄 2: 表 1



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Neediss Supply Instrument Co., Ltd.

536 หมู่ที่ 12 ตำบลบางพลีใหญ่ อำเภอบางพลี จังหวัดสมุทรปราการ 10540
Tel: 02-802-07860 Fax: 02-802-07861 E-mail: neediss@neediss.com



MODEL : SO2 ANALYZER Model 43C THERMO

DATE : 1-06-2022

S/N : ESOTE43C703317

Test Function Value	Before	After
Range 500 (PPB)	994	994
PMT VOLTS -450 - -850 (V)	-450	-453
LAMP VOLTAGE 950 - 1,200 (V)	994	985
LAMP INTENSITY 20000 - 50000 Hz	32546	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 :

[Signature]

Approve By :

[Signature]

Saral Poonlek

Sarawut Kaewsinual

Date:

1-Jun-22



Date:

1-Jun-22

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Neediss Supply Instrument Co., Ltd.

336 หมู่บ้าน 7 อ่างทอง อ.เมือง จ.อ่างทอง 10100 336 Soi Bangkok 7 Bangkok Bangkok Bangkok
Tel: 02-602-3760-2 Fax: 02-602-3758 E: info@neediss.com



NOx Analyzer Verification Test Report

Calibration Report No.: 8508008

Page:1/2

Calibrated Date: 1-Jun-22

☒ PM ☐ Onsite

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer: THERMO S/N: ENOTE42C671358
--	---

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: 29.3 °C

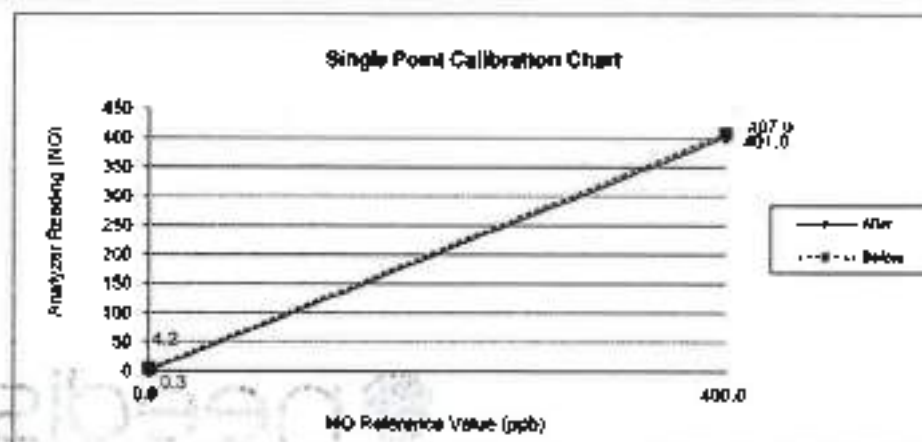
Humidity: 46 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	4.2	0.0	4.2	407	400.0	0.9
NO ₂	1.9	0.0	1.9	4.0	0.0	0.5
NOx	6.1	0.0	6.1	411	400.0	1.4

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.3	0.0	0.3	401	400.0	0.1
NO ₂	-0.3	0.0	-0.3	2.0	0.0	0.2
NOx	0.0	0.0	0.0	403	400.0	0.4



รับรองมาตรฐานถูกต้อง
ผู้ให้บริการผ่านระบบมาตรฐาน ISO 9001

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

531 หมู่ 10 ตำบล 7 ต. บางกะปิ เขต 10 กรุงเทพมหานคร 10130 531 หมู่ 10 บางกะปิ 7 บางกะปิ บางกะปิ กรุงเทพฯ
Tel : 02-007-0940-2 Fax : 02-007-0941 E-mail : info@neediss.com



MODEL : NOx ANALYZER Model 420 THERMO

DATE : 1-06-2022

S/N : ENOTE420671306

Page:2/2

Test Function Value	Before	After
Range 500 (PPB)	500	500
PMT VOLTS -450 - -550 (V)	-475	-478
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	360	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	129.8	129.8
No/Nox Slope	1.90.8	0.90.8

Calibrate By : Sirint Poonlek

Approve By : K

Sirint Poonlek

Sarawut Keawwathai

Date:

1-Jun-22

Date:

1-Jun-22



neediss

Neediss Supply Instrument Co., Ltd.



รับรองสำหรับลูกค้า
ใช้เพื่อการฝึกอบรมเท่านั้น

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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. Ink (mL)	Vol. Final (mL)	ΔVol. (mL)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H ₂ O)
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 (mL)	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
0.9880	1.0646	1.7312	0.9900	1.0656	1.0851
0.9874	1.1485	1.8699	0.9884	1.1506	1.1721
0.9799	1.4986	2.4483	0.9802	1.5011	1.5348
QSTD	m=	1.63057	QA	m=	1.40567
	b=	-0.01302		b=	-0.00783
	r=	0.99998		r=	0.99999

Calculations

$Vstd = \Delta Vol \left(\frac{Pa - \Delta P}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)$ $Va = \Delta Vol \left(\frac{Pa - \Delta P}{Pa} \right)$
 $Qstd = Vstd / \Delta Time$ $Qa = Va / \Delta Time$

For subsequent flow rate calculations:

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

Standard Conditions

Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH: calibrator manometer reading (in H ₂ O)	
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.

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

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



Certificate of Calibration

Certificate No. : 65-200022-1

Page : 1 of 2

Submitted by : Envitab 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, Envitab 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 : Akemdash 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-E2614	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%

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CAL

Calibratech Co.,Ltd.

7/16-7 Moo 2, Sukhaphrasan 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

Slider : 0.00015 g

-000-



รับรองว่าน้ำหนักต้อง
มีค่าไม่เกิน 100 กรัม



CAL

Calibratech Co., Ltd.

7/104-7 Moo 2, Sukhaphrathan 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. : 65-200922-2

Page : 1 of 2

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

Equipment : Electronic Balance
Manufacturer : Sartorius Model : SECURA3102-IS
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
F1R1-F1R21	65-210044-1	31 Jul 2022	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Sungchai Prasanthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaphruek Road 3 Rd., Bangpaed, Pakkred, Nonthaburi 11120

Tel.(02) 964-6311 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

UNC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
10	0.00	0.0002
20	0.00	0.0002
50	0.00	0.0002
100	0.00	0.0002
200	0.00	0.0003
500	-0.01	0.0005
1000	-0.01	0.0003
1500	-0.01	0.0011
2000	-0.01	0.0012
3000	-0.01	0.0023

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

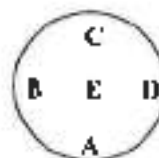
The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%.

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

Std.dev. : 0.000 g

- 0.00 -



รับรองสำหรับทุกตัว
Calibratech Co., Ltd. บริการฝ่ายควบคุมคุณภาพ





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 Bangkhue 7, Bangkhue, Bangkhue, 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 EPA-301A 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 2859871

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

This 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

PMEL/MTC.002 Rev.4

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E-mail : numpak@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
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Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
E-mail : sumprate@tistr.or.th
ผู้ตรวจการวัดและสอบเทียบ





THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-6510383

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 IEC 60942:2003 Class I
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 IEC 60942:2003 Class I
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 IEC 60942:2003 Class I
1/2 inch Brüel&Kjær 4180	1.55	± 0.50	$\pm 3.0\%$

Note : 1. No adjustment.

2. Theibrator pressure correction was not included.

3. The microphone volume correction was not included

Calibrated by :

(Mr. Wecachai Doecharyao)

Approved by :

(Mr. Prayut Klaisya)
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 : 2011263031501147002

End of Certificate

2 / 2

The results are valid only for the items tested/calibrated or value assigned.
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FM.B.MTC.002 Rev.4

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Office/Laboratory

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Amphoe Mueang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0-2323-1572-80 ext. 115, 116
Fax. (66) 0-2323-9145
E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak Bangkok 10900,
Thailand
Tel. (66) 0-2577 9592
Fax. (66) 0-2577 9592
E-mail : samut@tistr.or.th

Envilab Co., Ltd.

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: AIR LIQUIDE (THAILAND)
LTD
Part Number: E05N191E15A0003
Cylinder Number: EBD146406
Laboratory: 124 - Plymouthville - PA
PGVP Number: A12022
Gas Code: CO, CO2, NO, NOX, SO2, BALN

Reference Number: 160-402305648-1
Cylinder Volume: 146.7 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 880
Certification Date: Jan 03, 2022

Expiration Date: Jan 03, 2030

Calibration performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gas-phase 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 no 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. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	100.0 PPM	100.2 PPM	G1	+/- 0.9% 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	5.000 %	7.062 %	G1	+/- 0.9% NIST Traceable	12/27/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	06010241	KAL004894	98.48 PPM CARBON MONOXIDE/NITROGEN	+/- 0.5%	Oct 18, 2024
NTRM	200610-08	CG733475	98.61 PPM NITRIC OXIDE/NITROGEN	+/- 0.6%	Oct 06, 2026
GMIS	124206089113	CC322885	4.234 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Sep 03, 2024
NTRM	11010419	KAL004813	99.6 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.6%	Jul 26, 2023
NTRM	06010638	K018200	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 ULTRAMATE6E N1-C8-180	NDIR	Dec 08, 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

Test Data Available Upon Request

NOTES: Gross Weight: 26.1 Kg, Net Weight: 5.1 Kg.

UF0X5CX



Melinda A. Anderson
Approved for Release



รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



CALIBRATION LABORATORY Co., LTD.

210-14,16,55 Soi Phrasert Manukul 29 Yaek 4, Phrasert Manukul Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0953-4 Fax: 02-578-2672 www.cclaboratory.com E-mail: ccl@cllaboratory.com



Supplement to Calibration Certificate No. Q22008276

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE	:	VIBRATION METER
MANUFACTURER	:	INSTANTEL
MODEL / TYPE	:	721A2601/721A3301
SERIAL NO.	:	UM14631/UM14631 [EVMINMMATE4631]
CLID. NO.	:	252100218
JOB CONTROL NO.	:	220125008276

CUSTOMER : **ENVILAB CO., LTD. / HEAD OFFICE /**
340,340/1 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. Q22008276A1

P3-013-04/01-12

page 1 of 3



ON/Date
 รับรองสำเนาถูกต้อง
 ผู้จัดการฝ่ายควบคุมคุณภาพ



@cclcalibration



CALIBRATION LABORATORY CO., LTD.

2118-11.14, 55 Soi Praset Manmhi 29 Vach 4, Praset Manmhi Rd., Laophrao, Bangkok 10230
Tel: 02-578-0353-4 Fax: 02-578-2672 www.cal-lab.com E-mail: sales@cal-lab.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE	:	VIBRATION METER
MANUFACTURER	:	INSTANTEL
MODEL / TYPE	:	721A2601/721A3301
SERIAL NO.	:	UM14631/UM14631 EYMINMMATE4631
DATE OF CALIBRATION	:	26 January 2022

ENVIRONMENT CONDITIONS :

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

Relative Humidity : $(85 \pm 15) \% \text{RH}$

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. 2445A13042
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. BB-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 M2013)"

Certificate No. Q12008276

F3-011-04/01-12

page 2 of 3



รับรองสำเนาถูกต้อง
ผู้จัดทำ: นายสมชาย คุ้มคุณ



calibration



CALIBRATION LABORATORY Co., LTD.

2110-11,14,55 Soi Prasert Manukul 29 Yaek 4, Prasert Manukul Rd., Ladphrao, Bangkok 10230
Tel. 02-678-0353-4 Fax 02-678-2572 www.ccl-laboratory.com E-mail:husk@ccl-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)	± (% of rdg.)
1	50 Hz	peak	1.000	1.044	-0.044	1.1
2	50 Hz		2.000	2.069	-0.069	1.0
3	50 Hz		3.000	3.088	-0.088	1.0

2. VELOCITY RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
(mm/s)	(frequency)		(mm/s)	(mm/s)	(mm/s)	± (% of rdg.)
10	50 Hz	peak	10.000	10.089	-0.089	2.3
20	50 Hz		20.000	20.097	-0.097	1.8
30	50 Hz		30.000	30.157	-0.157	1.0

*3. DISPLACEMENT RESULT

Test point		Mode	STD Reading	DUC Reading	Correction	Uncertainty
(mm)	(frequency)		(mm)	(mm)	(mm)	± (% 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	0.030	0.000	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. Q12008276

F3-011-0401-12

page 3 of 3



วิเชตรักษ์ วัฒนากุล
วิศวกรฝ่ายควบคุมคุณภาพ



edcalibration

Mettler Toledo (Thailand) Ltd.
846/1 - 846/5 Laksalee Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+662 720 6382
MT-TH.ServiceSupport@mt.com



Accuracy Calibration Certificate

Customer

Company: Eavilab Co., Ltd.
Address: 540, 549/1 Soi Bang Khoo 7, Bang Khoo
City: Bang Khoo Contact: Naraphon Sampanpuang
Zip / Postal: 10180
State / Province: Bangkok
Order Number: 

Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: XSR205DU Asset Number: N/A
Serial No.: 0611303567 Terminal Model: SRAT
Building: N/A Terminal Serial No.: 0611303567
Floor: 3 Terminal Asset No.: N/A
Region: B304

Range	Max. Capacity	Readability (g)
1	21 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/WT002r20

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/pan 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: 68.3 %	End: 69.7 %

As Found Calibration Date: 02-Mar-2022 Calibration: Naraphon C.
As Left Calibration Date: N/A
Issue Date: 03-Mar-2022 Approved Signature: Naraphon Chomprachaisuk

☒ Naraphon Chomprachaisuk
☐ Sam Ninyom
☐ Sutachai Sukkiale



Measurement Results

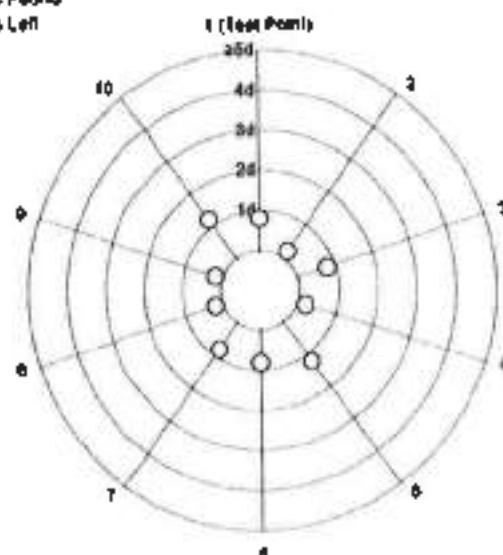
Repeatability

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	0.00000 g	N/A
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○ As Found
◆ As Left



The "d" in the graph represents the readability of the scale/instrument 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
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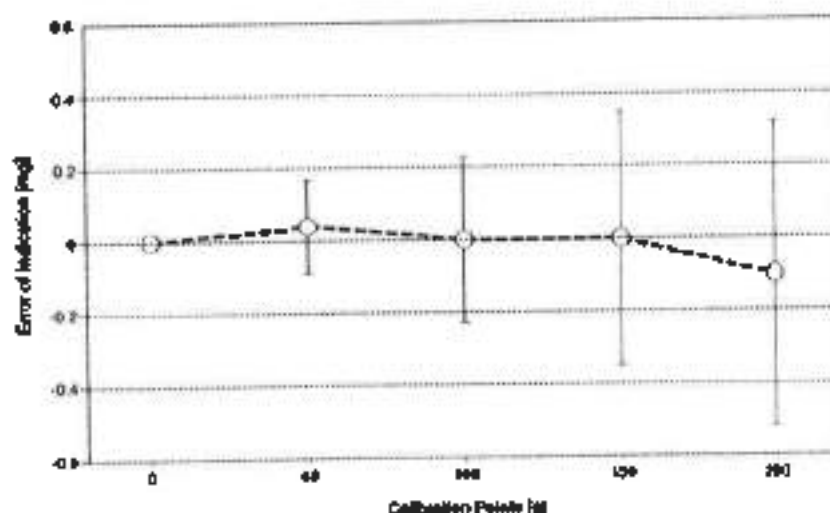
As Found

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

Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	n
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	49.99999 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	0.36 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 of calibration obtained by multiplying the standard combined uncertainty by the coverage factor $k = 2$ which can be larger than 2 according to EURAMET cg-16. 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.



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ผู้จัดการฝ่ายควบคุมคุณภาพ

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:	127836	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.:	84193	Date of Issue:	14-Jun-2021
Certificate Number	24H1221	Calibration Due Date:	01-Jun-2022

Remarks

FACT equipment functionality accepted

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 measured indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $1.5 \cdot 10^{-5} / K$

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

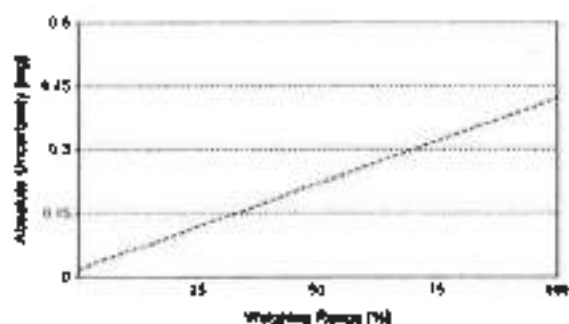
Linearization of Uncertainty Equation

	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

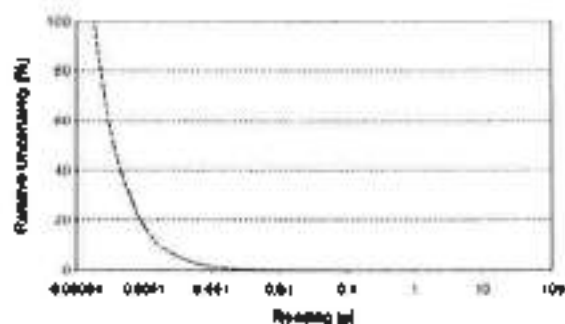
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger deviation for the calculation of the linear equation

Absolute and Relative Measurement Uncertainty in Use for various net indications (Example)

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	0.0087%	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



As Found



As Left

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



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ผู้จัดการห้องควบคุมคุณภาพ



SK SCALES AND SERVICE CO., LTD.

192/255, 107/257 Bangkok Rd. Samsat Station

Bangkok, Thailand 10100

Tel. 02-617-2124 Fax. 02-617-2155



Certificate of Calibration

Reference No. : 4182/202-017 Certificate No. : L2203-290
 Customer : Envikab Co., Ltd. (Head Office)
 : 540, 540/1 Soi Bangkhoe 7, Bangkhoe,
 : Bangkhoe Bangkok 10160
 Equipment : Digital Thermo-Hygrometer
 Manufacturer : Testo
 Model : 808-H1
 Serial No. : 83353607
 ID No. : -
 Received Date : 7 March 2022
 Calibrated Date : 9 March 2022
 Issued Date : 15 March 2022

Page 1 of 2

Environment	Start Calibration	Stop Calibration
Ambient Temperature (°C)	24.7	26.6
Relative Humidity (% RH)	61	62

Calibrated by : Mr. Nattawut Raangdech

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 0072/85	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 :

Ep.

☐ Mr. Suphachai Sakari

☐ 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 %

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Ep.

ต้อง
จัดการผ่านกรมชั่งตวงวัด

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 **



Sincelab Co., Ltd.

ปิ่นทองสำนักงานใหญ่
ผู้จัดการฝ่ายควบคุมคุณภาพ

Sp.

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 : 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%

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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
	10.002	10.009	-0.003	0.014

Remarks

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%.

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B



Calibratech

บริษัท แคลบรเทค จำกัด
ให้บริการสอบเทียบเครื่องมือวัด





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 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 :

Malee

Approved Signatory

- (☒) Malee Butkruea
(☐) Salthip Meangmai
(☐) Warakorn Larnagatrakul

Issue Date :

22 March 2022



Walalak
รับรองสำเนาถูกต้อง
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

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รับรองผ่านมาตรฐาน
ผู้จัดการฝ่ายควบคุมคุณภาพ

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CAL

Calibratech Co.,Ltd.

7106-7 Moo 2, Sukhprachasan 3 Rd., Bangpoed, Pakkred, Nonthaburi 11120

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



NSG-TISI-TIS17025
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. : 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-M0004, 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
ผู้จัดการฝ่ายควบคุมคุณภาพ

The Uncertainty are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 64-400527-3

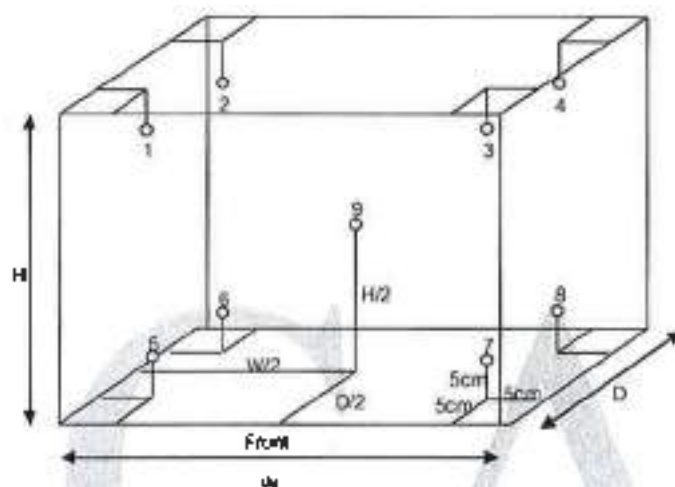
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilating 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	0.51

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%

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มีารองสำเนาถูกต้อง
ผู้จัดทำฝ่ายควบคุมคุณภาพ



CAL

Calibratech Co.,Ltd.

7/105-7 Moo 2, Sukhaphachan 3 Rd., Bangpoon, Pakkred, Nonthaburi 11120

Tel:0219646211 Fax:0219646155, e-mail : calibratech.cal@gmail.com, calibratech.cal@hotmail.com



ISO-TSI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-400569-1

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

540, 540/1 Soi Bangkhai 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. : ELABBQDC140N03

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

Envilab Co.,Ltd.

ผู้ควบคุมฝ่ายควบคุมคุณภาพ

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 64-400569-1

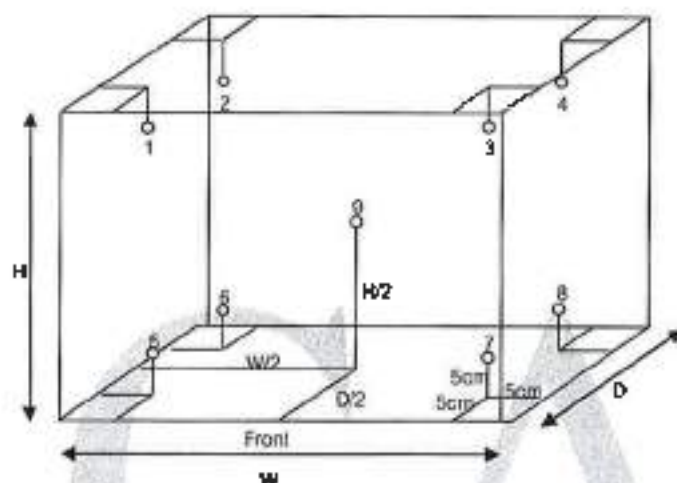
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Position : Temperature measurement

This instrument was setting air verification 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 Temperatures (°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%

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Signature



Signature

รับรองสำเนาถูกต้อง
ผู้จัดการฝ่ายควบคุมคุณภาพ



Certificate of Calibration

Certificate No. : 65-400155-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540, 540/1 Soi Bangkhiao 7, Bangkhao, 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 : Permporn 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



รับรองสำเนาถูกต้อง
หลังการผ่านควบคุมคุณภาพ

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 65-400155-2

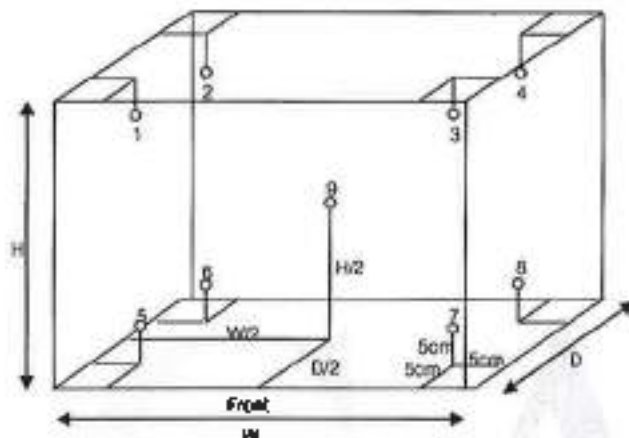
Page : 2 of 2

Result of Calibration : Without Adjustment

UNC Condition As-Received : Good

Function : Temperature measurement

This instrument was set up per specification as per page 0 (check)



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	110.2	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	179.6	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	0.2	0.1	0.8
110.0	109.5	109.5	0.2	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%

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B



บริษัท ใกล้เคียง

Calibratech Co., Ltd.



Certificate of Calibration

Certificate No. : 65-400053-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkhao7, Bangkhao, 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 : Pempon Chaiyap

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%

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Certificate of Calibration

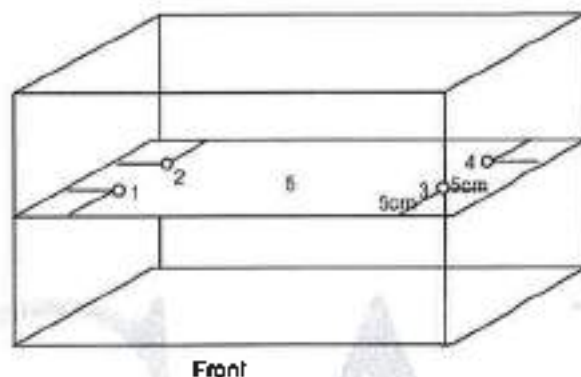
Certificate No. : 65-40053-1

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%

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รับรองว่าผลการวัด
เป็นไปตามข้อกำหนด
Calibratech Co., Ltd.



CAL

Calibratech Co.,Ltd.

7/100-7 Moo 2, Sukhprachasri 3 Rd., Bangpoo, Pakred, 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. : 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 ± 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 : Arcera 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 :

(Wipat Tuvakul)

Supervisor



The Uncertainties are for a confidence probability of approximately 95%

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มีรองสำเนาถูกต้อง

Envilab Co., Ltd. จัดการด้วยความถูกต้อง



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

UNC Condition As-Received : Good

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

Uncertainty of measurement with its \pm 0.054 ml

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

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

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D.



OK



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasen 3 Rd., Bangproed, Pakkred, Nonthaburi 11120

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



NSO-TISI-TS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 65-300147-4

Page : 1 of 2

Submitted by : Envilab Co.,Ltd.

540, 540/1 Soi Bangkhoe 7, Bangkhoe, 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 : Anonrat Sombun

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

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

Electronic Balance

ID No.	Cert. No.	Exp. Date	Traceability
241002	64-240354-1	4/2 Jun 2022	National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipat Towatoo)

Supervisor



รับรองสำเนาถูกต้อง
ผู้จัดการผ่านควบคุมคุณภาพ

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

1/105-7 Moo 2, Sukhaphrachasin 3 Rd., Bangpood, Paskred, Northtatum 11120

Tel.(02) 964-6211 Fax.(02) 964-3133, 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 to standard temperature at 20 °C

UNC 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 according to shown on date and place of calibration only.

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

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D



Envitab Co.,Ltd.

Wol
วิทยรองสำเนาถูกต้อง
ผู้จัดทำฝ่ายควบคุมคุณภาพ

