

ภาคผนวกที่ 50
เอกสารสอบเทียบเครื่องมือตรวจวัด





Certificate of Calibration

Method 5 Pre-Test Calibration - Liters (L)

UUT Meter Console Information

Model #: XC-572-V
Serial #: A2001003
DGM Model #: SK25EX
DGM Serial #: 00005796

Calibration Conditions

Bar. Pressure (mm Hg): 760.0
Ambient Temperature (°C): 25.0
Relative Humidity (%): 78.0
Altitude (m): 1.83
Bar. Pressure Corr. (mm Hg): 759.8

Factors/Conversions

Std. Temp. (K): 293.15
Std. Press. (mm Hg): 760
K₁ (K/mm Hg): 0.3857

Reference Equipment

Calibration Meter Model: DGM-200H
Cal. Due Date: 20-Aug-25
Serial No.: 0000026
Gamma: 1.0000

UUT Meter (DGM)

Run Time (seconds)	Office, ΔH (mm H ₂ O)	Volume			Meter Temperature (°C)		Meter Pressure (in H ₂ O)	Reference Meter (WTM)		
		Initial (L)	Final (L)	Total (L)	Initial	Final		Initial	Final	Total
Θ	P _{m(g)}	V _m	V _{mf}	V _m	t _{mf}	t _{mf}	P _w	V _{wi}	V _{wf}	V _w
870.00	13.00	894141.0	894297.8	156.8	25.0	25.0	0.3	0.00	162.18	162.18
650.00	25.00	894297.8	894465.2	167.4	25.0	26.0	0.5	0.00	172.42	172.42
450.00	50.00	894465.2	894632.6	167.4	26.0	26.0	0.6	0.00	172.28	172.28
360.00	80.00	894632.6	894802.4	169.8	27.0	27.0	2.0	0.00	174.01	174.01
300.00	120.00	894802.4	894976.0	173.6	27.0	27.0	2.4	0.00	177.76	177.76

Standardized Data

Reference Meter (L)	Std. Flow	UUT Meter (L)			Correction Factor		ΔH @ (mm H ₂ O)	
		Std. Vol.	Std. Flow	V _{w(Std)}	Value	Variance	ΔH@	Variance
	Q _{w(Std)}	V _{m(Std)}	V _{w(Std)}	V _{w(Std)}	Y	ΔY	ΔH@	ΔΔH@
	11.00	154.33	11.0	11.0	1.0338	0.0043	47.8	2.928
	15.66	164.67	15.7	15.7	1.0305	0.0011	45.3	0.505
	22.61	164.80	22.6	22.6	1.0291	-0.0003	43.6	-1.268
	28.65	167.08	28.6	28.6	1.0288	-0.0007	43.7	-1.126
	35.15	171.48	35.2	35.2	1.0250	-0.0044	43.8	-1.039
					1.0294	= Y Avg.	44.8	= ΔH@ Avg.

Metric

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ± 0.02 .

Note: For $\Delta H_{@}$, orifice pressure differential that equates to 0.0212 m³/min at standard temperature and pressure, acceptable tolerance of individual values from the average is ± 0.2 inches (5.1 mm) H₂O.

Pass/Fail Judgment : Pass

Nomenclature

P_b - Barometric Pressure
DGM - Dry Gas Meter
 K_1 - Constant based on standard temp and press
 Θ - Run time, in minutes
 $P_m - \Delta H$ (Meter Pressure, gauge)
 V_m - Volume collected by test meter, corrected for STP
 $Q_{m(std)}$ - Calculated flow rate of test meter
 K' - Critical orifice coefficient
 P_w - Measured pressure of reference meter
 t_w - Temperature measured in reference meter

Equations

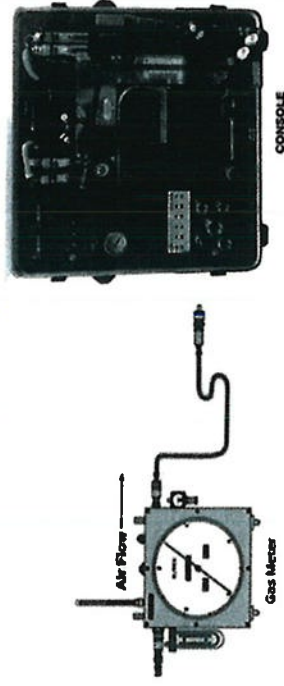
$$V_{w(std)} = Y * K_1 \frac{V_w * (P_{bar} + \frac{P_{m(std)}}{13.6})}{T_w}$$

$$V_{m(std)} = \frac{K_1 V_m (P_{bar} + \frac{\Delta H}{13.6})}{T_m}$$

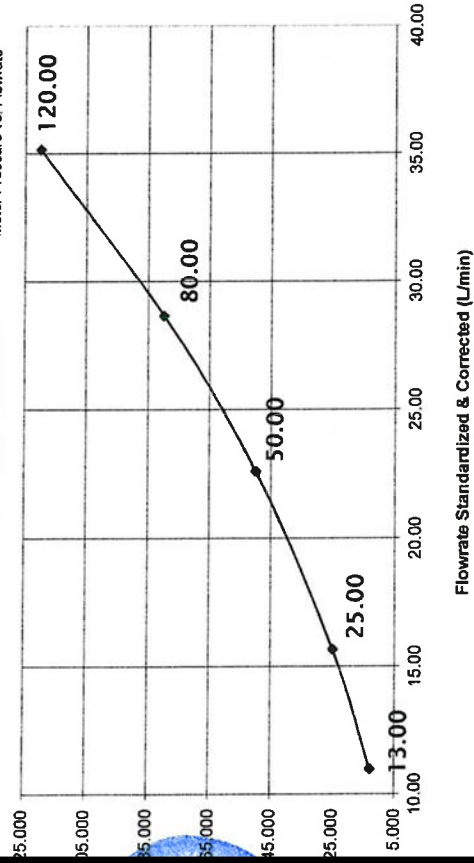
$$K_1 = \frac{T_{std}}{P_{std}} \quad Y = \frac{V_{cr(std)}}{V_{m(std)}} \quad Q_{w(std)} = \frac{V_{w(std)}}{\Theta}$$

$$Metric \Delta H_{\Phi} = \frac{P_{m(g)} * 0.0011696 * (P_{bar} + \frac{P_{m(std)}}{13.6})}{T_m} * \left(\frac{T_w * \Theta}{V_w * P_{bar}} \right)^2$$

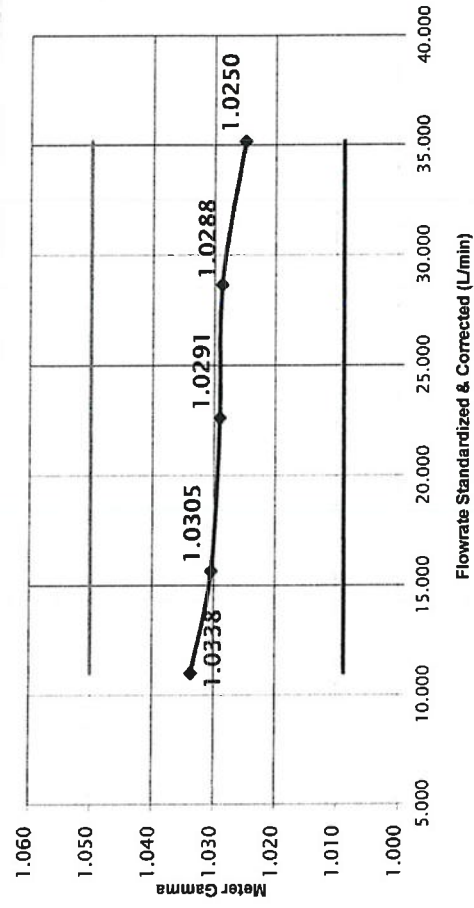
Calibration Train



Meter Pressure vs. Flowrate



Meter Gamma vs. Flowrate





Certificate of Calibration

Method 5 Console Sensor Calibration - Metric Units

Console Information

Model #: XC-572-V
Serial #: A2001003
Units: Metric

Calibration Conditions

Pbar (mm. Hg): 760.0
Humidity (%): 78
Tamb (°C): 25.0
Elevation (m): 1.8
Corr. Pbar (mm. Hg): 759.8

Reference Devices

TC Calibrator Model: CC-VTR-SH
Reference #: 091109269
Barometer Model: 736930
Reference #: EBARODIALSPE01
Pressure Model: 718 30G
Reference #: 9543013

Temperature Display Calibration Data

Reference Point ¹	Reference Temp.	Test Thermocouple Calibrations						Reference Point Status ²
		Aux	Stack	Probe	Oven	Filter	Exit	
#	°C	°C	°C	°C	°C	°C	°C	Pass/Fail
1	-18	-17	-17	-17	-17	-17	-17	PASS
2	38	38	37	37	37	37	37	PASS
3	93	94	93	93	93	93	93	PASS
4	149	149	149	149	149	149	149	PASS
5	260	259	259	259	259	259	259	PASS
6	371	372	372	372	372	372	372	PASS
7	482	483	483	483	482	483	483	PASS
8	593	594	594	594	594	594	594	PASS
9	816	816	816	816	816	816	816	PASS
10	1038	1039	1039	1038	1038	1038	1038	PASS
								PASS

Overall Audit Status

NIST Reference Thermocouple ID:

12702001

	Ref Point	Theoretical Temp.	DGM Thermocouple Sensor Reading	ΔT_{abs}^4
	#	°C	°C	°C
Ice Water	1	1.7	2	0.11%
Ambient ³	2	25	25	0.00%
Maximum ²				0.11%
Status				PASS

Internal temperature thermocouple is not audited to EPA standards, and should not be used as an official reference for ambient temperature.

Notes

¹ Suggested, minimum reference points are 10 (0, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more.

² For valid test results, the maximum difference between temperature and reference readings should be less than ± 5.4 °F (± 3 °C), for all thermocouples except for the stack thermocouple which should be less than $\pm 1.5\%$ absolute temperature from the reference reading and the exit thermocouple which should be less than ± 2 °F (± 1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1.7-6.1.1.8)

³ Do not change this cell value, it is instead based on input from Cell H9 at the top of this sheet under "Calibration Conditions"

⁴ Absolute temperature difference and other formulas are calculated based on unit input from cell C8 at the top of this sheet under "Meter Console Information"

⁵ For valid test results, the maximum difference between console and reference barometric pressure readings should be less than ± 0.1 in. Hg (± 2.5 mm Hg), (EPA Method 5, Section 6.1.2)

⁶ For valid test results, the maximum difference between console and reference vacuum readings should be less than ± 0.5 in. Hg (± 12.5 mm Hg)

⁶ For valid test results, the maximum difference between console and reference vacuum readings should be less than ± 0.05 in. H₂O (± 1.25 mm H₂O), or 5% of full scale



Model #: XC-572-V
Serial #: A2001003
Units: Metric
Type: "English"

Pbar (mm. Hg):	760.0
Humidity (%):	78.0
Tamb (°C):	25.0
Corr. Pbar (mm. Hg):	759.8

TC Simulator Model:	CC-VTR-SH
Reference #:	091109269
Barometer Model:	736930
Reference #:	EBARODIALSPE01
Digital Pressure Calibrator Model:	718 30G
Reference #:	3891001

Console Vacuum Calibration			
Reference Point	Reference Vacuum	Console Vacuum	Reference Point Status ⁶
#	in. Hg	in. Hg	Pass/Fail
1	-5.0	-5.0	PASS
2	-15.0	-15.0	PASS
3	-20.0	-20.0	PASS

Reference Point ¹	ΔH Manometer Calibration			Reference Point Status ²
	Reference	Positive (+) Pitot	Negative (-) Pitot	
#	mm H ₂ O	mm H ₂ O	mm H ₂ O	Pass/Fail
1	-200.0	0.0	-202.0	PASS
2	-150.0	0.0	-150.0	PASS
3	-100.0	0.0	-100.0	PASS
4	-80.0	0.0	-80.0	PASS
5	-50.0	0.0	-50.0	PASS
6	0.0	0.0	0.0	PASS
7	50.0	50.0	0.0	PASS
8	80.0	80.0	0.0	PASS
9	100.0	100.0	0.0	PASS
10	150.0	150.0	0.0	PASS
11	200.0	202.0	0.0	PASS
ΔH Overall Audit Status				PASS

Reference Point ¹	ΔP_Manometer Calibration			Reference Point Status ²
	Reference	Positive (+) Pitot	Negative (-) Pitot	
#	mm H2O	mm H2O	mm H2O	Pass/Fail
1	-200.0	0.0	-200.0	PASS
2	-150.0	0.0	-150.0	PASS
3	-100.0	0.0	-100.0	PASS
4	-80.0	0.0	-80.0	PASS
5	-50.0	0.0	-50.0	PASS
6	0.0	0.0	0.0	PASS
7	50.0	50.0	0.0	PASS
8	80.0	80.0	0.0	PASS
9	100.0	100.0	0.0	PASS
10	150.0	150.0	0.0	PASS
11	200.0	200.0	0.0	PASS
ΔP Overall Audit Status			PASS	

¹ Suggested, minimum reference points are 10 (0, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more.

²For valid test results, the maximum difference between temperature and reference readings should be less than $\pm 5.4^{\circ}\text{F}$ ($\pm 3^{\circ}\text{C}$), for all thermocouples except for the stack thermocouple which should be less than $\pm 1.5\%$ absolute temperature from the reference reading and the exit thermocouple which should be less than $\pm 2^{\circ}\text{F}$ ($\pm 1^{\circ}\text{C}$) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5).

³ Do not change this cell value. It is instead based on input from Cell H8 at the top of this sheet under "Calibration Conditions"

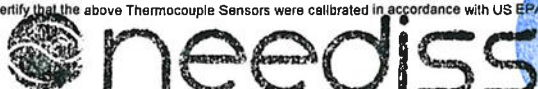
⁴ Absolute temperature difference and other formulas are calculated based on unit input from cell C8 at the top of this sheet under "Meter Console Information"

⁵For valid test results, the max/min difference between console and reference barometric pressure readings should be less than ± 0.1 in. Hg (± 2.5 mm Hg). (EPA Method 5, Section 6.1.2)

⁶ For valid test results, the maximum difference between console and reference vacuum readings should be

⁶ For valid test results, the maximum difference between console and reference vacuum readings should be less than 1 mmHg.

I certify that the above Thermocouple Sensors were calibrated in accordance with US EPA





Console Sensor Audit QA Sheet

Meter Console Information (UUT)

Model #: XC-572-V
Serial #: A2001003
Units: Metric

Calibration Conditions

Pbar (mm. Hg): 760.0
Humidity (%): 78.0
Amb. Temp. (°C): 25
Altitude (m): 1.8
Corrected Pbar (mm. Hg): 759.8

Reference Devices

TC Simulator Model: CC-VTR-SH
Reference #: 91109269
Barometer Model: 369307
Reference #: EBARODIALSPE01
Digital Pressure Calibrator Model: 718 30G
Reference #: 9543013

Audit Data

Reference Point	Reference Temp.	Thermocouple Probe Audit						Reference Point Status ¹
		Aux	Stack	Probe	Oven	Filter	Exit	
	°C	°C	°C	°C	°C	°C	°C	Pass/Fail
Ambient	25	25	25	25	25	25	25	PASS
Ice Water	1.8	2	2	2	2	2	2	PASS

Audit Data

Console Vacuum Audit			
Reference Point	Reference Vacuum	Console Vacuum	Reference Point Status ³
#	in. Hg	in. Hg	Pass/Fail
1	-17.0	-17.0	PASS

Notes

¹For valid test results, the maximum difference between test and reference readings should be less than 5.4 °F (3 °C), for all thermocouples except for the stack thermocouple which should be less than 1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than 2°F (1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1.7-6.1.1.8)

²For valid test results, the maximum difference between console and reference barometric pressure readings should be less than 0.1 in. Hg (2.5 mm Hg), (EPA Method 5, Section 6.1.2)

³For valid test results, the maximum difference between console and reference vacuum readings should be less than 0.5 in. Hg (12.5 mm Hg)

I certify that the above Thermocouple, Barometric, and Vacuum Sensors were calibrated and audited in accordance with US EPA Methods, CFR 40 Part 60.



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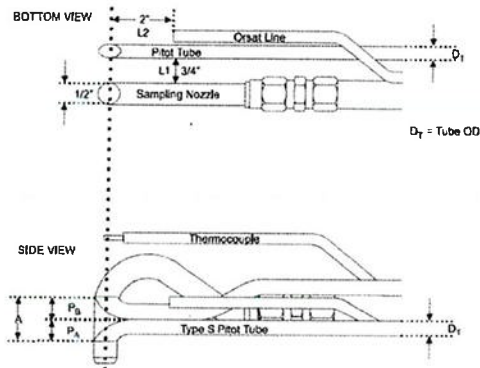
neediss Sampling Probe and Pitot Validation

Samplig System Equipment Information

Probe Sheat	Apex 1 in. , 5 ft.
Probe Number	w1906152
Pitot tube Number	A8777
Pitot tube Type	S Type 3/8 Inc.
Validation method	Standard Probe 1 in. and 1/2 in. Sampling Nozzle

Valibration Conditions and Equipment

Digital Callpers	CD-15APX
Reference No.	A22070181
Digital Inclnometer	BASELINE
Reference No.	FEI 12-1057
Temperatute	25.0 °C±3
Barometric Pressure	760.0 mm Hg



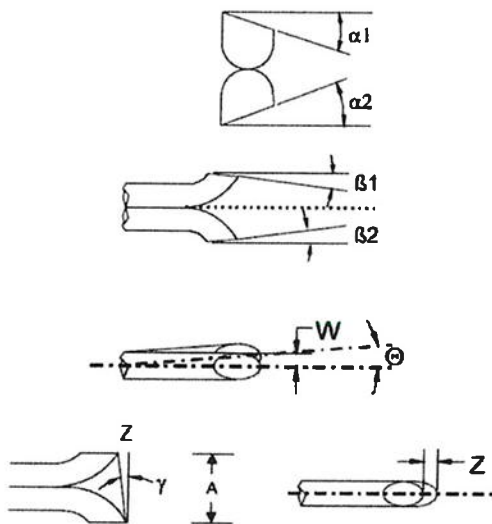
Sampling Probe Validation with Tune up

☒ Measure and Alinment with 1/2" Sampling Nozzle(12.7 mm)

Measured	Standard Range
$L_1 = 1.91 \text{ cm.}$	(1.905 cm. or 3/4 in.)
$L_2 = 5.05 \text{ cm.}$	(5.08 cm. or 2.0 in.)
$D_T = 0.967 \text{ cm.}$	(3/8 in.)
$A = 2.09 \text{ cm.}$	($2.1 D_T \leq A \leq 3D_T$)
$A/2D_T = 1.081 \text{ cm.}$	($1.05 P_A / D_T \leq A \leq 1.5$)

Pitot Tube Validations and Engles measurement Result

☒ : Measure Result after Maintanance and Adjustable



P_B Size Standard Range

$\alpha_1 = -1.70^\circ$	$\leq 10^\circ$
$\beta_1 = 1.10^\circ$	$\leq 5^\circ$

P_A Size

$\alpha_2 = 2.40^\circ$	$\leq 10^\circ$
$\beta_2 = 0.90^\circ$	$\leq 5^\circ$

Engles measurement Calculated Result Standard Range

$W = 0.60^\circ$	0.022 cm.	$W < 0.08 \text{ cm (1/32 in.)}$
$Z = 0.20^\circ$	0.007 cm.	$Z < 0.032 \text{ cm (1/8 in.)}$

Can be use 0.84 for $C_p(s)$ if the type of face-opening misafgnment show above with not affect the base line value of $C_p(s)$ Solong as standard range



Nozzle Validation

Samplig System Equipment Information

Console Model	XC-572-V
Console Number	A2001003
DGM Model	SK25EX
DGM Number	00005796

Validation Conditions

Digital Calipers	CD-15APX
Reference No	A22070181
Temperatute	25 °C±3
Barometric Pressure	760.0 mm Hg

Validation Data					Results	
Nozzle ID	Nozzle Diameter				Different	(D ₁ + D ₂ + D ₃) / 3
Sizes		D ₁	D ₂	D ₃	ΔD	Davg
	mm	mm	mm	mm	mm	mm
NS-5	3.96	3.96	3.96	3.97	0.010	3.963
NS-6	4.77	4.76	4.76	4.77	0.010	4.763
NS-10	7.92	6.35	6.36	6.36	0.010	6.357
NS-11	8.71	8.72	8.72	8.73	0.010	8.723
NS-13	10.31	10.32	10.32	10.31	0.010	10.317
NS-15	11.88	11.88	11.88	11.87	0.010	11.877
NS-17	13.48	13.48	13.47	13.48	0.010	13.477

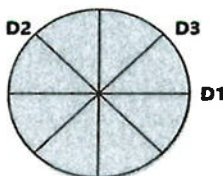
Where :

D1, D2, D3 = Inner Diameter of the nozzle,mm(in.)

(The Three separate measurements using different dimeters each time must be the nearest0.025mm(0.001 in.))

Δ D = The difference between the high and low numbers shall not exceed 0.1 mm(0.004 in.)

D avg = The average of the measurements by using Equation(D₁ + D₂ + D₃) / 3



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

Verification Test Report

Instruments Information

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Analyzer Type: Flue Gas Analyser

Manufacturer: MRU

Model: Optima7

Serial No.: 320779

Calibration Gas information

Standard Gas Mid Range

O2 Conc 2.1 %vol.
Cd/Ex: 343014/Jul 24,2025
CO Conc 100.2 ppm
NO Conc 101.9 ppm
NOX Conc 101.9 ppm
SO2 Conc 100.7 ppm
CO2 Conc 7.597 %
Cd/Ex: GN0029548/Mar 08,2032

Standard Gas High Range

O2 Conc 10.00 %vol.
Cd/Ex: 343018/Nov 9,2025
CO Conc 600.0 ppm
NO Conc 198.9 ppm
NOX Conc 198.9 ppm
SO2 Conc 200.0 ppm
CO2 Conc 16.00 %
Cd/Ex: GN0032954/Apr 30,2032

Environment: Temperature 26.4 °C Humidity: 77 %RH

SO2 calibration test

Set point	Std.gas (ppm)	Before Adj Reading(ppm)	After Adj Reading(ppm)	Difference	% error
Low/Zero	0.0	0	0	0.0	0.0
Mid	100.7	96	100	-0.7	-0.7
Hight	200.0	197	200	0.0	0.0

NO calibration test

Set point	Std.gas (ppm)	Before Adj Reading(ppm)	After Adj Reading(ppm)	Difference	% error
Low/Zero	0.0	0	0	0.0	0.0
Mid	101.9	92	101	-0.9	-0.9
Hight	198.9	190	199	0.1	0.1

NOX calibration test

Set point	Std.gas (ppm)	Before Adj Reading(ppm)	After Adj Reading(ppm)	Difference	% error
Low/Zero	0.0	0	0	0.0	0.0
Mid	101.9	92	100	-1.9	-1.9
Hight	198.9	190	199	0.1	0.1

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Verification Test Report

Instruments Information

Page:2/2

Analyzer Type: Flue Gas Analyser
Model: Optima7

Manufacturer: MRU
Serial No.: 320779

Calibration Gas information

Standard Gas Mid Range

O2 Conc 2.1 %vol.
Cd/Ex: 343014/Jul 24,2025
CO Conc 100.2 ppm
NO Conc 101.9 ppm
NOX Conc 101.9 ppm
SO2 Conc 100.7 ppm
CO2 Conc 7.597 %
Cd/Ex: GN0029548/Mar 08,2032

Standard Gas High Range

O2 Conc 10.00 %vol.
Cd/Ex: 343018/Nov 9,2025
CO Conc 600.0 ppm
NO Conc 198.9 ppm
NOX Conc 198.9 ppm
SO2 Conc 200.0 ppm
CO2 Conc 16.00 %
Cd/Ex: GN0032954/Apr 30,2032

Environment: Temperature 26.4 °C Humidity: 77 %RH

CO calibration test

Set point	Std.gas (ppm)	Before Adj Reading(ppm)	After Adj Reading(ppm)	Difference	% error
Low/Zero	0.0	0	0	0.0	0.0
Mid	100.2	101	99	-1.2	-1.2
Hight	600.0	607	601	1.0	0.2

O2 calibration test

Set point	Std.gas (ppm)	Before Adj Reading(ppm)	After Adj Reading(ppm)	Difference	% error
Low/Zero	0.0	0	0	0.0	0.0
Mid	2.1	2.2	2.1	0.0	0.0
Hight	10.00	10.21	10.2	0.2	2.0

Note

Technical Data Calibration results.:Calibration reading response discrepancy

O2 parameter ± 0.2 Vol-% at Range 0-21 Vol-%
CO2 parameter ± 0.3 Vol-% at Range 0-CO2 Max
CO parameter ± 5 % at Range 0-500 PPM
NO parameter ± 5 % at Range 0-1000 PPM
NO2 parameter ± 5 % at Range 0-1000 PPM
SO2 parameter ± 5 % at Range 0-2000 PPM

neediss

Envilab Co., Ltd.

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ให้การผ่านตามคุณภาพ

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We know the best thing to save environment

Certificate of Calibration

Certificate No. : 68-410088-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Digital Thermo-Hygrometer

Manufacturer : ebro

Model : EBI 20

Range Temperature : -30 °C to 70 °C

Resolution : 0.1 °C

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

Resolution : 0.1 %R.H.

Serial No. : 62324021

ID No. : ELABTMEB120TH1

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

Relative Humidity : (50 ± 15) %

Date of Received : 18 June 2025

Date of Calibration : 24 June 2025

Date of Issue : 24 June 2025

Calibrated by : Chortip Samchusri

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

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

Digital Indicator with Standard Probe Temp&Hum

ID No.	Cert. No.	Due Date	Traceability
400034 & 400036	SG-H-00001/68	04 Jul 2025	Success Gateway Co., Ltd., Accredited by TISI Calibration No.0268

The Uncertainties are for a confidence probability of approximately 95%

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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

Certificate of Calibration

Certificate No. : 68-410088-1

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)
24.99	24.9	0.1	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)
50.00	53.6	-3.6	2.2

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%

- o0o -

Certificate of Calibration

Certificate No. : 68-200034-1

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 : (20.4 to 21.0) °C

Relative Humidity : (41.9 to 42.9) %

Air Pressure : 1014.0 mbar

Date of Received : 28 January 2025

Date of Calibration : 28 January 2025

Date of Issue : 30 January 2025

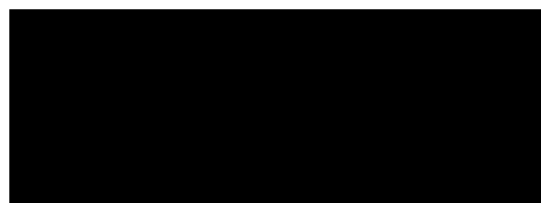
Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 7 - November 2022

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02242009	07 Nov 2025	National Institute of Metrology (Thailand), (NIMT)



The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-200034-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.01	0.0000	0.00012
0.1	0.0001	0.00012
1	0.0000	0.00013
2	0.0001	0.00013
5	0.0000	0.00013
10	0.0000	0.00013
20	-0.0001	0.00014
50	-0.0001	0.00015
100	-0.0001	0.00020
200	-0.0001	0.00038

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

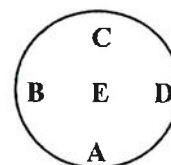
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.06$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

A B C D E

0.0004 0.0004 0.0005 0.0004 0.0000 g



Repeatability

Load test : 200 g

Stdev. : 0.00005 g

- o0o -



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Envilab Co., Ltd.
Tel : 02-802-3577-8

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540,540/1 Soi Bangkhae 7 Bangkhae Bangkok 10160 Thailand
Fax. 02-802-3773 E-mail : info@evltesting.com



Needless Envilab

TSP High Volume Sampler Calibration

Verification Report No.

SO2500043-E003 -TSP 01

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: วัดบ้านกล้วย	
UTM : N 1468029 E 588924	
Sampler: ETSP#34	
Recorder: ECRDS016339508	
Date: 22 Sep 25	
Technical: Yosvisit Ch.	
Approval: Wisan R.	

CONDITIONS

Barometric Press. (hPa): 1007.5	Corrected Pressure (mm Hg): 755.7
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

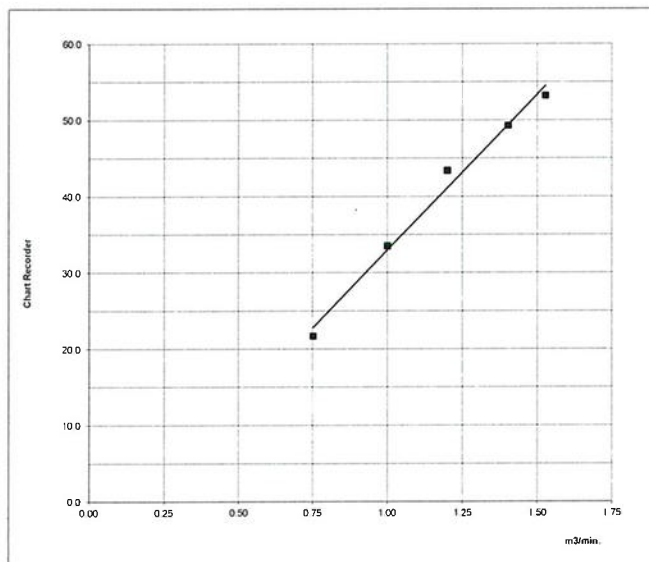
CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc
Model: TE-5025A
Serial#: 2067

Qstd Slope: 2.06933
Qstd Intercept: -0.02815
Date Certified: 4 Mar 25
Due Date : 03-Mar-26

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	10.10	1.527	54.0	53.23	Slope = 40.7713
2	8.50	1.402	50.0	49.28	Intercept = -7.7493
3	6.20	1.200	44.0	43.37	Corr. coeff.= 0.9937
4	4.30	1.001	34.0	33.51	# of Observations: 5
5	2.40	0.752	22.0	21.68	Range of Chart at 1.1 - 1.7 m3/min. 38 62



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



Needless Envilab

TSP High Volume Sampler Calibration

Verification Report No.

SO2500043-E003 -TSP 02

☐ PM ☒ Onsite

Site: อบต.หนองชุมพล

UTM : N 1469399 E 588064

Sampler: ETSP#33

Recorder: ECRDS016339509

Date: 22 Sep 25

Technical: Yosvisit Ch.

Approval: Wisan R.

CONDITIONS

Barometric Press. (hPa): 1007.4

Temperature (deg C): 32.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 755.6

Temperature (deg K): 305.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 2067

Qstd Slope: 2.06933

Qstd Intercept: -0.02815

Date Certified: 4 Mar 25

Due Date : 03-Mar-26

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)
1	12.20	1.677	56.0	55.19
2	9.60	1.489	52.0	51.25
3	6.40	1.219	44.0	43.37
4	4.30	1.001	34.0	33.51
5	2.20	0.720	24.0	23.65

LINEAR REGRESSION

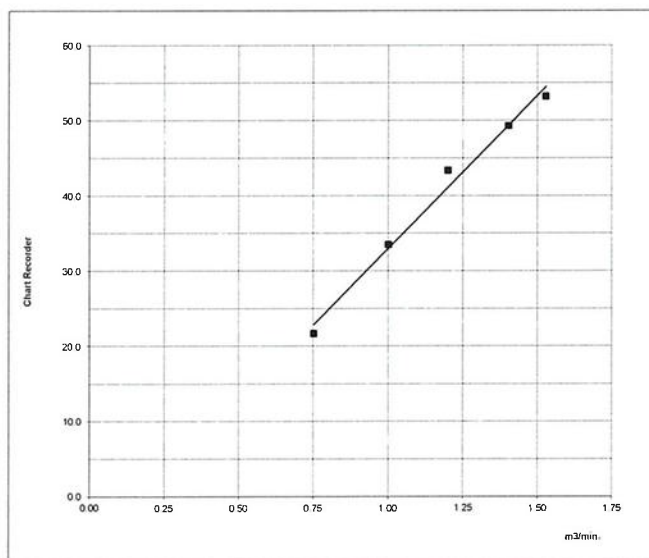
Slope = 33.7515

Intercept = 0.1752

Corr. coeff. = 0.9937

of Observations: 5

Range of Chart
at 1.1 - 1.7 m3/min.



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



Needless Envilab

TSP High Volume Sampler Calibration

Verification Report No.

SO2500043-E003 -TSP 03

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: บ้านเนิน	
UTM : N 1468251 E 588323	
Sampler: ETSP#32	
Recorder: ECRDS016339507	
Date: 22 Sep 25	
Technical: Yosvisit Ch.	
Approval: Wisan R.	

CONDITIONS

Barometric Press. (hPa): 1010.4	Corrected Pressure (mm Hg): 757.9
Temperature (deg C): 33.0	Temperature (deg K): 306.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

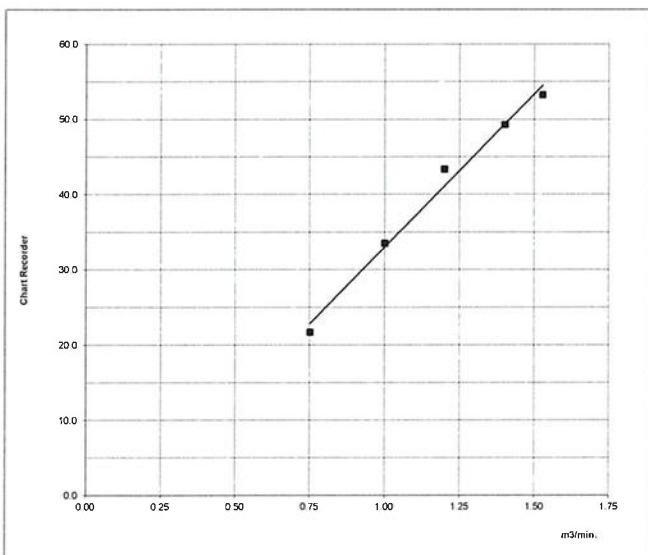
CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc
Model: TE-5025A
Serial#: 2067

Qstd Slope: 2.06933
Qstd Intercept: -0.02815
Date Certified: 4 Mar 25
Due Date : 3 Mar 26

CALIBRATIONS

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	13.50	1.763	56.0	55.19	Slope = 27.4815
2	11.00	1.593	52.0	51.24	Intercept = 7.2088
3	8.80	1.426	48.0	47.30	Corr. coeff.= 0.9980
4	6.20	1.199	40.0	39.42	# of Observations: 5
5	2.80	0.810	30.0	29.56	Range of Chart at 1.1 - 1.7 m3/min. 38
					54



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Fax. 02-802-3773 E-mail : info@evltesting.com



Needless Envilab

PM10 High Volume Sampler Calibration

Verification Report No.

SO2500043-E003 -PM 01

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: วัดบ้านกล้วย	
UTM : N 1468029 E 588924	
Sampler: EPM10#39	
Recorder: ECRDS019075261	
Date: 22 Sep 25	
Technical: Yosvisit Ch.	
Approval: Wisan R.	

CONDITIONS

Barometric Press. (hPa): 1007.5	Corrected Pressure (mm Hg): 755.7
Temperature (deg C): 32.0	Temperature (deg K): 305.0
Average Press. (hPa): 1013.0	Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg C): 30.0	Average Temp. (deg K): 303.0

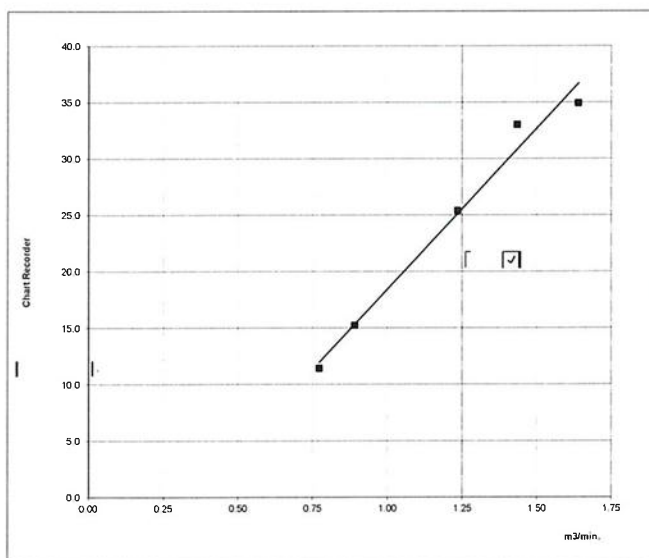
CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc
Model: TE-5025A
Serial#: 2067

Slope: 1.29578
Intercept: -0.01772
Date Certified: 4 Mar 25
Due Date : 3 Mar 26

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION
1	11.00	1.640	55.0	34.94	
2	8.40	1.435	52.0	33.04	Slope = 28.5429 Intercept = -10.0820 Corr. coeff.= 0.9905 SFR = 1.000 SSP = 29.06 # of Observations: 5
3	6.20	1.234	40.0	25.41	
4	3.20	0.891	24.0	15.25	
5	2.40	0.773	18.0	11.44	
					Range of Chart at SFR $\pm 10\%$
					25 33





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Fax 02-802-3773 E-mail : info@evltesting.com



Needless Envilab

PM10 High Volume Sampler Calibration

Verification Report No.

SO2500043-E003 -PM 02

<input type="checkbox"/> PM	<input checked="" type="checkbox"/> Onsite
Site: อบต.หนองปรือ	
UTM : N 1469399 E 588064	
Sampler: EPM10#16	
Recorder: NCRDS014261033	
Date: 22 Sep 25	
Technical: Yosvisit Ch.	
Approval: Wisan R.	

CONDITIONS

Barometric Press. (hPa): 1007.4
Temperature (deg C): 32.0
Average Press. (hPa): 1013.0
Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 755.6
Temperature (deg K): 305.0
Corrected Avg. Press. (mm Hg): 759.8
Average Temp. (deg K): 303.0

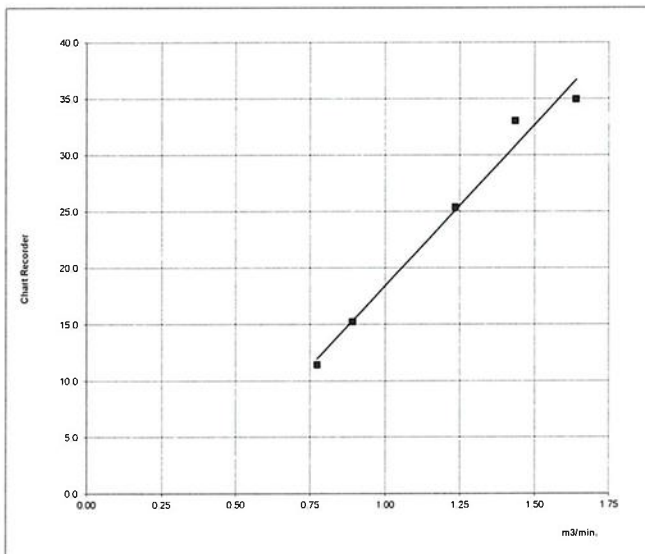
CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc
Model: TE-5025A
Serial#: 2067

Slope: 1.29578
Intercept: -0.01772
Date Certified: 4 Mar 25
Due Date : 3 Mar 26

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION Slope = 24.5513 Intercept = -6.1756 Corr. coeff.= 0.9902 SFR = 1.000 SSP = 28.92 # of Observations: 5 Range of Chart at SFR $\pm 10\%$
1	12.80	1.768	56.0	35.58	
2	10.40	1.595	54.0	34.31	
3	7.30	1.338	43.0	27.32	
4	4.40	1.042	32.0	20.33	
5	2.70	0.819	20.0	12.71	





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Envilab Co., Ltd.
Tel : 02-802-3577-8

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540,540/1 Soi Bangkhae 7 Bangkhae Bangkok 10160 Thailand
Fax 02-802-3773 E-mail : info@evltesting.com



Neediss Envilab

PM10 High Volume Sampler Calibration

Verification Report No.

SO2500043-E003 -PM 03

☐ PM ☒ Onsite

Site: บ้านเนิน

UTM : N 1468251 E 588323

Sampler: EPM10#15

Recorder: NCRPI500900752

Date: 22 Sep 25

Technical: Yosvisit Ch.

Approval: Wisan R.

CONDITIONS

Barometric Press. (hPa): 1010.4

Temperature (deg C): 33.0

Average Press. (hPa): 1013.0

Average Temp. (deg C): 30.0

Corrected Pressure (mm Hg): 757.9

Temperature (deg K): 306.0

Corrected Avg. Press. (mm Hg): 759.8

Average Temp. (deg K): 303.0

CALIBRATION ORIFICE

Brand: Tisch Environmental, Inc

Model: TE-5025A

Serial#: 2067

Slope: 1.29578

Intercept: -0.01772

Date Certified: 4 Mar 25

Due Date : 3 Mar 26

CALIBRATIONS

Plate or Test #	H2O (in)	Qa (m3/min)	I (chart)	IC (corrected)
1	11.50	1.677	56.0	35.58
2	10.40	1.595	51.0	32.41
3	8.30	1.426	44.0	27.96
4	4.40	1.042	32.0	20.33
5	2.20	0.741	18.0	11.44

LINEAR REGRESSION

Slope = 24.5938

Intercept = -6.3370

Corr. coeff. = 0.9966

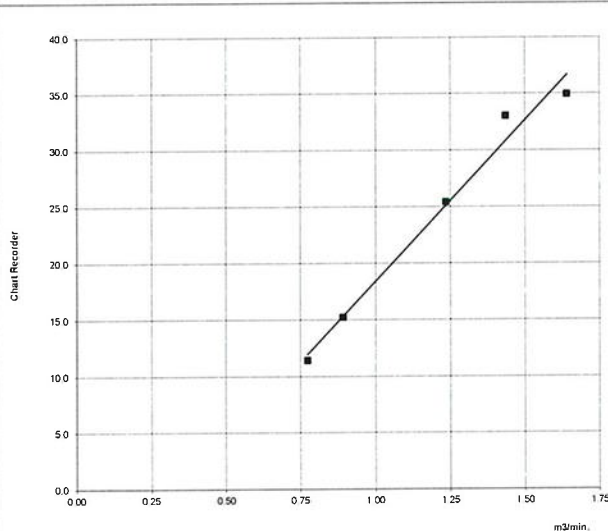
SFR = 1.000

SSP = 28.73

of Observations: 5

Range of Chart 25

at SFR $\pm 10\%$ 32





Certificate of Calibration

Calibration Certification Information

Cal. Date: March 4, 2025

Rootsmeter S/N: 438320

Ta: 294

°K

Operator: Jim Tisch

Pa: 746.0

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	1.4220	3.2	2.00
2	3	4	1	1.0090	6.4	4.00
3	5	6	1	0.9030	8.0	5.00
4	7	8	1	0.8610	8.8	5.50
5	9	10	1	0.7090	12.8	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
0.9907	0.6967	1.4106	0.9957	0.7002	0.8878
0.9864	0.9776	1.9949	0.9914	0.9826	1.2556
0.9843	1.0900	2.2304	0.9893	1.0955	1.4038
0.9832	1.1419	2.3393	0.9882	1.1477	1.4723
0.9779	1.3792	2.8212	0.9828	1.3862	1.7756
QSTD	m=	2.06933	QA	m=	1.29578
	b=	-0.02815		b=	-0.01772
	r=	0.99997		r=	0.99997

Calculations

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

Standard Conditions

Tstd: 298.15 °K

Pstd: 760 mm Hg

Key

ΔH: calibrator manometer reading (in H2O)

ΔP: rootsmeter manometer reading (mm Hg)

Ta: actual absolute temperature (°K)

Pa: actual barometric pressure (mm Hg)

b: intercept

m: slope

RECALIBRATION

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



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 24 October, 2024

Certification No. 357/24

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : NovaLynx

Type : Data Logger 110-WS-25DL-D

Serial No. : EWSNV110WS2508

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhae 7, Bangkhae, Bangkhae
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1009.8 hPa

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 S/N 91563

: HOOK GAGE NO 1425 : Wind Aloft Plotting Board

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94

Schneider No.918802

Barometer Vaisala Type PTB220 No. 71220015



Envilab Co.,Ltd. 540.540/1 Soi Bangkhae 7, Bangkhae, Bangkok 10160, Thailand.



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Sensor model

EWSNV110WS2508

Certification No. 357/24

24 October, 2024

Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure Inches H2O	Vacumm Inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.6	0.40
7.04	-	-	-	6.7	0.34
9.02	-	-	-	9.1	-0.08
11.01	-	-	-	10.7	0.31
13.01	-	-	-	13.1	-0.09
15.01	-	-	-	14.8	0.21
17.02	-	-	-	17.1	-0.08
20.02	-	-	-	20.3	-0.28

Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Sensor model

EWSNV110WS2508

Certification No. 357/24

24 October, 2024

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1010.12	1009.65	0.47
1010.35	1009.95	0.40
1010.56	1010.12	0.44
1010.85	1010.41	0.44
1011.05	1010.54	0.51
1011.46	1010.95	0.51
1011.82	1011.26	0.56
1011.95	1011.55	0.40
1012.15	1011.67	0.48
1012.54	1012.09	0.45
1012.81	1012.32	0.49
1010.25	1009.79	0.46
1010.14	1009.72	0.42
1009.95	1009.46	0.49
1009.84	1009.28	0.56
1009.45	1008.86	0.59
1009.32	1008.77	0.55
1009.11	1008.64	0.47
1009.56	1009.08	0.48
1009.86	1009.18	0.68

Average





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Sensor model

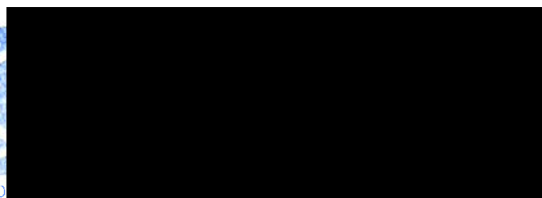
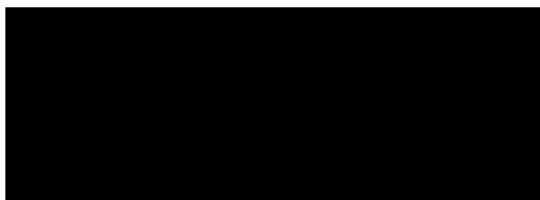
EWSNV110WS2508

Certification No. 357/24

24 October, 2024

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.6	45.4	0.2
30.2	30.4	-0.2
15.1	15.0	0.1





THAI METEOROLOGICAL DEPARTMENT

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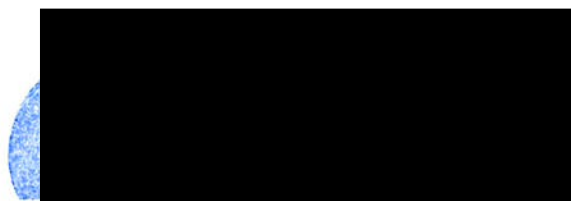
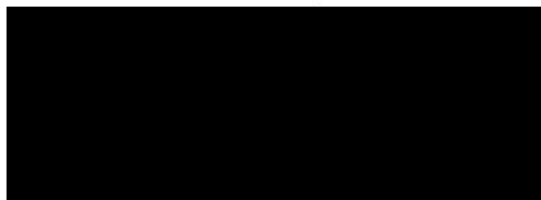
The Result of Calibration

Sensor model EWSNV110WS2508 Certification No. 357/24

24 October, 2024

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
92.5	96.2	-3.7
65.4	68.1	-2.7
45.2	46.6	-1.4





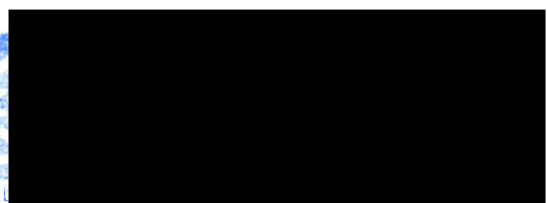
Date of Issue 24 October, 2024

Certification No. 357/24

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING
BUCKET Product No. 7342.026 Code No. EWSNV110WS2508 ทำการสอบเทียบกับแก้ววัด
ฝนแบบแก้วดวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON
No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.2mm./TIP)





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 24 October, 2024

Certification No. 358/24

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุณหภูมิตามวิทยา

Manufacturer : NovaLynx

Type : Data Logger 110-WS-25DL-D

Serial No. : EWSNV110WS2509

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhuae 7, Bangkhuae, Bangkhuae
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1009.5 hPa

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 S/N 91563

: HOOK GAGE NO 1425

: Wind Aloft Plotting Board

N.I.S.T. Test Reference Number 731/241460

: Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer

Model DA-650-3TV

(sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION

: Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER

: Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94

: Theodor Schneider No.918802

: Barometer Vaisala Type P/B220 No. V1220015





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Sensor model

EWSNV110WS2509

Certification No. 358/24

24 October, 2024

Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacumm	Velocity	Velocity	Correction
	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.5	0.50
7.04	-	-	-	7.0	0.04
9.02	-	-	-	9.1	-0.08
11.01	-	-	-	11.0	0.01
13.01	-	-	-	13.1	-0.09
15.01	-	-	-	15.0	0.01
17.02	-	-	-	17.1	-0.08
20.02	-	-	-	20.1	-0.08

Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Sensor model

EWSNV110WS2509

Certification No. 358/24

24 October, 2024

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1010.12	1009.52	0.60
1010.35	1009.78	0.57
1010.56	1009.98	0.58
1010.85	1010.35	0.50
1011.05	1010.48	0.57
1011.46	1010.82	0.64
1011.82	1011.23	0.59
1011.95	1011.42	0.53
1012.15	1011.58	0.57
1012.54	1011.95	0.59
1012.81	1012.29	0.52
1010.25	1009.68	0.57
1010.14	1009.64	0.50
1009.95	1009.38	0.57
1009.84	1009.18	0.66
1009.45	1008.85	0.60
1009.32	1008.73	0.59
1009.11	1008.58	0.53
1009.56	1008.93	0.63
1009.86	1009.21	0.65

Average





THAI METEOROLOGICAL DEPARTMENT

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The Result of Calibration

Sensor model

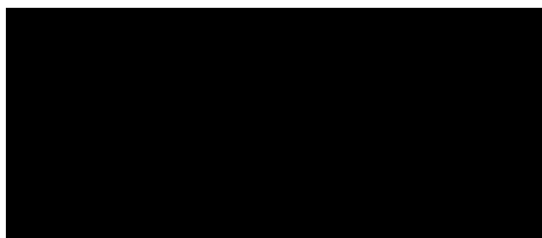
EWSNV110WS2509

Certification No. 358/24

24 October, 2024

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.6	45.8	-0.2
30.2	30.3	-0.1
15.1	14.9	0.2





THAI METEOROLOGICAL DEPARTMENT

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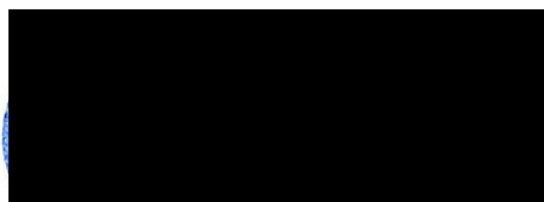
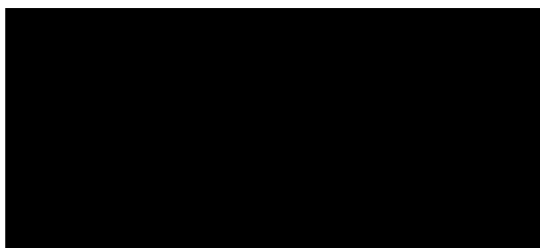
The Result of Calibration

Sensor model EWSNV110WS2509 Certification No. 358/24

24 October, 2024

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
92.5	96.5	-4.0
65.4	68.1	-2.7
45.2	46.1	-0.9





Date of Issue 24 October, 2024

Certification No. 358/24

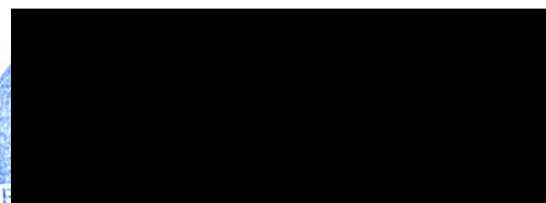
Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING
BUCKET Product No. 7342.026 Code No. EWSNV110WS2509 ทำการสอบเทียบกับแก้ววัด
ฝนแบบแก้วตวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON
No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01.inches/TIP)



วิศวกรชำนาญการ





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 23 June, 2025

Certification No. 301/25

Page : 1 of 6

Object : เครื่องมือตรวจวัดอุณหภูมิ

Manufacturer : NovaLynx

Type : Data Logger 110-WS-25DL-D

Serial No. : EWSNV110WS2503

Customer : Envilab Co.,Ltd.(Head Office)
540.540/1 Soi Bangkhae 7, Bangkhae, Bangkhae
Bangkok 10160,Thailand.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1006.6 hPa

NATIONAL STANDARD WIND TUNNEL : Vane Angel Bench Stand Model 18112

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119 : HOOK GAGE NO 1425

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94

: Thermoschneider No.9188 : testo, testo 645 Serial No. 02848057

Type PTB220 No. V1220015





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Sensor model

EWSNV110WS2503

Certification No. 301/25

23 June, 2025

Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacuum inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.3	0.70
3.02	-	-	-	2.4	0.62
5.00	-	-	-	4.3	0.70
7.04	-	-	-	6.8	0.24
9.02	-	-	-	8.8	0.22
11.01	-	-	-	11.1	-0.09
13.01	-	-	-	12.8	0.21
15.01	-	-	-	15.1	-0.09
17.02	-	-	-	16.8	0.22
20.02	-	-	-	20.1	-0.08

Vane Angel Bench Stand Model 18112 Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	92
180	181
270	





THAI METEOROLOGICAL DEPARTMENT

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The Result of Calibration

Sensor model

EWSNV110WS2503

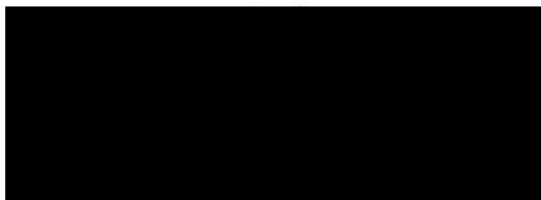
Certification No. 301/25

23 June, 2025

Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
1006.54	1006.94	-0.40
1006.75	1007.21	-0.46
1006.98	1007.57	-0.59
1007.24	1007.65	-0.41
1007.64	1008.13	-0.49
1007.82	1008.51	-0.69
1008.01	1008.51	-0.50
1008.28	1008.83	-0.55
1008.68	1009.02	-0.34
1008.93	1009.38	-0.45
1005.42	1005.87	-0.45
1005.84	1006.32	-0.48
1006.32	1006.74	-0.42
1006.87	1007.24	-0.37
1007.65	1008.03	-0.38
1007.94	1008.36	-0.42
1008.51	1008.96	-0.45
1008.92	1009.35	-0.43
1009.22	1009.64	-0.42
1009.85	1010.21	-0.36

Average





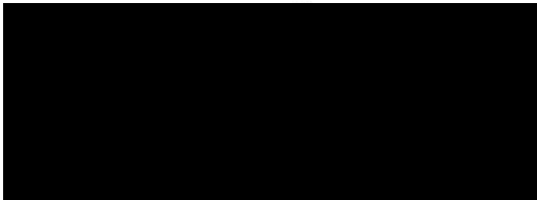
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 301/25

Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.2	45.5	-0.3
30.4	30.6	-0.2
15.6	15.5	0.1



Envilab Co., Ltd.



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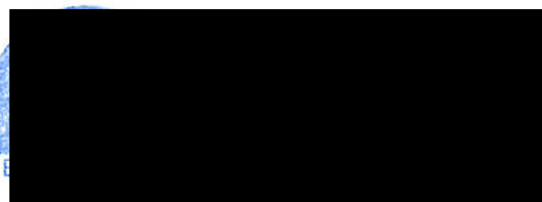
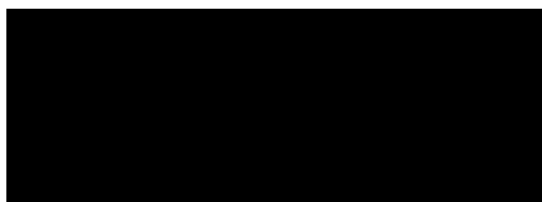
The Result of Calibration

Sensor model EWSNV110WS2503 Certification No. 301/25

23 June, 2025

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading	Correction
	% R.H.	% R.H.
86.4	95.2	-8.8
65.3	71.2	-5.9
42.2	45.5	-3.3





Date of Issue 23 June, 2025

Certification No. 301/25

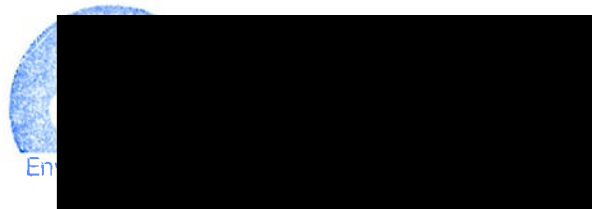
Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ชีห้อ Davis Instruments แบบ TIPPING BUCKET Product No. #7852 Mfg. Code. EWSNV110WS2503 ทำการสอบเทียบกับแก้ววัดฝน แบบแก้วตวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.2 mm./TIP)



วิศวกรชำนาญการ





บริษัท เอ็นไวแล็บ จำกัด
Envilab Co., Ltd.
Tel : 02-802-3577-8

540,540/1 ซอยบางแค 7 เขตบางแค แขวงบางแค กรุงเทพฯ 10160
540 .540/1 Soi Bangkhae 7 Bangkhae Bangkok 10160 Thailand
Fax. 02-802-3773 E-mail : info@evltesting.com



Neediss Envilab

Verification Test Report

Report No.: SO2500043-E003 / 001

Verification Date : 22 September 2025

Operate Information ☐ PM ☒ Onsite

Site : N1 : ริมรั้วด้านทิศเหนือของโครงการ

GPS coordinates : 47P N 1468501 E 588275

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 45

Serial No : 0018

Scale Rang : 20dB-140dB

Class : 1

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EEL.BP.65/0168

Date due : 17 January 2026

Traceability : TISTR

Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %

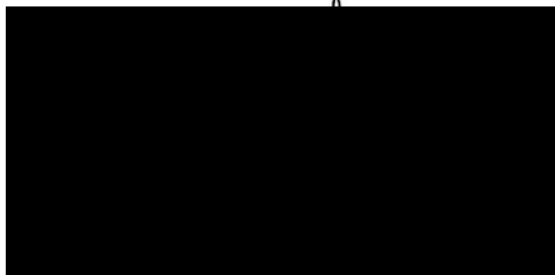
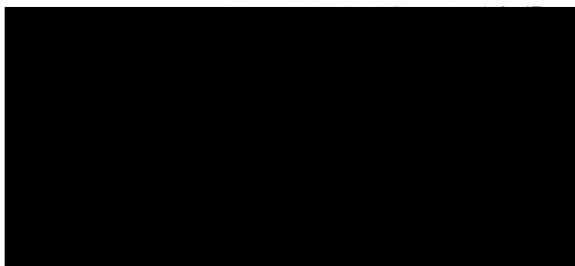
Atmospheric pressure 1013.3 hpa

Measurement Data

Refferance Value (dB)	Correction Value (dB)	Adjustment (dB)	UUR Reading		Error (dB)	Acceptant Criteria (dB)
			Initial	Final		
93.93	-0.3	93.63	93.87	94.03	0.16	±0.5

* UUR = Unit Under Referance flow

Acceptant Criteria : Sound Level Meter Class 1 ±0.5 dB



The Results shown in this verification report refer only to the equipment verif

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540 . 540/1 Soi Bangkhæ 7 Bangkhæ Bangkok 10160 Thailand
Fax 02-802-3773 E-mail : info@evltesting.com



Neediss Envilab

Verification Test Report

Report No.: SO2500043-E003 / 001

Verification Date : 22 September 2025

Operate Information ☐ PM ☒ Onsite

Site : N2 : รีมรืด้านทิศใต้ของโครงการ

GPS coordinates : 47P N 1468320 E 588452

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 45

Serial No : 0015

Scale Rang : 20dB-140dB

Class : 1

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EEL.BP.65/0168

Date due : 17 January 2026

Traceability : TISTR

Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %

Atmospheric pressure 1013.3 hpa

Measurement Data

Refferance Value (dB)	Correction Value (dB)	Adjustment (dB)	UUR Reading		Error (dB)	Acceptant Criteria (dB)
			Initial	Final		
93.93	0	93.93	93.27	93.09	-0.18	±0.5

* UUR = Unit Under Reference flow

Acceptant value : Sound Level Meter Class 1 ±0.5 dB

Sound Level Meter Class 2 ±1.0 dB

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540 .540/1 Soi Bangkhæ 7 Bangkhæ Bangkok 10160 Thailand
Fax. 02-802-3773 E-mail : info@evltesting.com



Neediss Envilab

Verification Test Report

Report No.: SO2500043-E003 / 001

Verification Date : 22 September 2025

Operate Information ☐ PM ☒ Onsite

Site : N3 : ริมรั้วด้านทิศตะวันออกของโครงการ

GPS coordinates : 47P N 1468266 E 588737

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 45

Serial No : 0022

Scale Rang : 20dB-140dB

Class : 1

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EEL.BP.65/0168

Date due : 17 January 2026

Traceability : TISTR

Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %
Atmospheric pressure 1013.3 hpa

Measurement Data

Refferance Value (dB)	Correction Value (dB)	Adjustment (dB)	UUR Reading		Error (dB)	Acceptant Criteria (dB)
			Initial	Final		
93.93	0	93.93	93.87	94.13	0.26	±0.5

* UUR = Unit Under Reference flow

Acceptant value : Sound Level Meter Class 1 ±0.5 dB

Sound Level Meter Class 2 ±1.0 dB

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Tel : 02-802-3577-8

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540,540/1 Soi Bangkhae 7 Bangkhae Bangkok 10160 Thailand
Fax 02-802-3773 E-mail : info@evitestng.com



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Verification Test Report

Report No.: SO2500043-E003 / 001

Verification Date : 22 September 2025

Operate Information ☐ PM ☒ Onsite

Site : N4 : ริมรั้วด้านทิศตะวันตกของโครงการ

GPS coordinates : 47P N 1468377 E 588283

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 45

Serial No : 0012

Scale Rang : 20dB-140dB

Class : 1

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EEL.BP.65/0168

Date due : 17 January 2026

Traceability : TISTR

Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %

Atmospheric pressure 1013.3 hpa

Measurement Data

Refferance Value (dB)	Correction Value (dB)	Adjustment (dB)	UUR Reading		Error (dB)	Acceptant Criteria (dB)
			Initial	Final		
93.93	0	93.93	94.11	94.25	0.14	±0.5

* UUR = Unit Under Reference flow

Acceptant value : Sound Level Meter Class 1 ±0.5 dB

Sound Level Meter Class 2 ±1.0 dB

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Envilab Co., Ltd.
Tel : 02-802-3577-8

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540 .540/1 Soi Bangkhae 7 Bangkhae Bangkok 10160 Thailand
Fax 02-802-3773 E-mail : info@evltesting.com



Neediss Envilab

Verification Test Report

Report No.: SO2500043-E003 / 001

Verification Date : 22 September 2025

Operate Information ☐ PM ☒ Onsite

Site : ชุมชนบ้านเนิน

GPS coordinates : 47P N 1468243 E 588342

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 45

Serial No : 0013

Scale Rang : 20dB-140dB

Class : 1

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EEL.BP.65/0168

Date due : 17 January 2026

Traceability : TISTR

Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %
Atmospheric pressure 1013.3 hpa

Measurement Data

Refferance Value (dB)	Correction Value (dB)	Adjustment (dB)	UUR Reading		Error (dB)	Acceptant Criteria (dB)
			Initial	Final		
93.93	0	93.93	94.52	94.85	0.33	±0.5

* UUR = Unit Under Reference flow

Acceptant value : Sound Level Meter Class 1 ±0.5 dB

Sound Level Meter Class 2 ±1.0 dB

The Results shown in this verification report refer only to the equipment verification unless otherwise stated

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0152

MTC No. EEL. BP. 65/0168

CALIBRATION CERTIFICATE

Submitted by : Envilab Co.,Ltd.

Address : 540, 540/1 Soi Bangkhuae 7, Bangkhuae, Bangkhuae, 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 : Pulsar

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

Model : 103

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

Serial No. : 98971

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 Panasonic VP-7722A S/N 041477D122.
7. Condenser Microphone B&K 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 Jan. 2025

Date of Calibration : 17 Jan. 2025

The results relate only to the items tested/calibrated or value assigned.

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FM.BI.MTC.002 Rev.5



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0152

MTC No. EEL. BP. 65/0168

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

Nominal Output of Unit Under Test = 94 dB re 20 μ Pa at 1000 Hz

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

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	93.93	-0.07	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1000.4	0.4	± 1.5	$\pm 1.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1.40	± 0.50	$\pm 3.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Date of Calibration : 17 Jan. 2025

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0152

MTC No. EEL. BP. 65/0168

Nominal Output of Unit Under Test = 114 dB re 20 μ Pa at 1000 Hz

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

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	114.01	0.01	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1000.3	0.3	± 1.5	$\pm 3.0\%$

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	2.05	± 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.

Approved by :



Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 17 Jan. 2025

Date of Issue : 20 Jan. 2025

Ref : 2011268011000116001

End of Certificate

3 / 3

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Needless Envilab

Verification Test Report

Instrument Information

Report No.: SO2500043-E003 / 001

Equipment : Air Sampling Pump

Verification Date : 24 September 2025

Manufacturer : AP Buck

Model : LP4

Serial No : 4832

Scale Rang : 5-4000 ml/min

Reference Standard

Standard : Blos Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %

Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	2000	1998.3	1998.6	1998.8	1999.4	1999.7	1999.0	-1.0	-0.1

* UUR = Unit Under Reference flow

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Neediss Envilab

Verification Test Report

Instrument Information

Equipment : Air Sampling Pump
Manufacturer : AP Buck
Model : LP4
Serial No : 4830
Scale Rang : 5-4000 ml/min

Report No.:

SO2500043-E003 / 002

Verification Date : 24 September 2025

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578
Certificate No. : L202507108-0002
Date due : 14 July 2026
Traceability : MIT

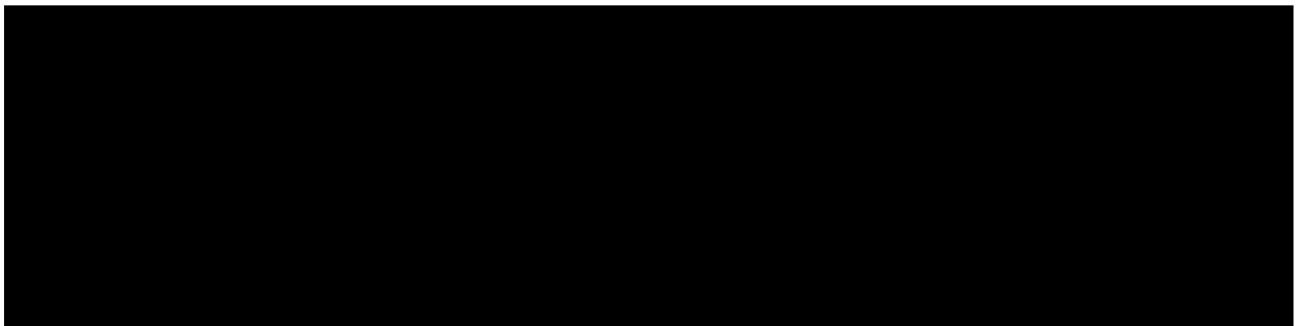
Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %
Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point
☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	2000	2000.0	1998.9	1999.4	1999.8	2000.3	1999.7	-0.3	0.0

* UUR = Unit Under Reference flow



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Verification Test Report

Instrument Information

Report No.: SO2500043-E003 / 003

Equipment : Air Sampling Pump

Verification Date : 24 September 2025

Manufacturer : AP Buck

Model : LP4

Serial No : 5445

Scale Rang : 5-4000 ml/min

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesolabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %

Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1700	1699.1	1699.3	1699.7	1700.5	1700.4	1699.8	-0.2	0.0

* UUR = Unit Under Reference flow

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Verification Test Report

Instrument Information

Report No.: SO2500043-E003 / 004

Equipment : Air Sampling Pump

Verification Date : 24 September 2025

Manufacturer : AP Buck

Model : LP5

Serial No : 5445

Scale Rang : 5-5000 ml/min

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %

Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1700	1701.1	1700.7	1700.4	1700.2	1699.8	1700.4	0.4	0.0

* UUR = Unit Under Reference flow

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Verification Test Report

Instrument Information

Equipment : Air Sampling Pump

Manufacturer : AP Buck

Model : LP5

Serial No : 5446

Scale Rang : 5-5000 ml/min

Report No.: SO2500043-E003 / 005

Verification Date : 24 September 2025

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %

Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1700	1698.7	1699.2	1699.6	1699.7	1699.8	1699.4	-0.6	0.0

* UUR = Unit Under Reference flow

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Verification Test Report

Instrument Information

Equipment : Air Sampling Pump

Manufacturer : AP Buck

Model : LP5

Serial No : 5447

Scale Rang : 5-5000 ml/min

Report No.: SO2500043-E003 / 006

Verification Date : 24 September 2025

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %

Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	2000	1998.5	1998.8	1999.2	1999.4	1999.5	1999.1	-0.9	0.0

* UUR = Unit Under Reference flow

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Verification Test Report

Instrument Information

Equipment : Air Sampling Pump

Manufacturer : AP Buck

Model : LP5

Serial No : 5448

Scale Rang : 5-5000 ml/min

Report No.: SO2500043-E003 / 007

Verification Date : 24 September 2025

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %

Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1700	1699.4	1699.6	1699.7	1699.9	1700.3	1699.8	-0.2	0.0

* UUR = Unit Under Reference flow

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Verification Test Report

Instrument Information

Report No.: SO2500043-E003 / 008

Equipment : Air Sampling Pump

Verification Date : 24 September 2025

Manufacturer : AP Buck

Model : LP5

Serial No : 5449

Scale Rang : 5-5000 ml/min

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %

Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1700	1698.4	1698.7	1698.9	1699.4	1699.7	1699.0	-1.0	-0.1

* UUR = Unit Under Reference flow

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Verification Test Report

Instrument Information

Report No.: SO2500043-E003 / 009

Equipment : Air Sampling Pump

Verification Date : 24 September 2025

Manufacturer : AP Buck

Model : LP5

Serial No : 0

Scale Rang : 5-5000 ml/min

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %
Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1700	1699.4	1699.8	1699.9	1700.3	1700.2	1699.9	-0.1	0.0

* UUR = Unit Under Reference flow

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Neediss Envilab

Verification Test Report

Report No.: SO2500043-E003 / 001

Verification Date : 23 September 2025

Operate Information ☒ PM ☐ Onsite

Site : Envilab Co.,Ltd.

GPS coordinates : 47Q N 1506368 E 257777

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial No : 1805

Scale Rang : 20dB-140dB

Class : 2

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EEL.BP.65/0168

Date due : 17 January 2026

Traceability : TISTR

Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %

Atmospheric pressure 1013.3 hpa

Measurement Data

Refferance Value (dB)	Correction Value (dB)	Adjustment (dB)	UUR Reading		Error (dB)	Acceptant Criteria (dB)
			Initial	Final		
93.93	-0.3	93.63	93.87	94.03	0.16	±1.0

Date : 23 September 2025

Date : 23 September 2025

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Fax 02-802-3773 E-mail : info@evltesting.com



Neediss Envilab

Verification Test Report

Report No.: SO2500043-E003 / 001

Verification Date : 23 September 2025

Operate Information ☒ PM ☐ Onsite

Site : Envilab Co.,Ltd.

GPS coordinates : 47Q N 1506368 E 257777

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial No : 1842

Scale Rang : 20dB-140dB

Class : 2

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EEL.BP.65/0168

Date due : 17 January 2026

Traceability : TISTR

Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %

Atmospheric pressure 1013.3 hpa

Measurement Data

Refferance Value (dB)	Correction Value (dB)	Adjustment (dB)	UUR Reading		Error (dB)	Acceptant Criteria (dB)
			Initial	Final		
93.93	-0.3	93.63	92.27	94.12	1.85	±1.0

* UUR = Unit Under Reference flow

Acceptant value : Sound Level Meter Class 1 ± 0.5 dB

Sound Level Meter Class 2 ± 1.0 dB

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Verification Test Report

Report No.: SO2500043-E003 / 001

Verification Date : 23 September 2025

Operate Information ☒ PM ☐ Onsite

Site : Envilab Co.,Ltd.

GPS coordinates : 47Q N 1506368 E 257777

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial No : 1877

Scale Rang : 20dB-140dB

Class : 2

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EEL.BP.65/0168

Date due : 17 January 2026

Traceability : TISTR

Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %
Atmospheric pressure 1013.3 hpa

Measurement Data

Refferance Value (dB)	Correction Value (dB)	Adjustment (dB)	UUR Reading		Error (dB)	Acceptant Criteria (dB)
			Initial	Final		
93.93	-0.3	93.63	93.47	94.13	0.66	±1.0

* UUR = Unit Under Reference flow

Acceptant

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Service Report

Instrument Manufacturer: Pulsar Instruments Plc

Job Reference Number: 98106

Instrument Type: Model 44

Serial Number: PN1805

Customer Name: Envilab Co., Ltd.

Customer Address: 540,540/1 Soi Bangkhae 7

Bangkhae

Thailand

10160

Issue	Action	Result	Engineer
USB port severely damaged	Repair to USB port carried out.	Functional checks carried out.	Andrew Windrass
Keypad not working.	New keypad fitted.	Functional checks carried out.	Andrew Windrass

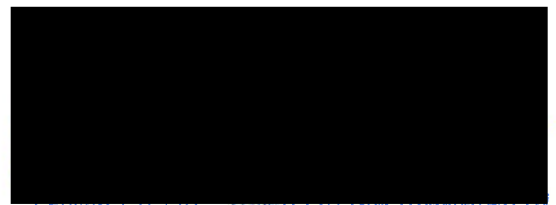
Date: 22 May 2025

We hope that you are satisfied with the service you have received from Pulsar Instruments plc.
If you have any concerns, would like further information or have any feedback do not hesitate to contact us.

Pulsar Instrument Plc, Acoustic House, Bridlington Road, Hunmanby, YO14 0PH

Telephone: +44 (0) 1723 518011 Fax: +44 (0) 1723 518043

Email: sales@pulsarinstruments.com



CERTIFICATE OF CALIBRATION

ISSUED BY **Pulsar Instruments Plc**

DATE OF ISSUE **22 May 2025**

CERTIFICATE NUMBER **241105**



**Pulsar Instruments Plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom**

Sound Level Meter : IEC 61672-3:2013

Instrument information

Manufacturer:	Pulsar Instruments Plc	Notes:
Model:	Model 44	
Serial number:	PN1805	
Class:	2	
Firmware version:	2.7.0.333	

Test summary

Date of calibration: 14 May 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013.

The sound level meter submitted for testing successfully completed the class 2 periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed.

However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 because (a) evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to determine that the model of sound level meter fully conformed to the class 2 specifications in IEC 61672-1:2013 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 cover only a limited subset of the specifications in IEC 61672-1:2013.

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number:

241105

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 101.76 kPa Temperature: 21.7 °C Humidity: 51.8 %
After Pressure: 101.77 kPa Temperature: 21.8 °C Humidity: 51.6 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDC7R0237
Attenuator	Cirrus Research	ZE:952	93891
Environmental Monitor	Comet	T7510	16966334

Additional instrument information

Instruction manual:

Reference level range: Single range

Pattern approval: No

Source of pattern approval: -

Preamplifier

Model: PA40

Serial number: 1759

Microphone

Model: PM2

Serial number: 021400B

Test results summary

Test	Result
Toneburst response	Complies
Electrical noise-floor	Complies
Linearity	Complies
Electrical Frequency weightings	Complies
Frequency and time weightings at 1 kHz	Complies
C-weighted peak	Complies
Overload indication	Complies
High level stability	Complies
Long-term stability	Complies
Acoustic Frequency weightings	Complies

Acoustic Calibrator

Manufacturer: Bruel and Kjaer

Model: 4231

Serial number: 2579252

Note: This sound calibrator is not of a model that is specified in the instruction manual.

Calibration

Calibration check frequency: 1000 Hz

Calibrator's certificate ref: 239540

Level before adjustment: 93.70 dB(A)

Level after adjustment: 93.70 dB(A)

CERTIFICATE OF CALIBRATION

ISSUED BY

Pulsar Instruments Plc

DATE OF ISSUE

22 May 2025

CERTIFICATE NUMBER 241106

Page 1 of 2



Pulsar Instruments Plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Microphone

Microphone capsule

Manufacturer: Pulsar Instruments Plc

Model: PM2

Serial Number: 021400B

Calibration procedure

Open circuit: 31.0 mV/Pa

Sensitivity at 1 kHz: -30.2 dB rel 1 V/Pa

The microphone capsule detailed above has been calibrated to the published data as described in the operating manual of the associated sound level meter (where applicable).

The frequency response was measured using an electrostatic actuator in accordance with BS EN 61094-6:2005 with the free-field response derived via standard correction data traceable to a National Measurement Institute.

The absolute sensitivity at 1 kHz was measured using an acoustic calibrator conforming to IEC 60942:2003 Class 1.

Environmental conditions

Pressure: 102.00 kPa

Temperature: 22.0 °C

Humidity: 47.0 %

CERTIFICATE OF CALIBRATION

Certificate Number:

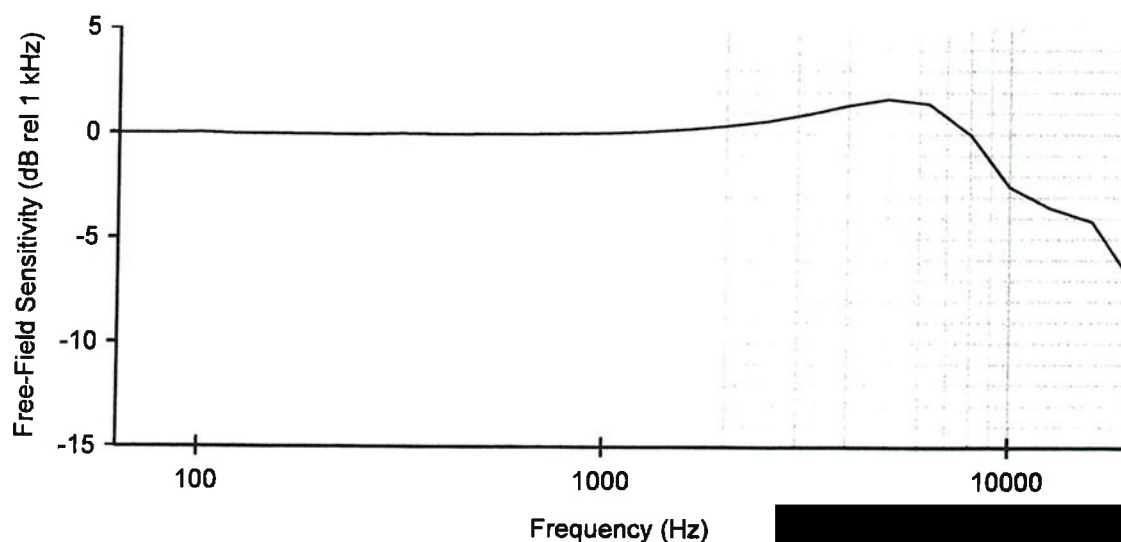
241106

Page 2 of 2

Free-Field Frequency Response : Tabular

Frequency (Hz)	Free-Field Sensitivity (dB rel 1 kHz)	Actuator Response (dB)
63	-0.03	-0.28
80	-0.03	-0.17
100	0.00	-0.08
125	-0.05	-0.09
160	-0.06	-0.08
200	-0.08	-0.07
250	-0.08	-0.07
315	-0.05	-0.06
400	-0.07	-0.06
500	-0.06	-0.06
630	-0.05	-0.05
800	-0.03	-0.04
1 000	0.00	-0.02
1 250	0.06	0.02
1 600	0.18	0.08
2 000	0.35	0.16
2 500	0.58	0.28
3 150	0.91	0.41
4 000	1.35	0.53
5 000	1.64	0.40
6 300	1.44	-0.51
8 000	-0.04	-3.11
10 000	-2.53	-7.22
12 500	-3.51	-10.01
16 000	-4.17	-12.12
20 000	-6.89	-15.94

Free-Field Frequency Response : Graphical





Certificate of Calibration

Certificate Number : SPR25050328-3

Page : 1 of 3

Customer : Envilab Co., Ltd.

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

Equipment Name : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial Number : PN1842

ID. Number : NSMPUMD44N1842

Environmental Conditions

Ambient Temperature : 23 °C \pm 3 °C

Received Date : 20 May 2025

Relative Humidity : 50 % \pm 15 %

Calibration Date : 24 May 2025

Location of Calibration : In-Lab

Recommend Due Date : 24 May 2026

Calibration Procedure : SP-CPE-04-01

Date of Issue : 25 May 2025

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Nanthawat Wanasit

Calibration Officer



Calibration Report

Certificate Number : SPR25050328-3

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP.22/0268	20 Feb 2026

Traceability

This certification is traceable to the International System of Unit maintained at :

TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate Number : SPR25050328-3

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty with the coverage factor $k = 2.00$, providing a level of confidence of approximately 95%.

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR25070275-6

Page : 1 of 3

Customer : Envilab Co., Ltd.

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

Equipment Name : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial Number : PN1877

ID. Number : NSMPUMD44N1877

Environmental Conditions

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

Received Date : 15 Jul 2025

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

Calibration Date : 17 Jul 2025

Location of Calibration : In-Lab

Recommend Due Date : 17 Jul 2026

Calibration Procedure : SP-CPE-04-01

Date of Issue : 18 Jul 2025

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Chumpon Dokpikul

Calibration Officer





Calibration Report

Certificate Number : SPR25070275-6

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP.22/0268	20 Feb 2026

Traceability

This certification is traceable to the International System of Unit maintained at :
TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate Number : SPR25070275-6

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.3	94.3	0.3	0.3	0.15
114	114.4	114.4	0.4	0.4	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.3	94.3	0.3	0.3	0.15
114	114.4	114.4	0.4	0.4	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.3	94.3	0.3	0.3	0.15
114	114.4	114.4	0.4	0.4	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty, expressed as a multiple of the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence of approximately 95%.

- End of Certificate -

Certificate of Calibration

Certificate No. : 68-200034-1

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 : (20.4 to 21.0) °C
Relative Humidity : (41.9 to 42.9) %
Air Pressure : 1014.0 mbar

Date of Received : 28 January 2025

Date of Calibration : 28 January 2025

Date of Issue : 30 January 2025

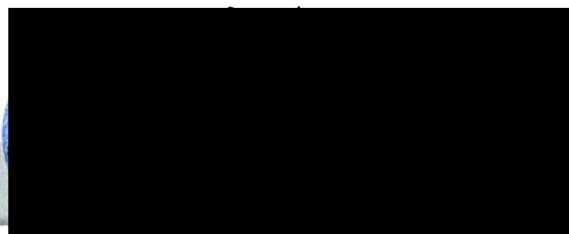
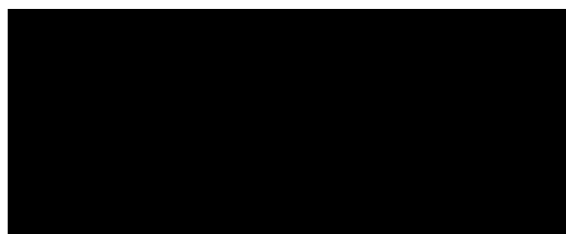
Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 7 - November 2022

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02242009	07 Nov 2025	National Institute of Metrology (Thailand), (NIMT)



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

Certificate of Calibration

Certificate No. : 68-200034-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.01	0.0000	0.00012
0.1	0.0001	0.00012
1	0.0000	0.00013
2	0.0001	0.00013
5	0.0000	0.00013
10	0.0000	0.00013
20	-0.0001	0.00014
50	-0.0001	0.00015
100	-0.0001	0.00020
200	-0.0001	0.00038

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

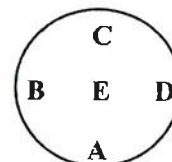
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.06$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

A B C D E

0.0004 0.0004 0.0005 0.0004 0.0000 g

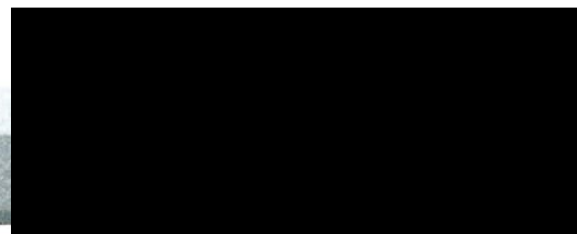
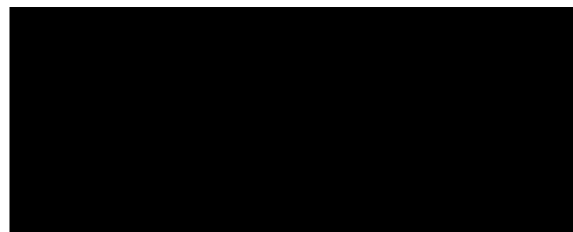


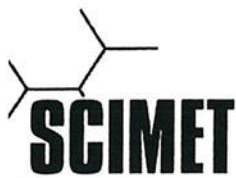
Repeatability

Load test : 200 g

Stdev. : 0.00005 g

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SCIMET Co., Ltd.
818/124 Udomsuk Rd., Bangna-Nuea,
Bangna, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
<https://www.scimet.co.th>



Certificate No. C08250053

Calibration Certificate

Equipment:	pH METER	Job No.:	KSMT2501044
Model:	F-74BW	Received Date:	19 March 2025
Serial No.(or ID):	B41J0001 (ELABPHHB74BW01)	Issued Date:	19 March 2025
Manufacturer:	HORIBA	Page:	1 of 3
Condition:	In Condition		

Customer

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

Calibration Place

Envilab Co., Ltd. (B300 CH1 ROOM)
540, 540/1 Soi Bangkhuae 7,Bangkhuae, Bangkhuae, Bangkok 10160

Calibration Date

19 March 2025

Environment Condition

Temperature: 26.1 °C ± 0.3 °C
Humidity: 50.2 %RH ± 1.1 %RH

The Method used

In-house method, WI08, based on ASTM E 70-07

Traceability

This certificate is traceable to SI Units, Sample Test is assured through primary measurement method Harned cell, through CPAchem Ltd. (ISO17034) Certificate No. 1066714, 1066714, 1066716, pH Scale and Temperature test are traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through Industrial Foundation Electrical and Electronics Institute Certificate No. CA20250010EA,

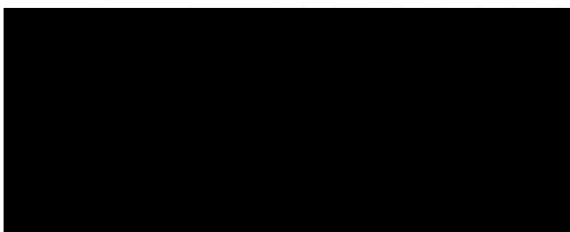
3240075



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

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

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



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

Condition of reference standards Instruments / CRM:

<u>Instruments</u>		<u>Model or S/N.</u>	<u>Certificate No.</u>	<u>Due date</u>
Standard Buffer solution	4.007 pH	PH216.L5	1066714	18-Jan-27
Standard Buffer solution	6.965 pH	PH107.L5	1066714	18-Jan-26
Standard Buffer solution	10.010 pH	PH220.L5	1066716	18-Jan-26
DC Voltage and Current Calibrator / XITRON		2000MN	CA20250010EA	19-Jan-26
Digital Thermometer		376	C23240075	30-Jul-25

Calibration Results:
pH Scale

Input	pH Meter Reading			Uncertainty of Measurement (mV)	Coverage Factor (<i>k</i>)
	(mV)	Error (mV)	(pH)		
414.12	414.2	0.08	0.000	0.065	2.00
354.96	355.0	0.04	1.000	0.065	2.00
295.80	295.8	0.00	2.000	0.065	2.00
236.64	236.7	0.06	3.000	0.065	2.00
177.48	177.5	0.02	4.000	0.065	2.00
118.32	118.4	0.08	5.000	0.065	2.00
59.16	59.2	0.04	6.000	0.065	2.00
0.00	0.0	0.00	7.000	0.065	2.00
-59.16	-59.1	0.06	8.000	0.065	2.00
-118.32	-118.2	0.12	9.000	0.065	2.00
-177.48	-177.4	0.08	10.000	0.065	2.00
-236.64	-236.6	0.04	11.000	0.065	2.00
-295.80	-295.7	0.10	12.000	0.065	2.00
-354.96	-354.9	0.06	13.000	0.065	2.00
-414.12	-414.0	0.12	14.000	0.065	2.00

Electrode Test Results*

The three-point calibration using three standard buffer solutions; pH 4.007 , pH 6.965 and pH 10.010

The practical slope of the pH electrode; 58.31 (mV/pH), 98.57%

The zero point of the pH electrode; 6.58 (pH)

Sample Test Results

Electrode Serial No.: 9X1K0003

Model: 9615S

Manufacturer: HORIBA

Standard Buffer Solution (pH)	Unit Under Calibration (pH)	Difference (pH)	Uncertainty of Measurement (pH)	Coverage Factor (<i>k</i>)
4.007	3.995	-0.012	0.011	2.43
6.965	6.970	0.005	0.011	2.07
10.010	10.019	0.009	0.0089	2.06

Temperature Electrode

Dimension of Probe;

Length : 100 mm
Diameter : 12 mm
Immersion Depth : 80 mm

STD. Reading (°C)	UUC. Reading (°C)	Correction of UUC (°C)	Uncertainty of Measurement (±°C)	Coverage Factor (<i>k</i>)
25.03	25.0	0.03	0.20	2.00

* Calibration Marked for Electrode Test" Not TISI Accredited " in this Certificate have been included for completeness.

The End of Certificate



ใบตรวจสอบสภาพเครื่อง pH Meter

เลขที่ใบงาน: KSMT2501044

ชนิดเครื่องมือ: pH METER

รุ่น: F-74BW

หมายเลขเครื่อง: B41J0001

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
19 Mar 2025			19 Mar 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Swicth)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. อิเล็กโทรด (Electrode and Connection Cable)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สายอิเล็กโทรด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	8. ระดับสารละลายใน Electrode (Level KCl)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. ขาจับอิเล็กโทรด (Stand)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

เพิ่มเติม/ข้อแนะนำ :

Mr. Dumrong Boonsopon
Service Engineer

Certificate of Calibration

Certificate No. : 68-400323-1**Page : 1 of 2****Submitted by : Envilab Co., Ltd.**

540,540/1 Soi Bangkhae7, Bangkhae, Bangkok 10160

Equipment : COD Reactor**Manufacturer : Hanna****Model : HI839800****Range : N/A °C****Resolution : 0.1 °C****Serial No. : 06480040101****ID No. : ELABHI83980001****Environment : Ambient Temperature : (23 ± 2) °C****Relative Humidity : (50 ± 15) %****Date of Received : 28 May 2025****Date of Calibration : 31 May 2025****Date of Issue : 31 May 2025****Calibrated by : Sarawut Sangiamging****Calibration Method :** This instrument was calibrated by In-house method direct measurement with Standard Digital Thermometer with TC Type T probe

The temperature scale used was based on ITS-90

Reference Standard Instruments :

Standard Digital Thermometer with TC Probe

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400046 & 400023	68-400148-1	02 Oct 2025	National Institute of Metrology Thailand (NIMT)
400046 & 400028	68-400148-3	01 Oct 2025	National Institute of Metrology Thailand (NIMT)

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

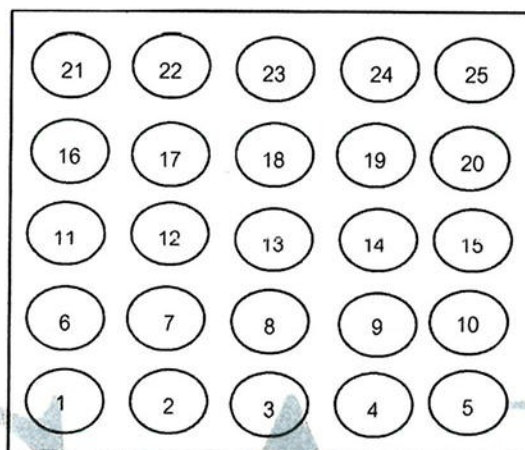
Certificate of Calibration

Certificate No. : 68-400323-1

Page : 2 of 2

Result of Calibration : Without Adjustment

Function : Temperature measurement



Controller

Test Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Standard Reading at Position (°C)									
			1	2	3	4	5	6	7	8	9	10
150.0	150.0	150.0	149.0	149.2	149.4	149.6	148.6	149.0	150.3	149.7	149.6	149.8

Test Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Standard Reading at Position (°C)									
			11	12	13	14	15	16	17	18	19	20
150.0	150.0	150.0	149.4	149.5	150.2	150.0	149.1	149.1	150.0	150.1	150.1	148.7

Test Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Standard Reading at Position (°C)					Uncertainty (± °C)
			21	22	23	24	25	
150.0	150.0	150.0	148.6	148.7	149.6	148.9	148.6	0.79

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

- oOo -



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

214 Bangwaek Rd. Bangpai Bangkae Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Page 1 of 2

Certificate No. : S2025040468-0002

Date Issued : 25-Apr-25

Customer : Envilab Co., Ltd.
540, 540/1 Soi Bangkhae 7, Bangkhae, Bangkhae, Bangkok, Thailand
10160

Equipment : Lab Refrigerator (TMF-PLR221)

Manufacturer : Thermo Scientific

Model : PLR221

Serial No. : 2210M319042801

ID No./Tag No. : ELABREFRIGEN02

Date Received : 24-Apr-25

Date Calibrated : 24-Apr-25

Calibrated by : Chanon Konyawong

Calibration Method or Calibration Procedure Used

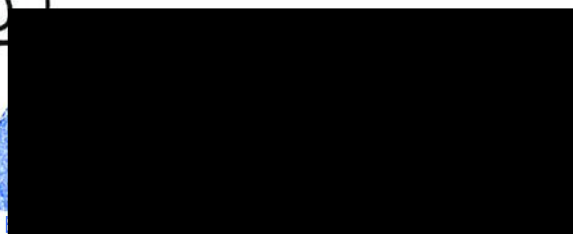
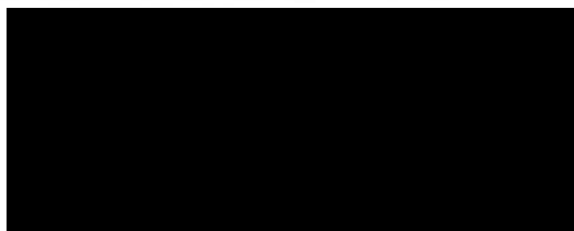
Standard method : CP-05 TLAS G-20.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.



Certificate No. : S2025040468-0002

Environment : Ambient Temperature : Start record 25.4 °C, Stop record 25.7 °C
Relative Humidity : Start record 50.5 %RH, Stop record 50.4 %RH

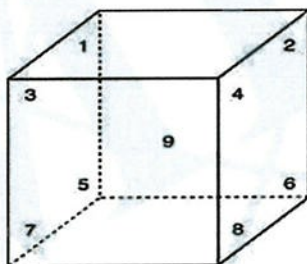
Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
4	4	4	1.29	0.55	2.68

Without adjustment

Calibration Temperature (°C)	STD No. 1 (°C)	STD No. 2 (°C)	STD No. 3 (°C)	STD No. 4 (°C)	STD No. 5 (°C)	STD No. 6 (°C)	STD No. 7 (°C)	STD No. 8 (°C)	STD No. 9 (°C)	Uncertainty ⁴ (±°C)
4	4.29	4.11	4.12	4.05	4.32	4.38	4.05	4.07	4.00	1.6

Note : Probe No. 9 is Reference Probe

Setting Air Fresh No. -



Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202412300-0027 for Temperature Indicator with Sensor Serial No. US37020317, Due 09-Sep-25

Notes : 1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.

2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.

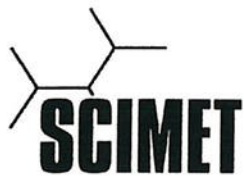
3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.

4. The uncertainty of measurement is included temperature stability.

5. The temperature uniformity, stability, overall variation and indicating temperature is applicable to all air or gas filled temperature controlled enclosures at atmospheric pressure.

End of Certificate





SCIMET Co., Ltd.
818/124 Udomsuk Rd., Bangna-Nuea,
Bangna, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
<https://www.scimet.co.th>



Certificate No. C17250137

Calibration Certificate

Equipment: Hot Air Oven

Model: UF75

Serial No.(or ID): B319.0600 (ELABHAOVEN0600)

Manufacturer: Memmert

Ventilation Valve: Closed

Shelves(pc.): 3

Job No.: KSMT2501050

Received Date: 19 March 2025

Issued Date: 24 March 2025

Page: 1 of 5

Customer

Envilab Co., Ltd.

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

Calibration Place

Envilab Co., Ltd. (B306 CH2 ROOM)

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

Calibration Date

19 March 2025

Environment Condition

Temperature: 29.4 °C ± 1.2 °C

Humidity: 48 %RH ± 3 %RH

The Method used

In-house method, WI17, based on G-20-1/02-08 (E)

Traceability

This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through SCIMET Co.,Ltd. Certificate No. C23250016

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

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

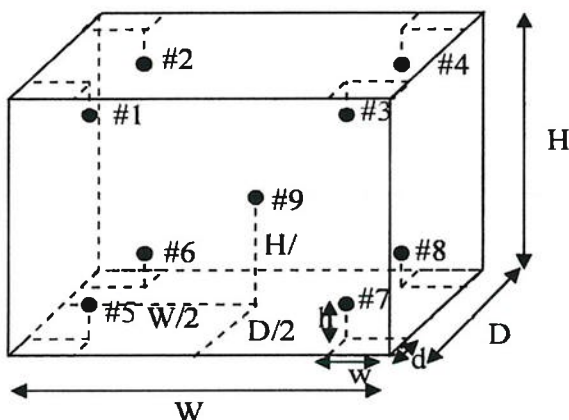
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SCIMET Co., Ltd.



Condition of reference standards Instruments:

Instruments	Model	S/N or ID.	Certificate No.	Due Date
Datalogger 1	34972A	MY59003249	C23250016	30-Jan-2026

Condition of Calibration Item : In Condition



Standard Installation Locations

Volume (Calibration Zone)= 30 (Liters)

Inside chamber: W = 40 (cm) D = 33 (cm) H = 56 (cm)

Standard Locations (#1, #2, #3, #4): w = 5 (cm) d = 5 (cm) h = 6 (cm)

Standard Locations (#5, #6, #7, #8): w = 5 (cm) d = 5 (cm) h = 6 (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	301	302	303	304	305	306	307	308	309

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation: The difference of maximum and minimum measured temperatures

Calibration Results:

Before adjustment

Desired (°C)	Setting (°C)	Indicating (°C)	#1 (°C)	#2 (°C)	#3 (°C)	#4 (°C)	#5 (°C)	#6 (°C)	#7 (°C)	#8 (°C)	#9 (°C)
104.0	104.0	104.0	104.44	104.95	105.08	104.82	104.94	104.72	104.13	104.70	105.02

After adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	103.85	-0.15	0.39
#2	104.35	0.35	0.39
#3	104.40	0.40	0.39
#4	104.17	0.17	0.39
#5	104.33	0.33	0.39
#6	104.12	0.12	0.39
#7	103.73	-0.27	0.39
#8	104.10	0.10	0.39
#9	104.31	0.31	0.39

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
104.0	104.0	104.0	103.85	104.35	104.40	104.17	104.33	104.12	103.73	104.10	104.31	0.39

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
104.0	0.65	0.09	0.80

Note: * Maximum uncertainty of the each position

After adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 110.0 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	109.74	-0.26	0.39
#2	110.28	0.28	0.39
#3	110.40	0.40	0.39
#4	110.15	0.15	0.39
#5	110.24	0.24	0.39
#6	110.01	0.01	0.39
#7	109.59	-0.41	0.39
#8	110.02	0.02	0.39
#9	110.33	0.33	0.39

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
110.0	110.0	110.0	109.74	110.28	110.40	110.15	110.24	110.01	109.59	110.02	110.33	0.39

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
110.0	0.84	0.12	0.98

Note: * Maximum uncertainty of the each position

After adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 179.0 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	179.37	-0.63	0.49
#2	180.52	0.52	0.48
#3	180.61	0.61	0.47
#4	180.55	0.55	0.47
#5	180.51	0.51	0.48
#6	180.03	0.03	0.50
#7	179.26	-0.74	0.49
#8	180.23	0.23	0.49
#9	180.67	0.67	0.47

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
180.0	179.0	179.0	179.37	180.52	180.61	180.55	180.51	180.03	179.26	180.23	180.67	0.50

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
179.0	1.54	0.17	1.68

Note: * Maximum uncertainty of the each position

The End of Certificate

Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, G20-1/02-08(E). Therefore, those parameters have not

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

- Decision rule :** ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk $< 50\%$ PFA.
- ☒ Choice B Non-binary statement with guard band ($w = 1 U$), Pass or Fail Specific Risk $< 2.5\%$ PFA and Condition Pass or Condition Fail Specific Risk $< 50\%$ PFA.
- ☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r U$) .
- ; PFA: Probability of False Accept



After adjustment

Desired Temperature : 104.0°C

Tolerances : 1.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	103.85	-0.15	0.39	1.0	Pass
#2	104.35	0.35	0.39	1.0	Pass
#3	104.40	0.40	0.39	1.0	Pass
#4	104.17	0.17	0.39	1.0	Pass
#5	104.33	0.33	0.39	1.0	Pass
#6	104.12	0.12	0.39	1.0	Pass
#7	103.73	-0.27	0.39	1.0	Pass
#8	104.10	0.10	0.39	1.0	Pass
#9	104.31	0.31	0.39	1.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

Statements of conformity:(Cont.)

After adjustment (Cont.)

Desired Temperature : 110.0°C

Tolerances : 1.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 110.0 °C

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	109.74	-0.26	0.39	1.0	Pass
#2	110.28	0.28	0.39	1.0	Pass
#3	110.40	0.40	0.39	1.0	Pass
#4	110.15	0.15	0.39	1.0	Pass
#5	110.24	0.24	0.39	1.0	Pass
#6	110.01	0.01	0.39	1.0	Pass
#7	109.59	-0.41	0.39	1.0	Pass
#8	110.02	0.02	0.39	1.0	Pass
#9	110.33	0.33	0.39	1.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

After adjustment (Cont.)

Desired Temperature : 180.0°C

Tolerances : 2.0 °C

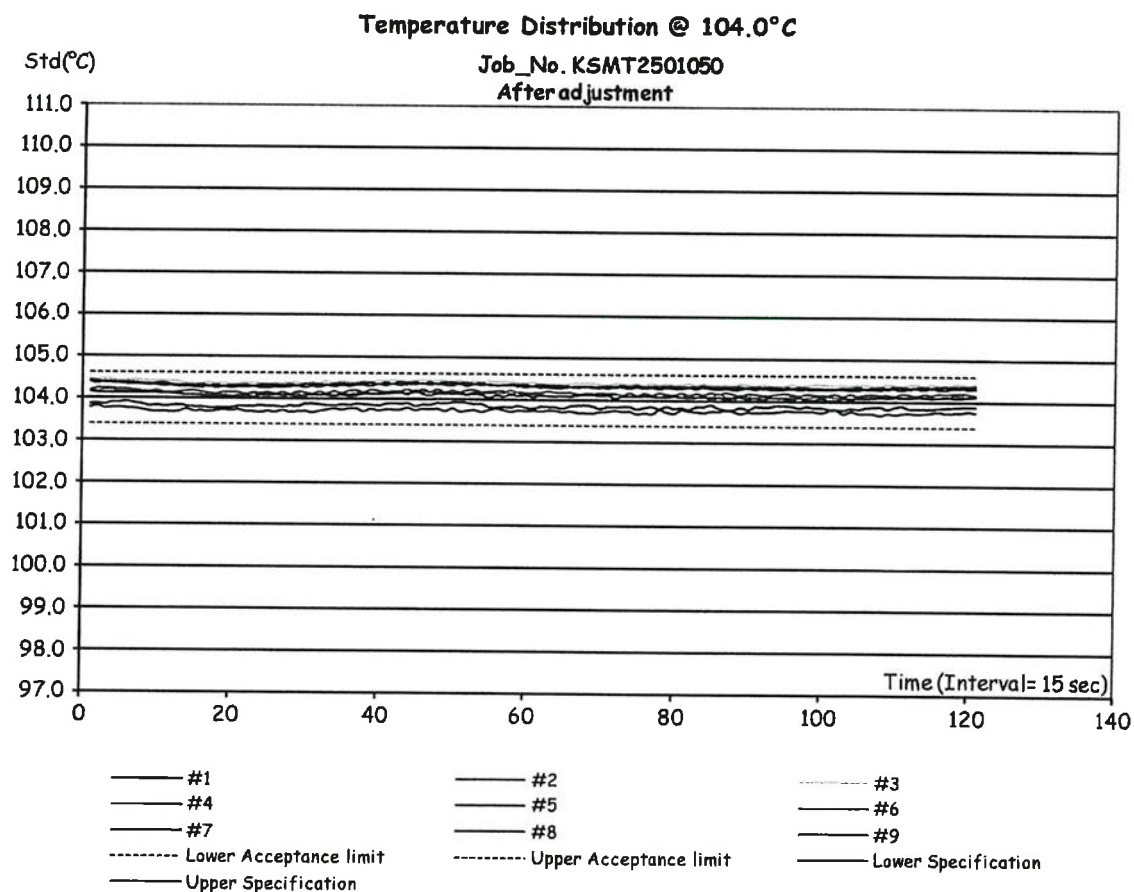
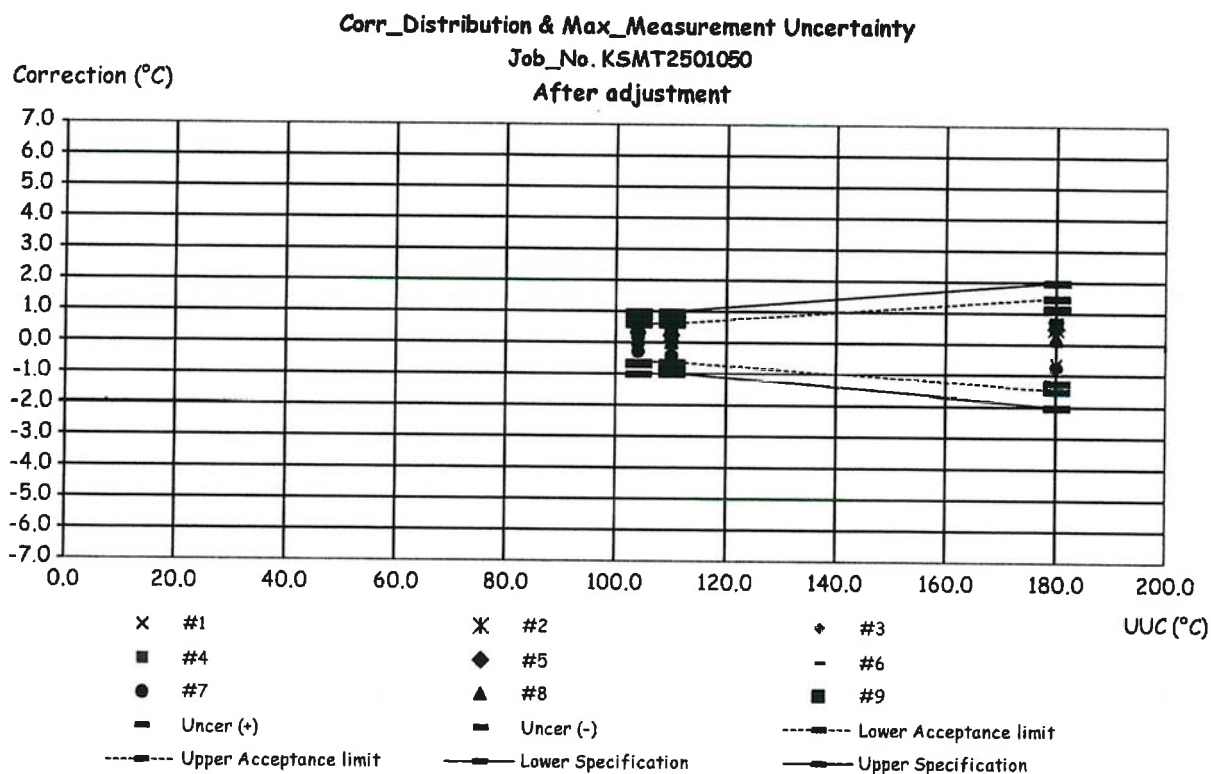
Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 179.0 °C

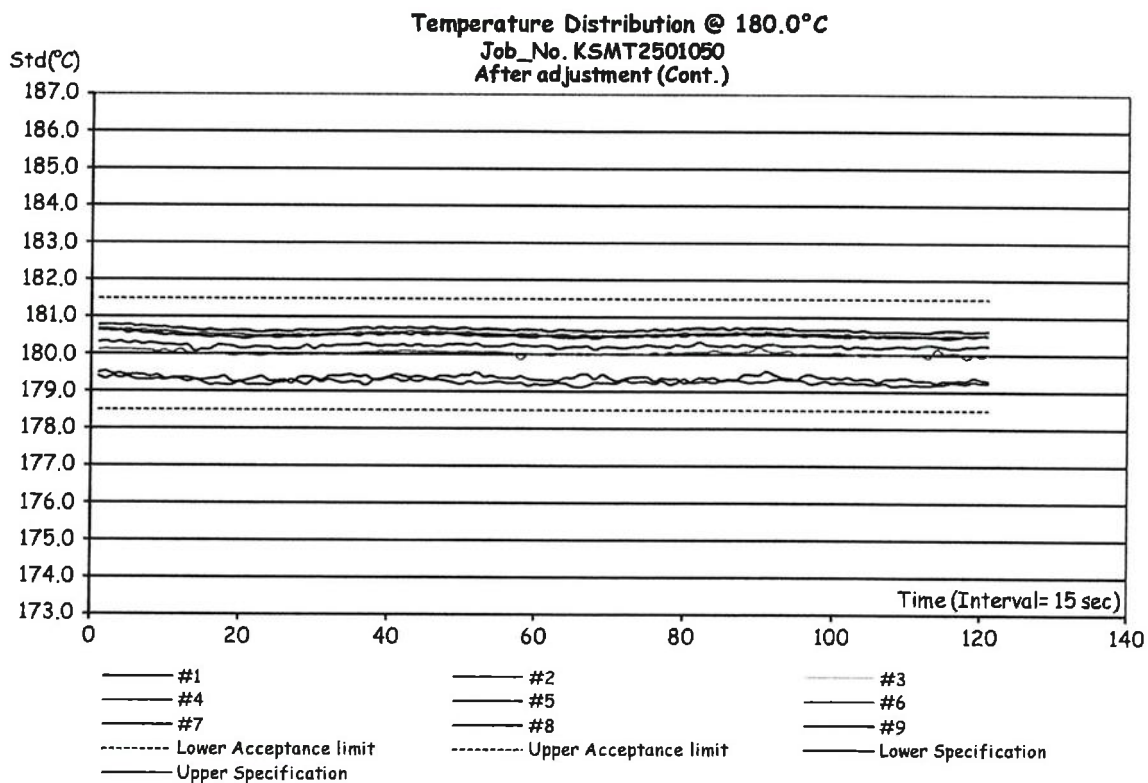
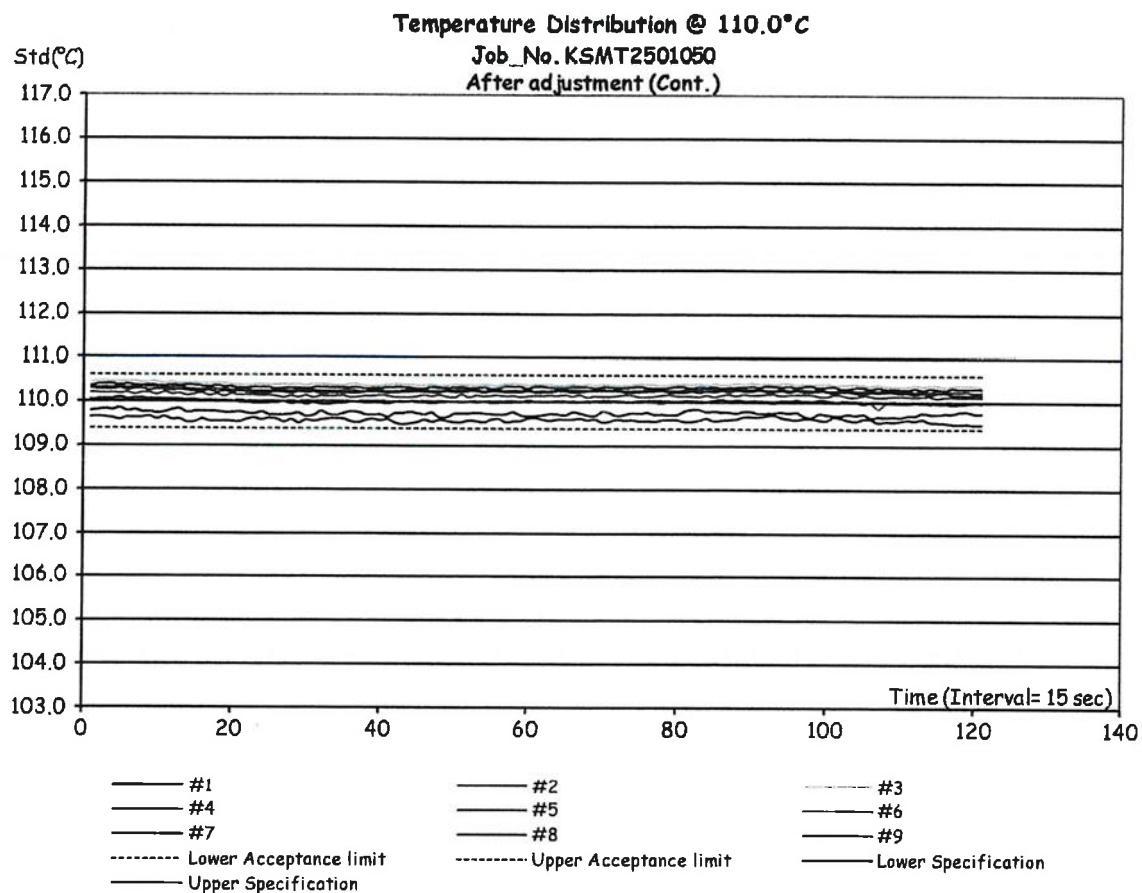
Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	179.37	-0.63	0.49	2.0	Pass
#2	180.52	0.52	0.48	2.0	Pass
#3	180.61	0.61	0.47	2.0	Pass
#4	180.55	0.55	0.47	2.0	Pass
#5	180.51	0.51	0.48	2.0	Pass
#6	180.03	0.03	0.5	2.0	Pass
#7	179.26	-0.74	0.49	2.0	Pass
#8	180.23	0.23	0.49	2.0	Pass
#9	180.67	0.67	0.47	2.0	Pass

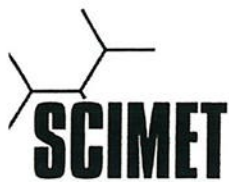
Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity







ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: KSMT2501050

ชนิดเครื่องมือ: Hot Air Oven

รุ่น: UF75

หมายเลขเครื่อง: B319.0600 (ELABHAOVEN0600)

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
19 Mar 2025			19 Mar 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน พัดลม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. สภาพ Lever of Ventilation valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาพ Door seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของระบบทำความร้อน	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	13. สภาพแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ :

Mr. Hattapong Pumnil
Service Engineer

Certificate of Calibration

Certificate No. : 68-400025-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
540,540/1 Soi Bangkhac7, Bangkhac, Bangkok 10160

Equipment : Autoclave
Manufacturer : Tomy **Model :** SX-500
Range : N/A °C **Resolution** 1 °C
Serial No. : 55133094 **ID No. :** ELABAUTOCLAVE1

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

Ambient Temperature : (26.5 to 27.0) °C

Relative Humidity : (40 to 45) %

Line Voltage : (224.0 to 225.0) V

Date of Received : 28 January 2025

Date of Calibration : 28 January 2025

Date of Issue : 31 January 2025

Calibrated by : Permpon Chanpu

Calibration Method : This instrument was calibrated by In-house method CAL-M4007 based on BS 2646 Part 1 : 2021

The temperature scale used was based on ITS-90

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

Standard Temperature Data Logger with RTD pt 100

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400039	67-400732-1	25 Jun 2025	National Institute of Metrology Thailand (NIMT)
400040	67-400732-2	25 Jun 2025	National Institute of Metrology Thailand (NIMT)
400041	67-400732-3	25 Jun 2025	National Institute of Metrology Thailand (NIMT)

Certificate of Calibration

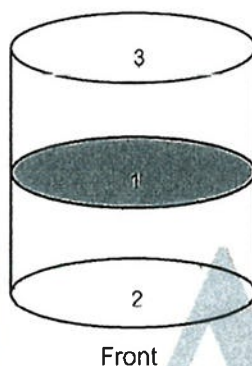
Certificate No. 68-400025-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.			Uncertainty (± °C)	Measured Uniformity (°C)	Measured Stability (°C)	Sterilizing Time (minute)	Pressure Gauge Reading (kg/cm²)
			1	2	3					
121	121	121	121.6	121.6	121.6	0.71	0.1	0.1	15	0.11

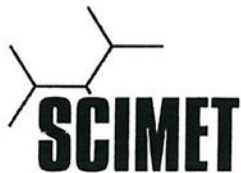
Remark

1. UUC : Unit Under Calibration
2. Pressure Gauge reading are out of accreditation's scope.

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

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

- o0o -



SCIMET Co., Ltd.
818/124 Udomsuk Rd., Bangna-Nuea,
Bangna, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
https://www.scimet.co.th



Certificate No. C17250552

Calibration Certificate

Equipment: Cooled Incubator

Model: BIC-140

Serial No.(or ID): 100613-1 (ELABBODC140N01)

Manufacturer: M-LAB

Ventilation Valve: None

Shelves(pc.): 5

Job No.: KSMT2503905

Received Date: 06 October 2025

Issued Date: 09 October 2025

Page: 1 of 3

Customer

Envilab Co., Ltd.

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

Calibration Place

Envilab Co., Ltd. (B300 CH1 ROOM)

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

Calibration Date

06 October 2025

Environment Condition

Temperature: 21.0 °C ± 1.3 °C

Humidity: 53.6 %RH ± 3.8 %RH

The Method used

In-house method, WI17, based on G-20-1/02-08 (E)

Traceability

This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through SCIMET Co.,Ltd. Certificate No. C23250017

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

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

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

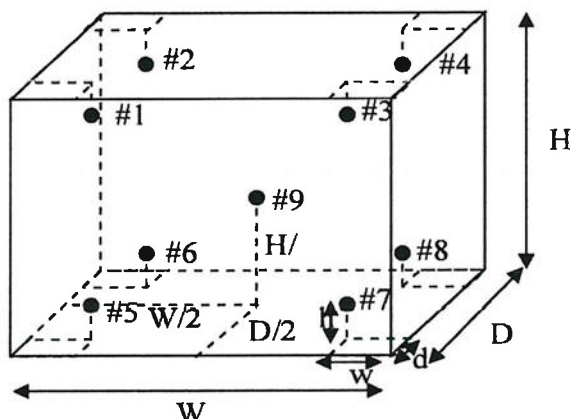


Envilab Co.,Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ
EC17-03-27 JAN 2025

Condition of reference standards instruments:

<u>Instruments</u>	<u>Model</u>	<u>S/N or ID.</u>	<u>Certificate No.</u>	<u>Due Date</u>
Datalogger 3	34970A	MY44075238	C23250017	28-Jan-2026

Condition of Calibration item : In Condition



Standard Installation Locations

Volume (Calibration Zone)= 57 (Liters)

Inside chamber: $W = 38 \text{ (cm)}$ $D = 32 \text{ (cm)}$ $H = 114 \text{ (cm)}$

Standard Locations (#1, #2, #3, #4): $w = 5 \text{ (cm)}$ $d = 5 \text{ (cm)}$ $h = 11 \text{ (cm)}$

Standard Locations (#5, #6, #7, #8): $w = 5 \text{ (cm)}$ $d = 5 \text{ (cm)}$ $h = 11 \text{ (cm)}$

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	201	202	203	204	205	206	207	208	209

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation: The difference of maximum and minimum measured temper

Calibration Results:

Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 20.1 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	20.30	0.30	0.58
#2	20.40	0.40	0.59
#3	20.53	0.53	0.58
#4	19.55	-0.45	0.57
#5	20.09	0.09	0.66
#6	20.11	0.11	0.77
#7	20.12	0.12	0.64
#8	20.03	0.03	0.72
#9	20.11	0.11	0.63

Temperature Distribution

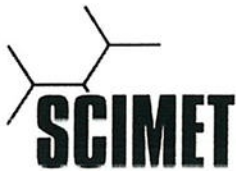
Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
20.0	20.0	20.1	20.30	20.40	20.53	19.55	20.09	20.11	20.12	20.03	20.11	0.77

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
20.1	0.70	0.50	1.57

Note: * Maximum uncertainty of the each position

The End of Certificate



Refer to Certificate No.: C17250552

Page: 1 of 1

Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, G20-1/02-08(E). Therefore, those parameters have not

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

- Decision rule :** ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk $< 50\%$ PFA.
- ☒ Choice B Non-binary statement with guard band ($w = 1 U$), Pass or Fail Specific Risk $< 2.5\%$ PFA and Condition Pass or Condition Fail Specific Risk $< 50\%$ PFA.
- ☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r U$) .
- ; PFA: Probability of False Accept



Without adjustment

Desired Temperature : 20.0°C

Tolerances : 1.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 20.1 °C

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	20.30	0.30	0.58	1.0	Pass
#2	20.40	0.40	0.59	1.0	Pass
#3	20.53	0.53	0.58	1.0	Condition Pass
#4	19.55	-0.45	0.57	1.0	Condition Pass
#5	20.09	0.09	0.66	1.0	Pass
#6	20.11	0.11	0.77	1.0	Pass
#7	20.12	0.12	0.64	1.0	Pass
#8	20.03	0.03	0.72	1.0	Pass
#9	20.11	0.11	0.63	1.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places

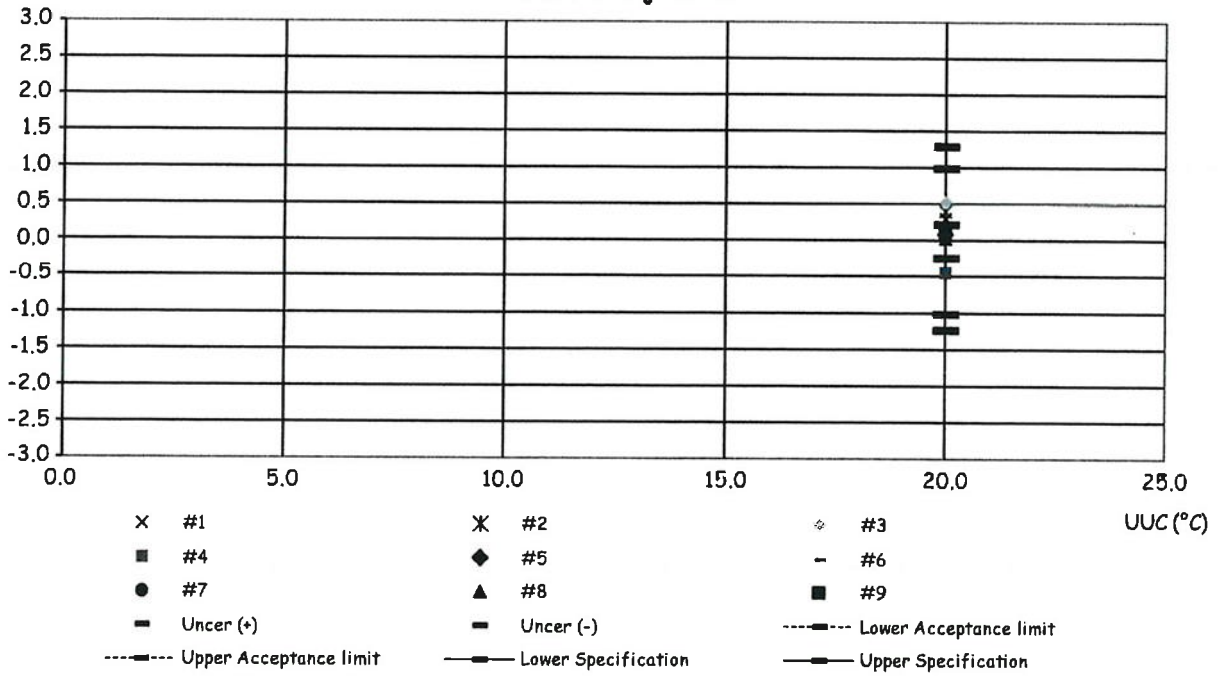
The End of Statements of Conform

Corr_Distribution & Max_Measurement Uncertainty

Job_No. KSMT2503905

Without adjustment

Correction (°C)

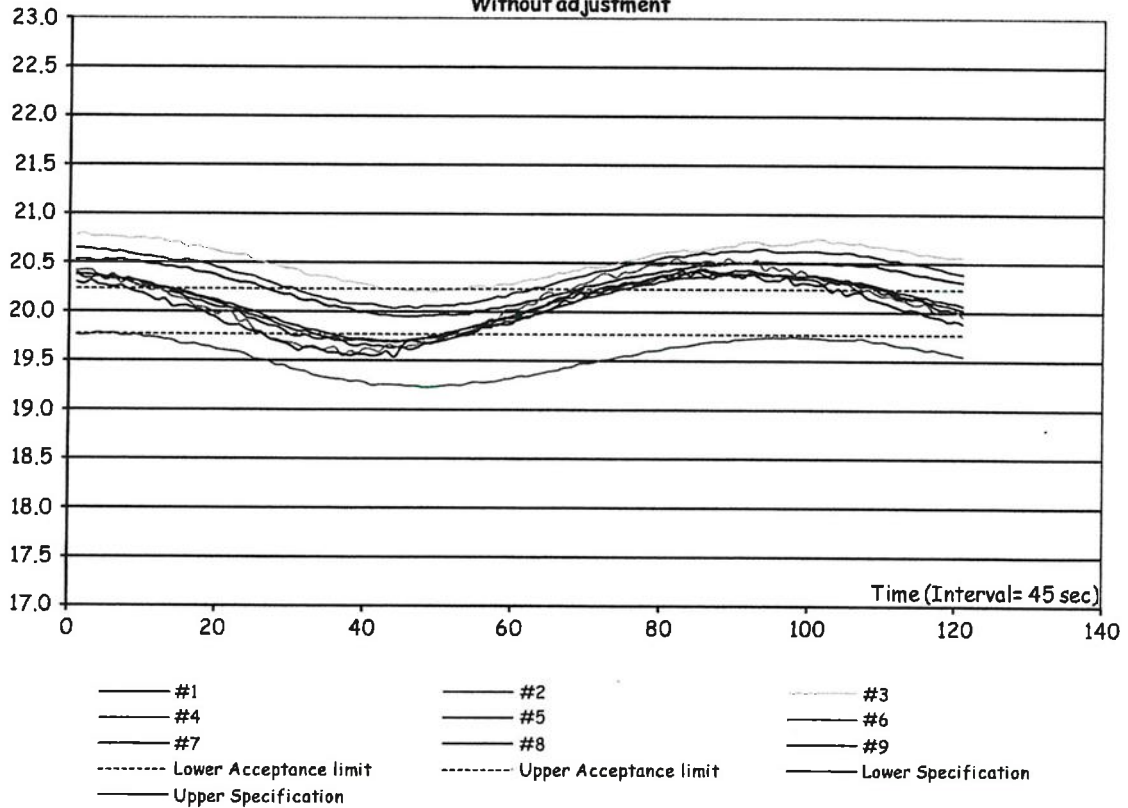


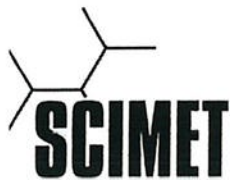
Temperature Distribution @ 20.0°C

Job_No. KSMT2503905

Without adjustment

Std(°C)





ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: KSMT2503905

ชนิดเครื่องมือ: Cooled Incubator

รุ่น: BIC-140

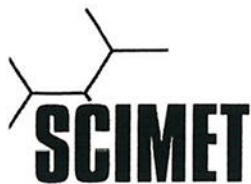
หมายเลขเครื่อง: 100613-1 (ELABBODC140N01)

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
06 Oct 2025			06 Oct 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน พัดลม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. สภาพ Lever of Ventilation valve	<input type="checkbox"/>	<input type="checkbox"/>	-
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาพ Door seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของระบบทำความชื้น	<input type="checkbox"/>	<input type="checkbox"/>	-
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	13. สภาพแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อเสนอแนะ :

Mr. Mongkolwat Hasanon

Service Engineer



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

Certificate No. C27250001

Calibration Certificate

Equipment:	DO METER	Job No.:	KSMT2501049
Model:	HI9146	Received Date:	17 March 2025
Serial No.(or ID):	GOOO7931 (ELABDOHI914601)	Issued Date:	18 March 2025
Manufacturer:	HANNA	Page:	1 of 2
Condition:	In Condition		

Customer

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

Calibration Place

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

Calibration Date

17 March 2025

Environment Condition

Temperature: 23 °C ± 2 °C
Humidity: 50 %RH ± 15 %RH

The Method used

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

Traceability

This is certificate is traceable to SI Units , Sample test and
temperature test are assured through HANNA instruments
company certificare No. 26142, through Quality Reborn
Co.,LTD certificare No.C23240075

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

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

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



Calibration Results:

Electrode Serial No. -
Model : -
Brand : HANNA

Electrode Test

Atmospheric pressure measured while calibrating. 756.36 mmHg
Temperature measured while calibrating.(± 0.2 °C) 24.7 °C
The Oxygen Solubility was calculated from the ambient conditions. 8.27 \pm 0.03 mg/L
The Oxygen Solubility reading from the DO METER - mg/L

Sample Test

Standard Oxygen Solution	Unit Under Calibration Reading	Correction	Coverage Factor (k)	Uncertainty of Measurement (\pm)
0.0 %	0.0 %	0.0 %	2.00	0.20 %

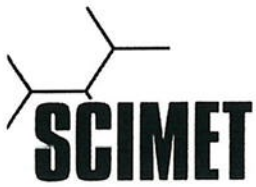
Temperature Electrode

Dimension of Probe;

Length : 85 mn.
Diameter : 18 mn.
Immersion Depth 80 mn.

STD. Reading (°C)	UUC. Reading (°C)	Correction of UUC (°C)	Coverage Factor (k)	Uncertainty of Measurement (\pm °C)
25.01	25.6	-0.59	2.00	0.15

The End of Certificate



ใบตรวจสอบสภาพเครื่อง Do Meter

เลขที่ใบงาน: KSMT2501049

ชนิดเครื่องมือ: DO METER

รุ่น: HI9146

หมายเลขเครื่อง: GOOO7931

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
17 Mar 2025			17 Mar 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิทช์ ปิด – เปิด เครื่อง (On-Off Swicth)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. อิเล็กโทรด (Electrode and Connection Cable)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สายอิเล็กโทรด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. เซ็นเซอร์อิเล็กโทรด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. ขาจับอิเล็กโทรด (Stand)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อเสนอแนะ :

Mr.Dumrong Boonsopon

Service Engineer



SCIMET Co., Ltd.
818/124 Udomsuk Rd., Bangna-Nuea,
Bangna, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
https://www.scimet.co.th



Certificate No. C17250395

Calibration Certificate

Equipment:	Hot Air Oven	Job No.:	KSMT2502802
Model:	UF55	Received Date:	07 July 2025
Serial No.(or ID):	B215.1147 (ELABHAOVEN1147)	Issued Date:	10 July 2025
Manufacturer:	Memmert	Page:	1 of 5
Ventilation Valve:	Closed		
Shelves(pc.):	2		

Customer

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

Calibration Place

Envilab Co., Ltd. (B306 CH2 ROOM)
540, 540/1 Soi Bangkhuae 7, Bangkhuae, Bangkhuae, Bangkok 10160

Calibration Date

07 July 2025

Environment Condition

Temperature: 31.1 °C ± 1.1 °C
Humidity: 59.3 %RH ± 5.0 %RH

The Method used

In-house method, WI17, based on G-20-1/02-08 (E)

Traceability

This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through SCIMET Co.,Ltd. Certificate No. C23250016

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

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

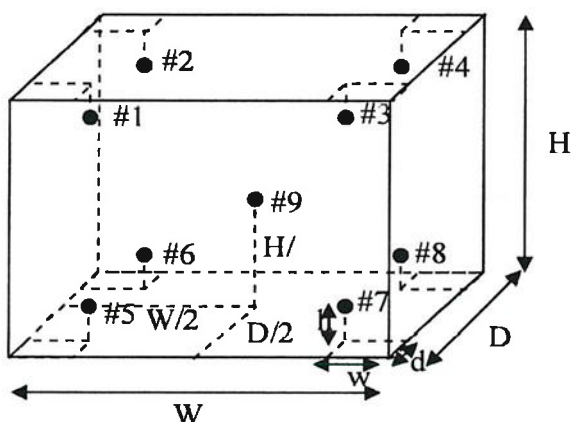
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SCIMET Co., Ltd.



Condition of reference standards Instruments:

<u>Instruments</u>	<u>Model</u>	<u>S/N or ID.</u>	<u>Certificate No.</u>	<u>Due Date</u>
Datalogger 1	34972A	MY59003249	C23250016	30-Jan-2026

Condition of Calibration item : In Condition



Standard Installation Locations

Volume (Calibration Zone)= 16 (Liters)

Inside chamber: W = 40 (cm) D = 33 (cm) H = 40 (cm)

Standard Locations (#1, #2, #3, #4): w = 6 (cm) d = 6 (cm) h = 6 (cm)

Standard Locations (#5, #6, #7, #8): w = 6 (cm) d = 6 (cm) h = 6 (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	101	102	103	104	105	106	107	108	109

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation: The difference of maximum and minimum measured tempera

Calibration Results:

Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	104.09	0.09	0.39
#2	104.22	0.22	0.39
#3	104.02	0.02	0.39
#4	103.80	-0.20	0.39
#5	104.22	0.22	0.39
#6	104.19	0.19	0.39
#7	103.87	-0.13	0.39
#8	103.51	-0.49	0.39
#9	104.17	0.17	0.39

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
104.0	104.0	104.0	104.09	104.22	104.02	103.80	104.22	104.19	103.87	103.51	104.17	0.39

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
104.0	0.71	0.09	0.82

Note: * Maximum uncertainty of the each position

Without adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 110.0 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	110.13	0.13	0.39
#2	110.29	0.29	0.39
#3	110.06	0.06	0.39
#4	109.81	-0.19	0.39
#5	110.29	0.29	0.39
#6	110.26	0.26	0.39
#7	109.91	-0.09	0.39
#8	109.50	-0.50	0.39
#9	110.23	0.23	0.39

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
110.0	110.0	110.0	110.13	110.29	110.06	109.81	110.29	110.26	109.91	109.50	110.23	0.39

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
110.0	0.79	0.11	0.89

Note: * Maximum uncertainty of the each position

Without adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 180.0 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	180.18	0.18	0.46
#2	180.47	0.47	0.46
#3	180.00	0.00	0.46
#4	179.38	-0.62	0.47
#5	180.64	0.64	0.46
#6	180.60	0.60	0.47
#7	180.31	0.31	0.58
#8	179.09	-0.91	0.48
#9	180.52	0.52	0.46

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
180.0	180.0	180.0	180.18	180.47	180.00	179.38	180.64	180.60	180.31	179.09	180.52	0.58

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
180.0	1.52	0.30	1.77

Note: * Maximum uncertainty of the each position

The End of Certificate

Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, G20-1/02-08(E). Therefore, those parameters have not

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

- Decision rule :** ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk $< 50\%$ PFA.
- ☒ Choice B Non-binary statement with guard band ($w = 1$ U), Pass or Fail Specific Risk $< 2.5\%$ PFA and Condition Pass or Condition Fail Specific Risk $< 50\%$ PFA.
- ☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r$ U) .
- ; PFA: Probability of False Accept



Without adjustment

Desired Temperature : 104.0°C

Tolerances : 1.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	104.09	0.09	0.39	1.0	Pass
#2	104.22	0.22	0.39	1.0	Pass
#3	104.02	0.02	0.39	1.0	Pass
#4	103.80	-0.20	0.39	1.0	Pass
#5	104.22	0.22	0.39	1.0	Pass
#6	104.19	0.19	0.39	1.0	Pass
#7	103.87	-0.13	0.39	1.0	Pass
#8	103.51	-0.49	0.39	1.0	Pass
#9	104.17	0.17	0.39	1.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

Statements of conformity:(Cont.)

Without adjustment (Cont.)

Desired Temperature : 110.0°C

Tolerances : 1.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 110.0 °C

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	110.13	0.13	0.39	1.0	Pass
#2	110.29	0.29	0.39	1.0	Pass
#3	110.06	0.06	0.39	1.0	Pass
#4	109.81	-0.19	0.39	1.0	Pass
#5	110.29	0.29	0.39	1.0	Pass
#6	110.26	0.26	0.39	1.0	Pass
#7	109.91	-0.09	0.39	1.0	Pass
#8	109.50	-0.50	0.39	1.0	Pass
#9	110.23	0.23	0.39	1.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

Without adjustment

Desired Temperature : 180.0°C

Tolerances : 2.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 180.0 °C

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	180.18	0.18	0.46	2.0	Pass
#2	180.47	0.47	0.46	2.0	Pass
#3	180.00	0.00	0.46	2.0	Pass
#4	179.38	-0.62	0.47	2.0	Pass
#5	180.64	0.64	0.46	2.0	Pass
#6	180.60	0.60	0.47	2.0	Pass
#7	180.31	0.31	0.58	2.0	Pass
#8	179.09	-0.91	0.48	2.0	Pass
#9	180.52	0.52	0.46	2.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

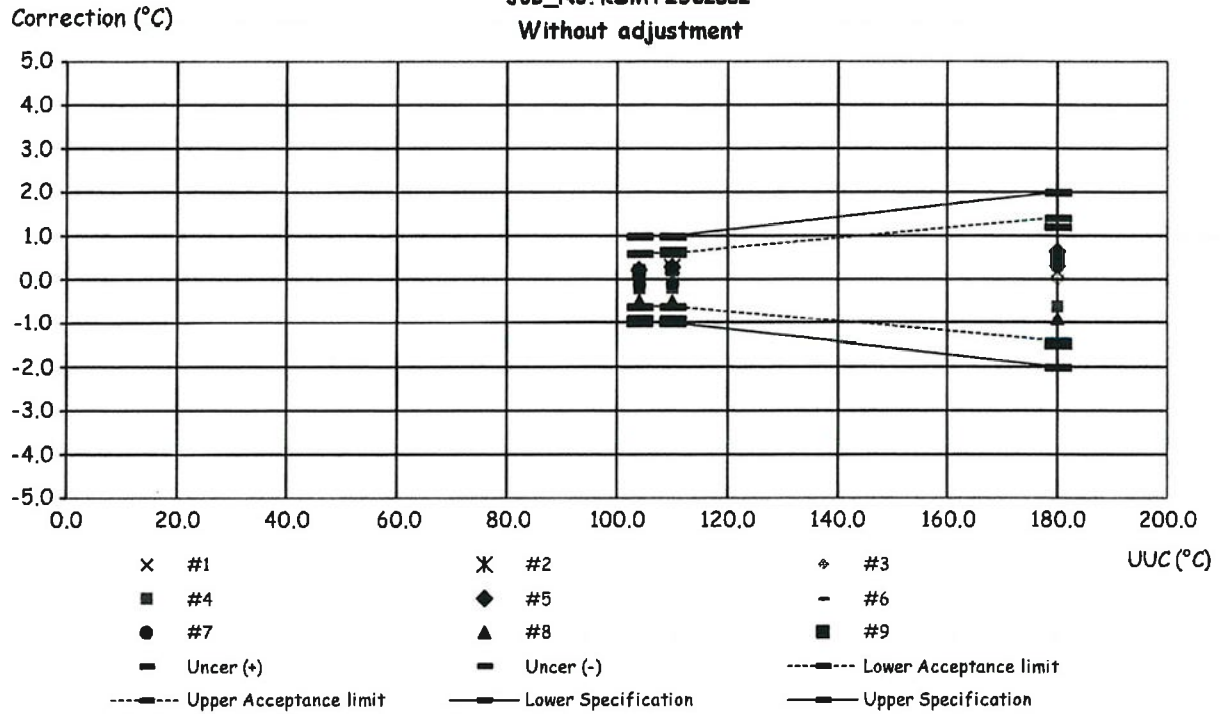
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity

Corr_Distribution & Max_Measurement Uncertainty

Job_No. KSMT2502802

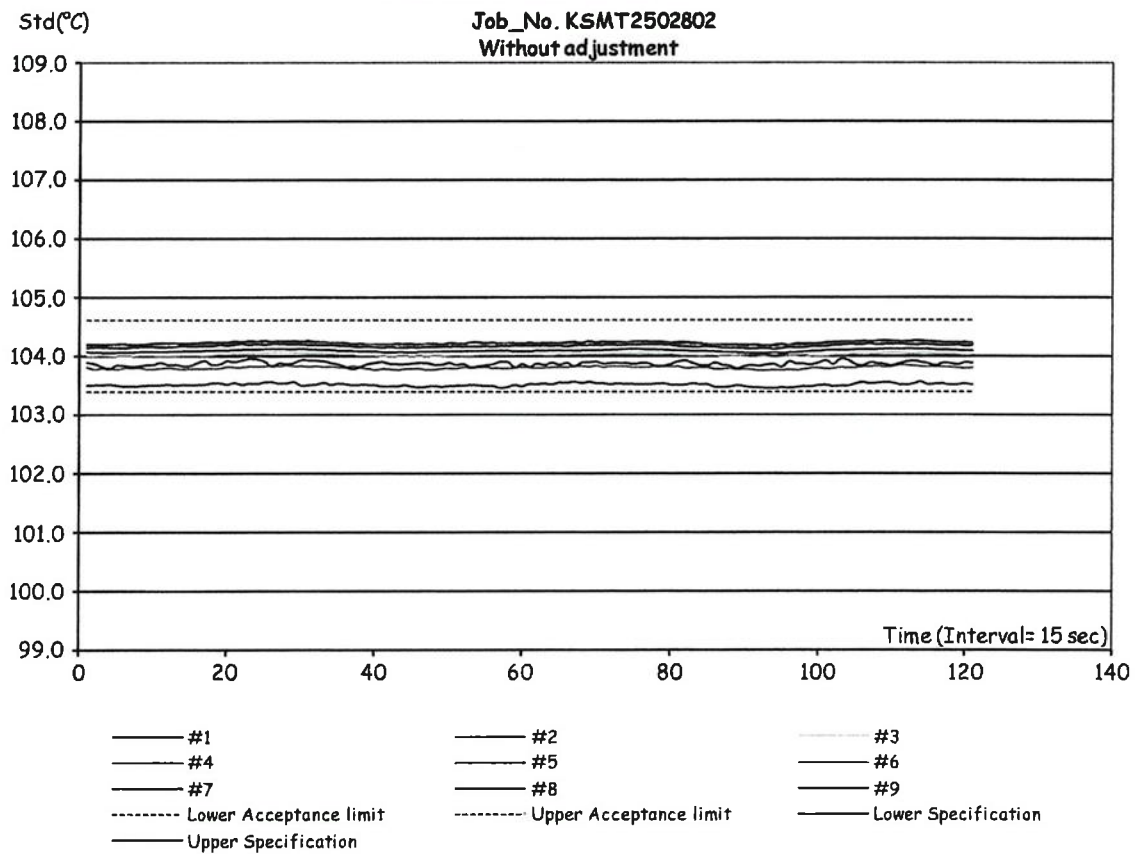
Without adjustment

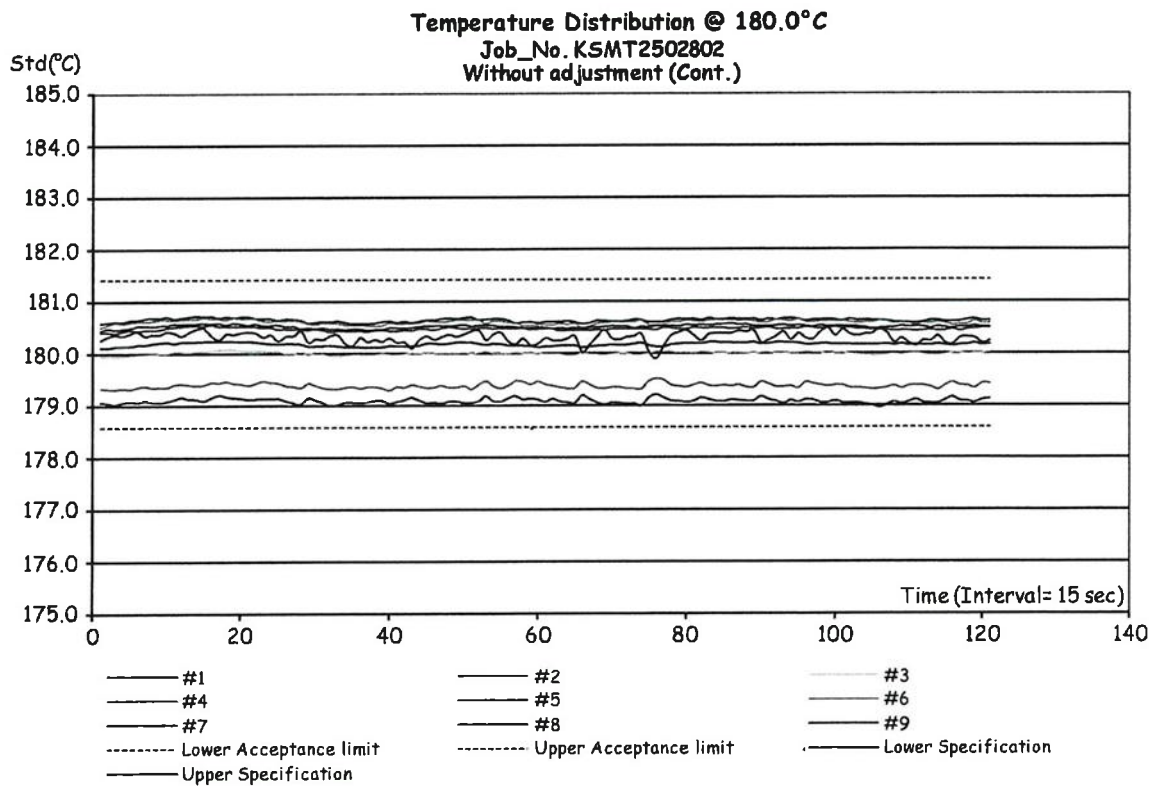
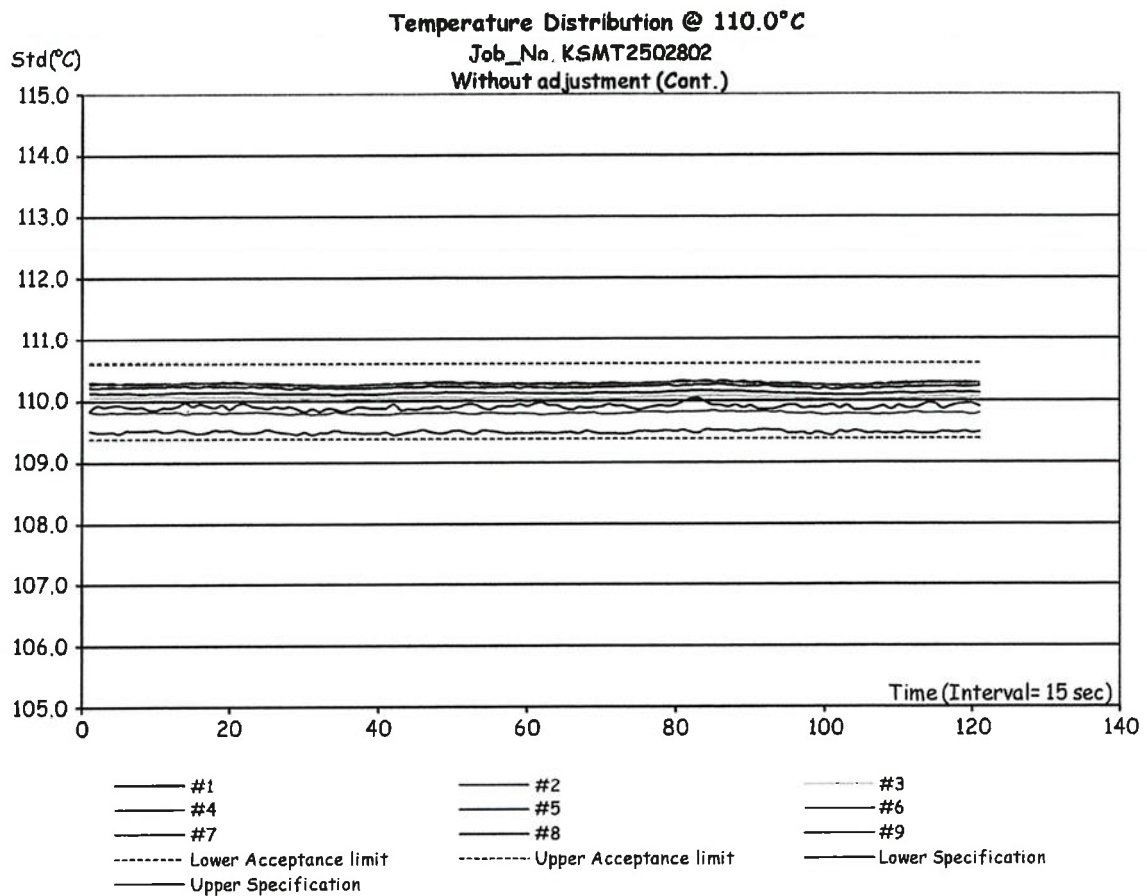


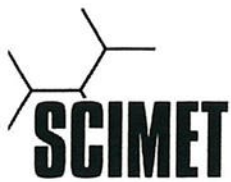
Temperature Distribution @ 104.0°C

Job_No. KSMT2502802

Without adjustment







ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: KSMT2502802

ชนิดเครื่องมือ: Hot Air Oven

รุ่น: UF55

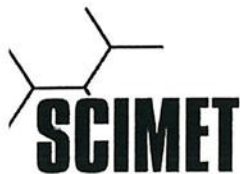
หมายเลขเครื่อง: B215.1147 (ELABHAOVEN1147)

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
07 Jul 2025			07 Jul 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน พัดลม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	100%
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. สภาพ Lever of Ventilation valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาพ Door seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input type="checkbox"/>	<input type="checkbox"/>	-
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของระบบทำความชื้น	<input type="checkbox"/>	<input type="checkbox"/>	-
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	13. สภาพแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ :

Mr. Mongkolwat Hasanon

Service Engineer



SCIMET Co., Ltd.
818/124 Udomsuk Rd., Bangna-Nuea,
Bangna, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
<https://www.scimet.co.th>



Certificate No. C18250038

Calibration Certificate

Equipment:	Liquid Bath	Job No.:	KSMT2501047
Model:	WNB14	Received Date:	19 March 2025
Serial No.(or ID):	L412.2222 (ELABWBWNB14N01)	Issued Date:	24 March 2025
Manufacturer:	Memmert	Page:	1 of 3
Circulation:	None		

Customer

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

Calibration Place

Envilab Co., Ltd. (B300 CH1 ROOM)
540, 540/1 Soi Bangkhae 7, Bangkhae, Bangkhae, Bangkok 10160

Calibration Date

19 March 2025

Environment Condition

Temperature: 28.1 °C ± 0.5 °C
Humidity: 49.2 %RH ± 3 %RH

The Method used

In-house method, WI18, based on ASTM E715-1980
(reapproved 2022)

Traceability

This certificate is traceable to the SI Units maintained by
National Institute of Metrology (NIMT), Thailand through
SCIMET Co., Ltd. Certificate No. C23250016

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

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

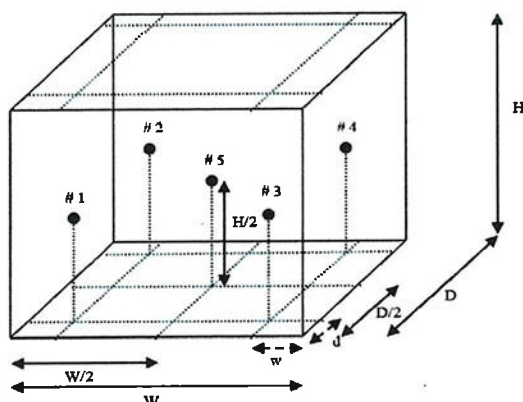
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SCIMET Co., Ltd.



Condition of reference standards instruments:

<u>Instruments</u>	<u>Model</u>	<u>S/N or ID.</u>	<u>Certificate No.</u>	<u>Due Date</u>
Datalogger 1	34972A	MY59003249	C23250016	30-Jan-2026

Condition of Calibration item : In Condition



Standard Installation Locations

Midway between the diffuser plate and the water surface

Inside bath: W = 37 (cm) D = 33 (cm) H = 16 (cm) Volume = 20 (Liters)
Standard Locations #1: w = 5 (cm) d = 5 (cm)
Standard Locations #2: w = 5 (cm) d = 5 (cm)
Standard Locations #3: w = 5 (cm) d = 5 (cm)
Standard Locations #4: w = 5 (cm) d = 5 (cm)

Standard Locations #5: Center of any probes. (#1 - #4)

Position of Std	#1	#2	#3	#4	#5
Channel of Logger	101	102	103	104	105

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the bath.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the bath at steady-state. The reference probe is preferably located in the geometric center of the bath.

Measured Stability: The one-half of greatest maximum difference of measured temperatures.

Overall Variation: The difference of maximum and minimum measured temperatures.

Calibration Results:

Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 94.5 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	95.08	0.08	0.20
#2	95.12	0.12	0.20
#3	95.03	0.03	0.20
#4	95.07	0.07	0.20
#5	95.08	0.08	0.20

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)					Uncertainty (± °C)*
			#1	#2	#3	#4	#5	
95.0	94.5	94.5	95.08	95.12	95.03	95.07	95.08	0.20

Bath Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
94.5	0.12	0.09	0.28

Note: * Maximum uncertainty of the each position

The End of Certificate

Statements of conformity:

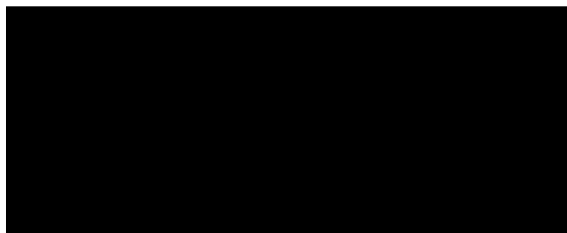
This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, ASTM E715-1980 (reapproved 2022). Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

- Decision rule :** ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk $< 50\%$ PFA.
- ☒ Choice B Non-binary statement with guard band ($w = 1$ U), Pass or Fail Specific Risk $< 2.5\%$ PFA and Condition Pass or Condition Fail Specific Risk $< 50\%$ PFA.
- ☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r$ U) .
- ; PFA – Probability of False Accept



Without adjustment

Desired Temperature : 95.0°C Tolerances : 1.0 °C

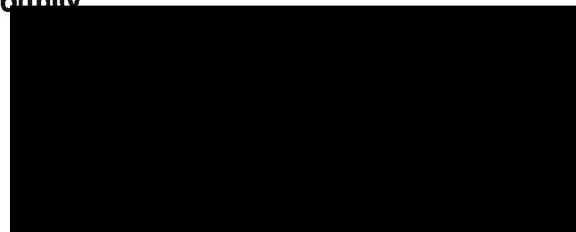
Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 94.5 °C

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	95.08	0.08	0.20	1.0	Pass
#2	95.12	0.12	0.20	1.0	Pass
#3	95.03	0.03	0.20	1.0	Pass
#4	95.07	0.07	0.20	1.0	Pass
#5	95.08	0.08	0.20	1.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity

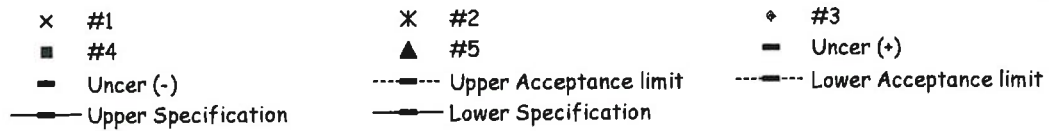
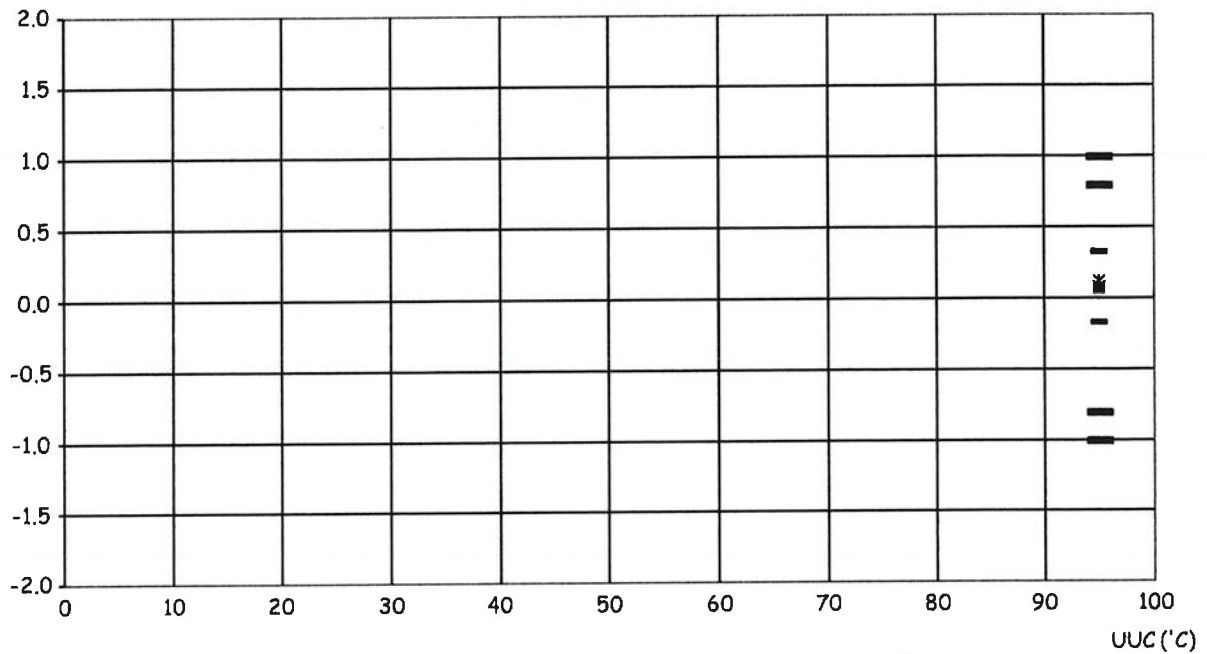


Corr_Distribution & Max_Measurement Uncertainty

Job_No. KSMT2501047

Without adjustment

Correction ('C)

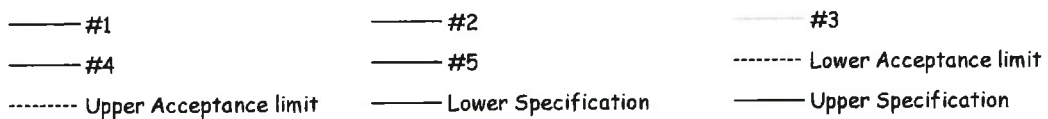
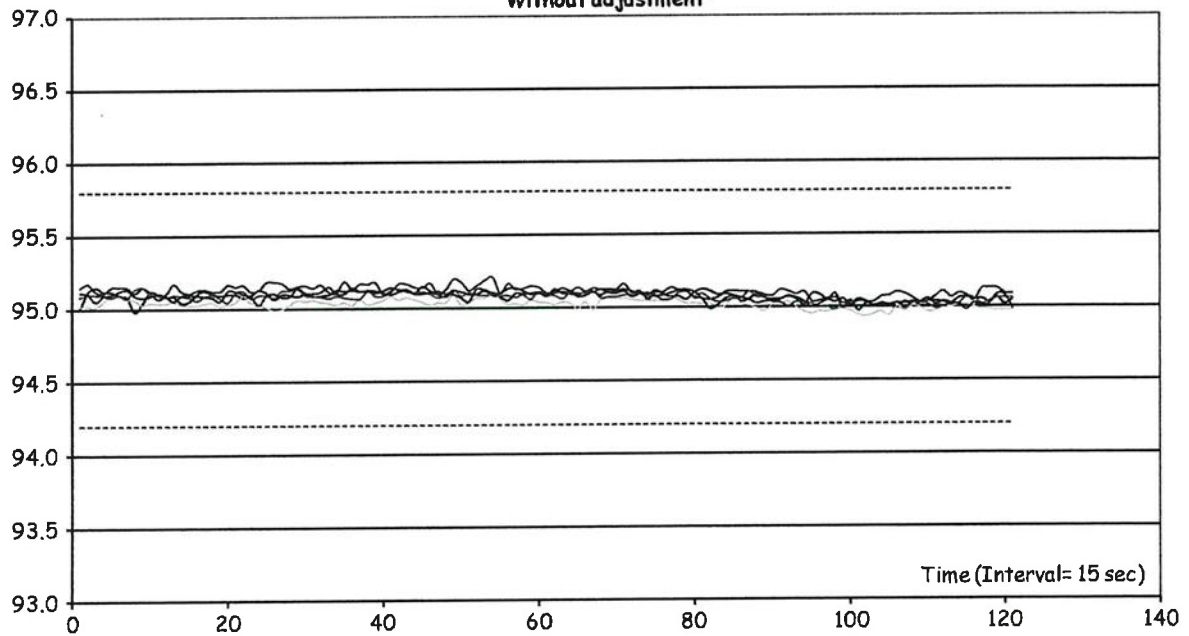


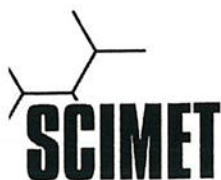
Temperature Distribution @ 95.0°C

Job_No. KSMT2501047

Without adjustment

Std('C)





ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: KSMT2501047

ชนิดเครื่องมือ: Liquid Bath

รุ่น: WNB14

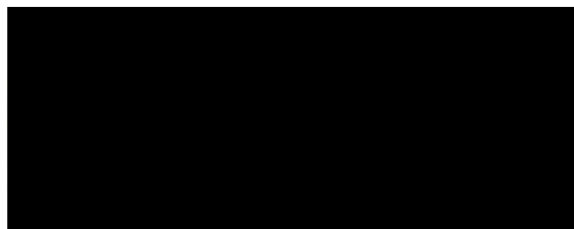
หมายเลขเครื่อง: L412.2222

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
19 Mar 2025			19 Mar 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน Circulator	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. สภาพ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. ท่อระบายน้ำทิ้ง (DRAIN)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	8. การทำงานของระบบทำความเย็น	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. สภาพแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ :

Mr. Hattapong Pumnil

Service Engineer



Certificate of Calibration

Certificate No. : 68-300237-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Cylinder

Manufacturer : BOROSIL

Class : A

Capacity : 50 ml

Graduation : 1 ml

ID No. : C-WW-004/24

Environment : Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1015.8 mbar.

Date of Received : 14 March 2025

Date of Calibration : 18 March 2025

Date of Issue : 18 March 2025

Calibrated by : Areerat Sombun

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

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

Electronic Balance

ID No.

Cert. No.

Due Date

Traceability

241002

67-200410-1

02 Jun 2025

National Institute of Metrology (Thailand) (NIMT)

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 app

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

Certificate of Calibration

Certificate No. : 68-300237-2

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	30.07
50	50.08

Uncertainty of measurement with in \pm 0.054 ml

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

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

- o0o -

CAL

Calibratech Co.,Ltd.

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

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



Certificate of Calibration

Certificate No. : 68-300237-5

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 : 500 ml

Graduation : 5 ml

ID No. : C-WW-005/21

Environment : Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1015.9 mbar.

Date of Received : 14 March 2025

Date of Calibration : 18 March 2025

Date of Issue : 18 March 2025

Calibrated by : Areerat Sombun

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

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

Electronic Balance

ID No.

Cert. No.

Due Date

Traceability

241002

67-200410-1

02 Jun 2025

National Institute of Metrology (Thailand) (NIMT)

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Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 68-300237-5

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)
250	250.80
500	500.66

Uncertainty of measurement with in \pm 0.12 ml

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

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

- o0o -

CAL

Calibratech Co.,Ltd.

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

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



Certificate of Calibration

Certificate No. : 68-300237-6

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 : 1000 ml

Graduation : 10 ml

ID No. : C-WW-001/24

Environment : Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1015.9 mbar.

Date of Received : 14 March 2025

Date of Calibration : 18 March 2025

Date of Issue : 18 March 2025

Calibrated by : Areerat Sombun

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

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

Electronic Balance

ID No.

Cert. No.

Due Date

Traceability

241002

67-200410-1

02 Jun 2025

National Institute of Metrology (Thailand) (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 68-300237-6

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	501.34
1000	1001.27

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%

- oOo -

Certificate of Calibration

Certificate No. : 68-300233-5

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Measuring Pipette

Manufacturer : witeg

Class : A

Capacity : 25 ml

Graduation : 0.1 ml

ID No. : G-WW-014/23

Environment : Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1008.0 mbar.

Date of Received : 14 March 2025

Date of Calibration : 18 March 2025

Date of Issue : 18 March 2025

Calibrated by : Areerat Sombun

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

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

Electronic Balance

ID No.

Cert. No.

Due Date

Traceability

241005

67-200410-4

02 Jun 2025

National Institute of Metrology (Thailand) (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 68-300233-5

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

Delivery Time : 15.09 sec.

Nominal Volume (ml)	Measuring Volume (ml)
1	1.0096
10	9.9778
25	24.9769

Uncertainty of measurement with in \pm 0.0067 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%

- oOo -

Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.
- For customers using HF applications, the instrument should be returned to its standard sample introduction system.



Agilent CrossLab Start Up Services Agilent 5100 5110 ICP-OES Preventive Maintenance

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.



Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Service not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the **Service Review** section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Completion section
- **Ask the customer to sign the Service Verification section including the customer's and your signature.**



Important Customer Web Links

- ✓ To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
 - Sample Prep and Containment
 - Chemical Standards
 - Analysis
 - Service and Support
 - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- **Need to place a service call?** Flexible Repair Options | Agilent



Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and implementation of Service Notes
- ☒ Check for required firmware/software updates and verify with customers if they would like them installed.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it.
- ☒ Ask the customer to remove any samples from the ICP-OES sample introduction area, auto sampler or around the ICP-OES.

Instrument Maintenance

System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	G8015A / MY17490002
Instrument System Site and Location	Envilab Company Limited

List System Component Product Numbers		List the Serial Numbers of each Component
1.	G8410A	AU17393768
2.	G8015A	MY17490002
3.	G8481	1709-05327
4.		
5.		
6.		
7.		
8.		
9.		

ICP-OES Configuration Table		Circle the type or write in the type if other
Nebulizer Type	SeaSpray	OneNeb Conikal Other
Spray Chamber	Cyclonic Single Pass	Cyclonic Double Pass Other
Torch	Radial Dual View	Other
Torch Type	One Piece	Semi Demountable Fully Demountable Other
Injector Diameter	2.4mm 1.8mm	4mm 0.8mm Other
Injector Material	Quartz	Ceramic Other

SPS 3 Auto Sampler

Type text here

- ☒ **Service not applicable**
- ☐ Power cycle the autosampler and verify successful initialization.
- ☐ Inspect X and Z axis belts for wear. Replace is necessary.
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

SPS 4 Auto sampler

- ☐ **Service not applicable**
- ☒ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☒ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner.
- ☒ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☒ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☒ Pump Tubing Replacement: Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles
- ☒ Test using customer's tray and move the sample probe to the sample vial 1, wash vial and rinse port and ensure that the probe is centered in the vial. If not use calibration wizard and calibrate the position.

4, 6, 7 Advanced Valve System

- ☐ **Service not applicable**
- ☐ Replace valve rotor seal
- ☐ Check fittings for signs of leaks
- ☐ Check tubing including autosampler tubing for kinks or excessive wear
- ☐ Check high flow pump for signs of leaks

Preventive Maintenance Procedures

Record Pre-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table – Pre-PM.

Clean and inspect ICP-OES system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☒ Replace high capacity air inlet dust filter element if installed.
- ☒ Remove and clean instrument water inlet filter.

Agilent Water Recirculator

- ☐ **Service not applicable**
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter if present.
- ☒ Re fill with Agilent Cool Clear cooling fluid.
- ☒ Clean the cooling system: Air filter and the condenser.

Restore Instrument

- ☐ For HF applications, ask the customer to reinstall their sample introduction system.
- ☐ Leave system in an idle state: on and purging.
- ☐ Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☒ **Complete the Signature Page with both Service Engineer and Customer signatures.**

ADS 2 Advanced Dilution System (5110 only)

- ☒ SERVICE NOT APPLICABLE
- ☐ LOOK FOR ANY OBVIOUS EXTERNAL DAMAGE OR PROBLEMS.
- ☐ REPLACE VALVE ROTOR SEAL ON VALVES A AND B.
- ☐ REPLACE BOTH SYRINGES.
- ☐ REPLACE ACID VAPOR FILTER (WASTE VESSEL)
- ☐ REPLACE VENTING VALVE (DILUENT CARRIER BOTTLE)
- ☐ CHECK FITTINGS FOR SIGNS OF LEAKS.
- ☐ CHECK TUBING INCLUDING AUTOSAMPLER TUBING FOR KINKS OR EXCESSIVE WEAR.

ICP-OES adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.

Record Post-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above, run the following Instrument tests

- ☒ Subsystem Communications Test
- ☒ Air Flow
- ☒ Water Flow
- ☒ Gas Flows
- ☒ RF Generator
- ☒ Camera Test
- ☒ Optics Test
- ☒ Nebulizer Test

- ☒ Record the result in the Instrument Test Results Table

ICP-OES Status Results Table

Note: These measurements do not form part of any specification and are for reference only.

Measurement	Standby Mode	Plasma On
Mains Voltage	220.640	219.053 VAC
Mains Current	0.080	0.099 A
Instrument Temperature	23.2 °C	22.3 °C
RF Air Flow (sensor speed)	7.0 Hz	20.0 Hz
Plasma Exhaust Temperature	No measurement	46.5 °C
Water Flow Oscillator	No measurement	1.51 L/min
Water Flow Detector	1.20 L/min	1.17 L/min
Water Inlet Temperature	18.3 °C	18.3 °C
Polychromator Temperature	35.3 °C	35.0 °C
CCD Temperature	-35.7 °C	-39.8 °C
Thermal Stabilizer	35.0 °C	35.0 °C
Argon Supply Pressure	611.44 kPa	564.69 kPa
Purge Gas Supply Pressure*1	610.40 kPa	594.52 kPa
Option Gas Supply Pressure**1	- kPa	- kPa
Nebulizer Flow	No measurement	0.70 L/min
Back Pressure	No measurement	280.74 kPa
Ar Gas Flow	No measurement	12.03 L/min
Ar Gas Flow	No measurement	1.00 L/min
Ar Gas Flow	No measurement	1203.4 W
Ar Gas Flow	No measurement	8.244 A
Ar Gas Flow	No measurement	194.614 V

Option installed

Test Results

Instrument Performance Test Results Table

Note: These measurements do not form part of any specification and are for reference only.

Pre FM Sensitivity Check			Post PM Sensitivity Check		
	Radial	Axial *		Radial	Axial*
Zn 213.857 nm SRBR	2745.8	3632.4		14128.0	23024.3
Mn 257.610 nm SRBR	12504.7	26596.0		86470.0	215311.3
Al 396.152 nm SBR	5.0	14.9		564.1	2335.7
K 766.491 nm SBR	4.4	71.4		639.6	11029.3

* Axial result is not applicable for G8016AA, G8012AA Radial View instruments.

Instrument Test Results Table

Note: The Instrument Test results are for systems using ICP Expert version 7.3 and above only.

Instrument Test	Result
Subsystem Communications Test	Pass
Air Flow	Pass
Water Flow	Pass
Gas Flows	Pass
RF Generator	Pass
Camera Test	Pass
Optics Test	Pass
Nebulizer test	Pass

Part Description	Part Number	Product or Model# where used	Quantity consumed
------------------	-------------	------------------------------	-------------------

Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

-Torch is broken. Should be replaced and should be spaerd.

Service Verification

Request Number: 07747651
Engineer Name: van Onkhom
Date Service Completed: June 26, 2025
Customer Name:

Consumed PM Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
Axial Pre-Optic Window	G8010-68014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-68015	AI	1
Agilent Cool Clear Coolant Fluid	5799-0037	Agilent Water Recirculator	N/A
Purge Gas Filter	G8010-60136	AI	1
Air Inlet filter	G8000-68002	AI	1
High Capacity Air Filter	G8010-60189	Optional	N/A
Rotor seal for 6.7 port valve for AVS6/7	G8494-60002	G8494A/G8495, ADS 2	N/A
Rotor seal for 4 port valve for AVS4	G8493-60002	G8493A	N/A
Rinse solution to rinse station 2.5mm id x 1m	G8410-80123	SPS 4	N/A
Barb connector 2.5mm-1.5mm ID	G8410-80124	SPS 4	N/A
PVC waste tubing 8mm od x 5mm id, 2m	G8410-80122	SPS 4	N/A
Syringe, 5mL	5299-0037	ADS 2	N/A
Syringe, 10mL	5299-0038	ADS 2	N/A
Acid vapor filter	5043-1193	ADS 2	N/A
Venting valve	5043-1190	ADS 2	N/A
Additional Parts may be required from engineer's stock:			
X axis drive belt	5410047500	SPS 3	N/A
Z axis drive belt	5410047400	SPS 3	N/A
Peristaltic pump tubing, PVC SolvaFlex, 3 bridged,	3710049000	SPS 4	N/A

Consumed Parts Reference
(Purchased by customer, not included as part of PM)

☐ Section Not Applicable.

Part Description	Part Number	Product or Model# where used	Quantity consumed
------------------	-------------	------------------------------	-------------------

Agilent 5100, 5110 Preventive Maintenance Checklist

Customer Signature:

Service Engineer Signature:

Suwan O.

Total number of pages in this document:

15 pages



Certificate of Calibration

Certificate No. : 68-410088-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Digital Thermo-Hygrometer

Manufacturer : ebro

Model : EBI 20

Range Temperature : -30 °C to 70 °C **Resolution :** 0.1 °C

Range Humidity : 0 %R.H. to 100 %R.H. **Resolution :** 0.1 %R.H.

Serial No. : 62324021

ID No. : ELABTMEB120TH1

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

Relative Humidity : (50 ± 15) %

Date of Received : 18 June 2025

Date of Calibration : 24 June 2025

Date of Issue : 24 June 2025

Calibrated by : Chortip Samchusri

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

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

Digital Indicator with Standard Probe Temp&Hum

ID No.	Cert. No.	Due Date	Traceability
400034 & 400036	SG-H-00001/68	04 Jul 2025	Success Gateway Co., Ltd., Accredited by TISI Calibration No.0268

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 68-410088-1

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)
24.99	24.9	0.1	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)
50.00	53.6	-3.6	2.2

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%

- o0o -



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Envilab Co., Ltd.
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Verification Test Report

Instrument Information

Report No.: SO2500043-E004 / 001

Equipment : Air Sampling Pump

Verification Date : 03 December 2025

Manufacturer : AP Buck

Model : LP5

Serial No : 5426

Scale Rang : 5-5000 ml/min

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %

Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	2000	2000.7	2000.9	2000.3	2001.2	2000.4	2000.7	0.7	0.0

* UUR = Unit Under Reference flow

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Verification Test Report

Instrument Information

Equipment : Air Sampling Pump
Manufacturer : AP Buck
Model : LP5
Serial No : 5427
Scale Rang : 5-5000 ml/min

Report No.: SO2500043-E004 / 002

Verification Date : 03 December 2025

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578
Certificate No. : L202507108-0002
Date due : 14 July 2026
Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %
Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point
☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1700	1700.0	1700.6	1701.9	1701.1	1700.3	1700.8	0.8	0.0

* UUR = Unit Under Reference flow

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Verification Test Report

Instrument Information

Equipment : Air Sampling Pump

Manufacturer : AP Buck

Model : LP5

Serial No : 5428

Scale Rang : 5-5000 ml/min

Report No.: SO2500043-E004 / 003

Verification Date : 03 December 2025

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %

Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1700	1700.8	1700.4	1700.5	1700.3	1701.2	1700.6	0.6	0.0

* UUR = Unit Under Reference flow

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Verification Test Report

Instrument Information

Equipment : Air Sampling Pump

Manufacturer : AP Buck

Model : LP5

Serial No : 5429

Scale Rang : 5-5000 ml/min

Report No.: SO2500043-E004 / 004

Verification Date : 03 December 2025

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %

Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1700	1700.2	1699.8	1700.5	1700.4	1700.7	1700.3	0.3	0.0

* UUR = Unit Under Reference flow

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Verification Test Report

Instrument Information

Equipment : Air Sampling Pump
Manufacturer : AP Buck
Model : LP5
Serial No : 5430
Scale Rang : 5-5000 ml/min

Report No.: SO2500043-E004 / 005

Verification Date : 03 December 2025

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578
Certificate No. : L202507108-0002
Date due : 14 July 2026
Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %
Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point
☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1700	1700.9	1700.6	1700.4	1699.8	1699.4	1700.2	0.2	0.0

* UUR = Unit Under Reference flow

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Verification Test Report

Instrument Information

Equipment : Air Sampling Pump
Manufacturer : AP Buck
Model : LP5
Serial No : 5445
Scale Rang : 5-5000 ml/min

Report No.: SO2500043-E004 / 006

Verification Date : 03 December 2025

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578
Certificate No. : L202507108-0002
Date due : 14 July 2026
Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %
Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point
☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1700	1700.1	1701.7	1700.4	1700.8	1701.3	1700.9	0.9	0.1

* UUR = Unit Under Reference flow

The Results shown in this verification report refer only to the equipment verified.
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Verification Test Report

Instrument Information

Equipment : Air Sampling Pump
Manufacturer : AP Buck
Model : LP5
Serial No : 5446
Scale Rang : 5-5000 ml/min

Report No.: SO2500043-E004 / 007

Verification Date : 03 December 2025

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578
Certificate No. : L202507108-0002
Date due : 14 July 2026
Traceability : MIT

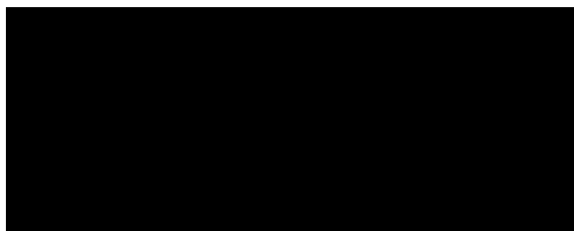
Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %
Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point
☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1000	1000.6	1001.3	1000.3	999.5	1000.7	1000.5	0.5	0.0

* UUR = Unit Under Reference flow



The Results shown in this verification report refer only to the equipment verification unless otherwise stated
This Calibration Certificate cannot be reproduced, except in full,



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Verification Test Report

Instrument Information

Equipment : Air Sampling Pump

Manufacturer : AP Buck

Model : LP5

Serial No : 5447

Scale Rang : 5-5000 ml/min

Report No.: SO2500043-E004 / 008

Verification Date : 03 December 2025

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %

Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1000	1000.9	1000.4	1001.3	1000.8	1000.6	1000.8	0.8	0.1

* UUR = Unit Under Reference flow

The Results shown in this verification report refer only to the equipment verification unless otherwise stated

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Fax: 02-802-3773 E-mail : info@evltesting.com



Verification Test Report

Instrument Information

Equipment : Air Sampling Pump

Manufacturer : AP Buck

Model : LP5

Serial No : 5448

Scale Rang : 5-5000 ml/min

Report No.: SO2500043-E004 / 009

Verification Date : 03 December 2025

Reference Standard

Standard : Bios Flow Calibrator Manufacturer : Mesalabs Model : Defender 520H S/N : 164578

Certificate No. : L202507108-0002

Date due : 14 July 2026

Traceability : MIT

Ambient Condition : Temperature 25.00 °C Relative humidity 58.00 %

Atmospheric pressure 1013.3 hpa

Verification Point : ☒ Single Point

☐ Multi Point

Measurement Data

UUR Point	UUR Reading (ml/min)	Reference flow response						Error (ml/min)	Accuracy (± 5% of the flow set point)
		Test 1 (ml/min)	Test 2 (ml/min)	Test 3 (ml/min)	Test 4 (ml/min)	Test 5 (ml/min)	Average (ml/min)		
1	1700	1700.7	1701.9	1700.3	1700.6	1700.9	1700.9	0.9	0.1

* UUR = Unit Under Reference flow

The Results shown in this verification report refer only to the equipment ver

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CALIBRATION LABORATORY Co., LTD.

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

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



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : HEAT STRESS MONITOR
MANUFACTURER : METROSONICS
MODEL / TYPE : hs-32
SERIAL NO. : MCE030014[EHEMTHS3230014]
CLID. NO. : 232400048
JOB CONTROL NO. : 251021124939
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVILAB CO., LTD.
540, 540/1 SOI BANGKHAE 7, BANGKHAE,
BANGKHAE, BANGKOK 10160 THAILAND

DATE OF RECEIVED : 21 October 2025

DATE OF ISSUED : 24 October 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Oranut Kamchatphai

Approved By : Mongkol Yotsoontorn

Authorized Signatory

24 October 2025

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. Q25124939

F3-011-05/12-23





CALIBRATION LABORATORY Co., LTD.

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

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



REPORT OF CALIBRATION

FOR

NOMENCLATURE : **HEAT STRESS MONITOR**
MANUFACTURER : **METROSONICS**
MODEL / TYPE : **hs-32**
SERIAL NO. : **MCE030014[EHEMTHS3230014]**
DATE OF CALIBRATION : **22 October 2025**

ENVIRONMENT CONDITIONS :

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

Relative Humidity : $(55 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. **CLC-CPTH-11**. The calibration was performed by using Chilled Mirror Hygrometer which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, Edgetech Model Dew Master S/N. 36151.

Temperature & Humidity Chamber, PGC Model 9141-5116 S/N. 1304261.

TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Thunder Scientific Corporation.
Certificate No. 23247, Due Date 23 April 2026.

UNCERTAINTY :

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

Certificate No. **Q25124939**

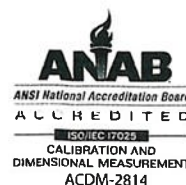
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CALIBRATION LABORATORY Co., LTD.

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

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



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring heat stress monitor.

CALIBRATION DATA

1. CORRECTION OF TEMPERATURE : WET

Test point (° C)	Actual Temperature (° C)	DUC Reading (° C)	Correction (° C)	Uncertainty \pm (° C)
20.0	20.00	19.9	+0.10	0.27
30.0	30.00	29.9	+0.10	
40.0	40.00	39.9	+0.10	

2. CORRECTION OF TEMPERATURE : DRY

Test point (° C)	Actual Temperature (° C)	DUC Reading (° C)	Correction (° C)	Uncertainty \pm (° C)
20.0	20.00	20.0	0.00	0.27
30.0	30.00	30.0	0.00	
40.0	40.00	40.0	0.00	

3. CORRECTION OF TEMPERATURE : GLOBE

Test point (° C)	Actual Temperature (° C)	DUC Reading (° C)	Correction (° C)	Uncertainty \pm (° C)
20.0	20.00	20.1	-0.10	0.27
30.0	30.00	30.1	-0.10	
40.0	40.00	40.0	0.00	

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 016 Page 63 of 73

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

End of Certificate

Certificate No. Q25124939

F3-011-05/12-23





CALIBRATION LABORATORY Co., LTD.

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



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : HEAT STRESS MONITOR
MANUFACTURER : METROSONICS
MODEL / TYPE : hs-32
SERIAL NO. : MCG010014[NHEMTHS3210014]
CLID. NO. : 232400056
JOB CONTROL NO. : 250109002331
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVILAB CO., LTD.
540, 540/1 SOI BANGKHAE 7, BANGKHAE,
BANGKHAE, BANGKOK 10160 THAILAND

DATE OF RECEIVED : 09 January 2025

DATE OF ISSUED : 15 January 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Oranut Kamchatphai
Calibration Engineer

Approved By

Authorized Signatory

15 January 2025

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. Q25002331

F3-011-05/12-23





CALIBRATION LABORATORY CO., LTD.

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



REPORT OF CALIBRATION

FOR

NOMENCLATURE : **HEAT STRESS MONITOR**
MANUFACTURER : **METROSONICS**
MODEL / TYPE : **hs-32**
SERIAL NO. : **MCG010014[NHEMTHS3210014]**
DATE OF CALIBRATION : **14 January 2025**

ENVIRONMENT CONDITIONS :

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

Relative Humidity : $(55 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. **CLC-CPTH-11**. The calibration was performed by using Chilled Mirror Hygrometer which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, Edgetech Model Dew Master S/N. 36151.

Temperature & Humidity Chamber, PGC Model 9141-5114 S/N.0802282.

TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Thunder Scientific Corporation.
Certificate No. 22212, Due Date 23 February 2025.

UNCERTAINTY :

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

Certificate No. Q25002331

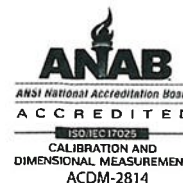
F3-011-05/12-23





CALIBRATION LABORATORY Co., LTD.

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



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring heat stress monitor.

CALIBRATION DATA

1. CORRECTION OF TEMPERATURE : WET

Test point (° C)	Actual Temperature (° C)	DUC Reading (° C)	Correction (° C)	Uncertainty ± (° C)
20.0	20.00	20.0	0.00	0.27
30.0	30.00	30.0	0.00	
40.0	40.00	39.9	+0.10	

2. CORRECTION OF TEMPERATURE : DRY

Test point (° C)	Actual Temperature (° C)	DUC Reading (° C)	Correction (° C)	Uncertainty ± (° C)
20.0	20.00	20.1	-0.10	0.27
30.0	30.00	30.1	-0.10	
40.0	40.00	39.9	+0.10	

3. CORRECTION OF TEMPERATURE : GLOBE

Test point (° C)	Actual Temperature (° C)	DUC Reading (° C)	Correction (° C)	Uncertainty ± (° C)
20.0	20.00	19.9	+0.10	0.27
30.0	30.00	29.7	+0.30	
40.0	40.00	40.1	-0.10	

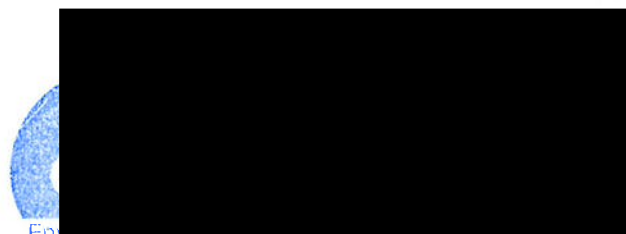
Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 013 Page 61 of 69

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

End of Certificate

Certificate No. Q25002331

F3-011-05/12-23





CALIBRATION LABORATORY Co., LTD.

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



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : HEAT STRESS MONITOR
MANUFACTURER : QUEST TECHNOLOGIES
MODEL / TYPE : QUESTemp^o32
SERIAL NO. : MCH110027[EHEMTHS3211027]
CLID. NO. : 232400069
JOB CONTROL NO. : 251021124937
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVILAB CO., LTD.
540, 540/1 SOI BANGKHAE 7, BANGKHAE,
BANGKHAE, BANGKOK 10160 THAILAND

DATE OF RECEIVED : 21 October 2025

DATE OF ISSUED : 24 October 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Oranut Kamchatphai
Calibration Engineer

Approved By

Authorized Signatory

24 October 2025

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. Q25124937

F3-011-05/12-23





CALIBRATION LABORATORY Co., LTD.

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



REPORT OF CALIBRATION

FOR

NOMENCLATURE : **HEAT STRESS MONITOR**
MANUFACTURER : **QUEST TECHNOLOGIES**
MODEL / TYPE : **QUESTemp^o32**
SERIAL NO. : **MCH110027[EHEMTHS3211027]**
DATE OF CALIBRATION : **22 October 2025**

ENVIRONMENT CONDITIONS :

Temperature : **(23 ± 2) °C**

Relative Humidity : **(55 ± 10) %RH**

PROCEDURE USED :

This instrument was calibrated under procedure No. **CLC-CPTH-11**. The calibration was performed by using Chilled Mirror Hygrometer which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, Edgetech Model Dew Master S/N. 36151.

Temperature & Humidity Chamber, PGC Model 9141-5116 S/N. 1304261.

TRACEABILITY :

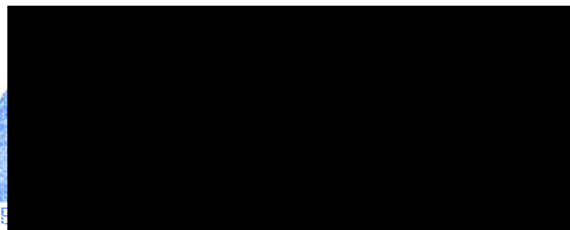
The measurements are traceable to International System of Units (SI) , through Thunder Scientific Corporation.
Certificate No. 23247, Due Date 23 April 2026.

UNCERTAINTY :

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

Certificate No. Q25124937

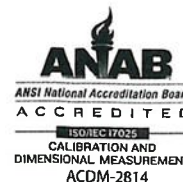
F3-011-05/12-23





CALIBRATION LABORATORY Co., LTD.

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



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring heat stress monitor.

CALIBRATION DATA

1. CORRECTION OF TEMPERATURE : WET

Test point (° C)	Actual Temperature (° C)	DUC Reading (° C)	Correction (° C)	Uncertainty \pm (° C)
20.0	20.00	19.9	+0.10	0.27
30.0	30.00	29.9	+0.10	
40.0	40.00	39.9	+0.10	

2. CORRECTION OF TEMPERATURE : DRY

Test point (° C)	Actual Temperature (° C)	DUC Reading (° C)	Correction (° C)	Uncertainty \pm (° C)
20.0	20.00	20.1	-0.10	0.27
30.0	30.00	30.1	-0.10	
40.0	40.00	40.0	0.00	

3. CORRECTION OF TEMPERATURE : GLOBE

Test point (° C)	Actual Temperature (° C)	DUC Reading (° C)	Correction (° C)	Uncertainty \pm (° C)
20.0	20.00	20.1	-0.10	0.27
30.0	30.00	30.1	-0.10	
40.0	40.00	40.0	0.00	

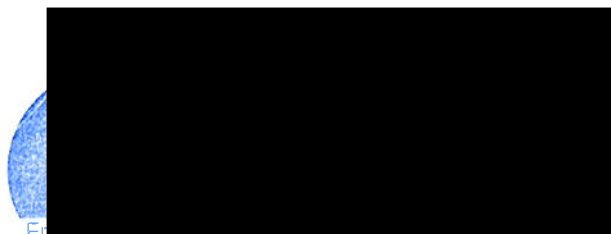
Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 016 Page 63 of 73

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

End of Certificate

Certificate No. Q25124937

F3-011-05/12-23





บริษัท เอ็นไวแล็บ จำกัด
Envilab Co., Ltd.
Tel : 02-802-3577-8

540,540/1 ซอยบางแค 7 เขตบางแค แขวงบางแค กรุงเทพฯ 10160
540,540/1 Soi Bangkhae 7 Bangkhae Bangkok 10160 Thailand
Fax 02-802-3773 E-mail : info@evitestesting.com



Verification Test Report

Report No.: SO2500043-E004 / 001

Verification Date : 03 December 2025

Operate Information ☒ PM ☐ Onsite

Site : Evilab Co.,Ltd.

GPS coordinates : 47Q N 1506368 E 257777

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial No : 1810

Scale Rang : 20dB-140dB

Class : 2

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EEL.BP.65/0168

Date due : 17 January 2026

Traceability : TISTR

Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %
Atmospheric pressure 1013.3 hpa

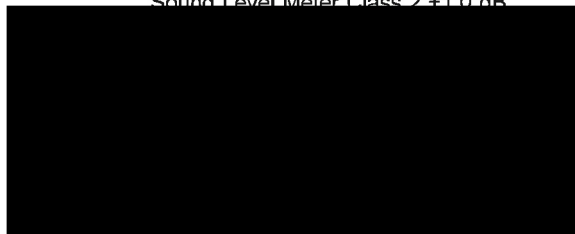
Measurement Data

Refferance Value (dB)	Correction Value (dB)	Adjustment (dB)	UUR Reading		Error (dB)	Acceptant Criteria (dB)
			Initial	Final		
93.93	0	93.93	93.58	93.89	0.31	±1.0

* UUR = Unit Under Reference flow

Acceptant Criteria : Sound Level Meter Class 1 ±0.5 dB

Sound Level Meter Class 2 ±1.0 dB



The Results shown in this verification report refer only to the equipment v

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Envilab Co., Ltd.
Tel : 02-802-3577-8

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540 . 540/1 Soi Bangkhæ 7 Bangkhæ Bangkok 10160 Thailand
Fax. 02-802-3773 E-mail : info@evltesting.com



Verification Test Report

Report No.: SO2500043-E004 / 002

Verification Date : 03 December 2025

Operate Information ☒ PM ☐ Onsite

Site : Envilab Co.,Ltd.

GPS coordinates : 47Q N 1506368 E 257777

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial No : 1821

Scale Rang : 20dB-140dB

Class : 2

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EEL.BP.65/0168

Date due : 17 January 2026

Traceability : TISTR

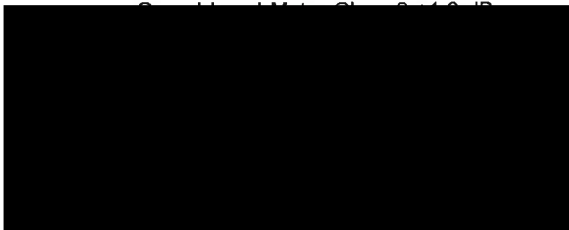
Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %
Atmospheric pressure 1013.3 hpa

Measurement Data

Refferance Value (dB)	Correction Value (dB)	Adjustment (dB)	UUR Reading		Error (dB)	Acceptant Criteria (dB)
			Initial	Final		
93.93	0	93.93	93.44	93.52	0.08	±1.0

* UUR = Unit Under Reference flow

Acceptant value : Sound Level Meter Class 1 ±0.5 dB



The Results shown in this verification report refer only to the equipment verification unless otherwise stated.

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Envilab Co., Ltd.
Tel : 02-802-3577-8

540,540/1 ซอยบางแค 7 เขตบางแค แขวงบางแค กรุงเทพฯ 10160
540 . 540/1 Soi Bangkhae 7 Bangkhae Bangkok 10160 Thailand
Fax 02-802-3773 E-mail : info@evltesting.com



Needless Envilab

Verification Test Report

Report No.: SO2500043-E004 / 003

Verification Date : 03 December 2025

Operate Information ☒ PM ☐ Onsite

Site : Envilab Co.,Ltd.

GPS coordinates : 47Q N 1506368 E 257777

Instrument Information

Equipment : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial No : 1842

Scale Rang : 20dB-140dB

Class : 2

Reference Standard

Standard : Acoustic Calibrator Manufacturer : Pulsar Model : 103 S/N : 98971

Certificate No. : EEL.BP.65/0168

Date due : 17 January 2026

Traceability : TISTR

Ambient Condition : Temperature 32.60 °C Relative humidity 54.20 %

Atmospheric pressure 1013.3 hpa

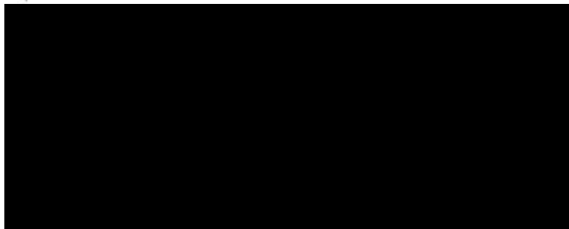
Measurement Data

Refferance Value (dB)	Correction Value (dB)	Adjustment (dB)	UUR Reading		Error (dB)	Acceptant Criteria (dB)
			Initial	Final		
93.93	0	93.93	93.87	94.26	0.39	±1.0

* UUR = Unit Under Reference flow

Acceptant value : Sound Level Meter Class 1 ±0.5 dB

Sound Level Meter Class 2 ±1.0 dB



The Results shown in this verification report refer only to the equipment verification unless otherwise stated

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0152

MTC No. EEL. BP. 65/0168

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 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Ambient Environment

Description : Acoustic Calibrator

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

Manufacturer : Pulsar

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

Model : 103

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

Serial No. : 98971

- 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 Panasonic VP-7722A S/N 041477D122.
 7. Condenser Microphone B&K 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 Jan. 2025

Date of Calibration : 17 Jan. 2025

The results relate only to the items tested/calibrated or value
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9036
Fax. (66) 0 2577 9009

Office/Laboratory

668 Mu 2 Tambon Bangpoomai, Amphoe Muang Samut
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9440
E-mail : mtc@tistr.or.th Website : www.tistr.or.th

FM.BL.MTC.002 Rev.5



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0152

MTC No. EEL. BP. 65/0168

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

Nominal Output of Unit Under Test = 94 dB re 20 μ Pa at 1000 Hz

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

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	93.93	-0.07	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1000.4	0.4	± 1.5	$\pm 1.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1.40	± 0.50	$\pm 3.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Date of Calibration : 17 Jan. 2025

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BL.MTC.002 Rev.5

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9036
Fax. (66) 0 2577 9009

Office/Laboratory

668 Mu 2 Tambon Bangpoomai, Amphoe Muang Samu
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9440
E-mail : mtc@tistr.or.th Website : www.tistr.or.th



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-68/0152

MTC No. EEL. BP. 65/0168

Nominal Output of Unit Under Test = 114 dB re 20 μ Pa at 1000 Hz

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

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	114.01	0.01	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1000.3	0.3	± 1.5	$\pm 3.0\%$

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	2.05	± 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.

Approved by :



(Mr. Prayate Kluyapa)

Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 17 Jan. 2025

Date of Issue : 20 Jan. 2025

Ref : 2011268011000116001

End of Certificate

3 / 3

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BL.MTC.002 Rev.5

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9036
Fax. (66) 0 2577 9009

Office/Laboratory

668 Mu 2 Tambon Bangpoomai, Amphoe Muang Samut
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Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9440
E-mail : mtc@tistr.or.th Website : www.tistr.or.th

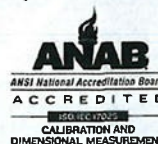


A Trescal company



ID LINE : IEC17025

METROLOGY SYSTEM (THAILAND) CO.,LTD.



Certificate of Calibration

Certificate Number : SPR25050328-2

Page : 1 of 3

Customer : Envilab Co., Ltd.

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

Equipment Name : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial Number : PN1810

ID. Number : NSMPUMD44N1810

Environmental Conditions

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

Received Date : 20 May 2025

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

Calibration Date : 24 May 2025

Location of Calibration : In-Lab

Recommend Due Date : 24 May 2026

Calibration Procedure : SP-CPE-04-01

Date of Issue : 25 May 2025

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Nanthawat Wanasit

Calibration Officer



A Tescal company



ID LINE : IEC17025

METROLOGY SYSTEM (THAILAND) CO.,LTD.



Calibration Report

Certificate Number : SPR25050328-2

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP.22/0268	20 Feb 2026

Traceability

This certification is traceable to the International System of Unit maintained at :

TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate Number : SPR25050328-2

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence of approximately 95%.

- End of Certificate -



A TreScal company

METROLOGY SYSTEM (THAILAND) CO.,LTD.



Certificate of Calibration

Certificate Number : SPR25110156-3

Page : 1 of 3

Customer : Envilab Co., Ltd.

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

Equipment Name : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial Number : PN1821

ID. Number : NSMPUMD44N1821

Environmental Conditions

Ambient Temperature : 23 °C \pm 3 °C

Received Date : 11 Nov 2025

Relative Humidity : 50 % \pm 15 %

Calibration Date : 22 Nov 2025

Location of Calibration : In-Lab

Recommend Due Date : 22 Nov 2026

Calibration Procedure : SP-CPE-04-01

Date of Issue : 23 Nov 2025

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Karoon Pengsalung

Calibration Officer





Calibration Report

Certificate Number : SPR25110156-3

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP.22/0268	20 Feb 2026

Traceability

This certification is traceable to the International System of Unit maintained at :

TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate Number : SPR25110156-3

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.8	93.8	-0.2	-0.2	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence of 95%.

- End of Certificate -





Certificate of Calibration

Certificate Number : SPR25050328-3

Page : 1 of 3

Customer : Envilab Co., Ltd.

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

Equipment Name : Sound Level Meter

Manufacturer : Pulsar

Model : 44

Serial Number : PN1842

ID. Number : NSMPUMD44N1842

Environmental Conditions

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

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

Location of Calibration : In-Lab

Calibration Procedure : SP-CPE-04-01

Received Date : 20 May 2025

Calibration Date : 24 May 2025

Recommend Due Date : 24 May 2026

Date of Issue : 25 May 2025

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Nanthawat Wanasit

Calibration Officer





Calibration Report

Certificate Number : SPR25050328-3

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP.22/0268	20 Feb 2026

Traceability

This certification is traceable to the International System of Unit maintained at :
TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate Number : SPR25050328-3

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty standard uncertainty with the coverage factor $k = 2.00$, providing a level

- End of Certificate -





SCIMET Co., Ltd.
818/124 Udomsuk Rd., Bangna-Nuea,
Bangna, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
https://www.scimet.co.th



Certificate No. C08250053

Calibration Certificate

Equipment:	pH METER	Job No.:	KSMT2501044
Model:	F-74BW	Received Date:	19 March 2025
Serial No.(or ID):	B41J0001 (ELABPHHB74BW01)	Issued Date:	19 March 2025
Manufacturer:	HORIBA	Page:	1 of 3
Condition:	In Condition		

Customer

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

Calibration Place

Envilab Co., Ltd. (B300 CH1 ROOM)
540, 540/1 Soi Bangkhuae 7,Bangkhuae, Bangkhuae, Bangkok 10160

Calibration Date

19 March 2025

Environment Condition

Temperature: 26.1 °C ± 0.3 °C
Humidity: 50.2 %RH ± 1.1 %RH

The Method used

In-house method, WI08, based on ASTM E 70-07

Traceability

This certificate is traceable to SI Units, Sample Test is assured through primary measurement method Harned cell, through CPAchem Ltd. (ISO17034) Certificate No. 1066714, 1066714, 1066716, pH Scale and Temperature test are traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through Industrial Foundation Electrical and Electronics Institute Certificate No. CA20250010EA, through SCIMET Co., Ltd. Certificate No.C23240075

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

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

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



Condition of reference standards Instruments / CRM:

<u>Instruments</u>		<u>Model or S/N.</u>	<u>Certificate No.</u>	<u>Due date</u>
Standard Buffer solution	4.007 pH	PH216.L5	1066714	18-Jan-27
Standard Buffer solution	6.965 pH	PH107.L5	1066714	18-Jan-26
Standard Buffer solution	10.010 pH	PH220.L5	1066716	18-Jan-26
DC Voltage and Current Calibrator / XITRON		2000MN	CA20250010EA	19-Jan-26
Digital Thermometer		376	C23240075	30-Jul-25

Calibration Results:
pH Scale

Input	pH Meter Reading			Uncertainty of Measurement (mV)	Coverage Factor (<i>k</i>)
	(mV)	Error (mV)	(pH)		
414.12	414.2	0.08	0.000	0.065	2.00
354.96	355.0	0.04	1.000	0.065	2.00
295.80	295.8	0.00	2.000	0.065	2.00
236.64	236.7	0.06	3.000	0.065	2.00
177.48	177.5	0.02	4.000	0.065	2.00
118.32	118.4	0.08	5.000	0.065	2.00
59.16	59.2	0.04	6.000	0.065	2.00
0.00	0.0	0.00	7.000	0.065	2.00
-59.16	-59.1	0.06	8.000	0.065	2.00
-118.32	-118.2	0.12	9.000	0.065	2.00
-177.48	-177.4	0.08	10.000	0.065	2.00
-236.64	-236.6	0.04	11.000	0.065	2.00
-295.80	-295.7	0.10	12.000	0.065	2.00
-354.96	-354.9	0.06	13.000	0.065	2.00
-414.12	-414.0	0.12	14.000	0.065	2.00

Electrode Test Results*

The three-point calibration using three standard buffer solutions; pH 4.007 , pH 6.965 and pH 10.010

The practical slope of the pH electrode; 58.31 (mV/pH), 98.57%

The zero point of the pH electrode; 6.58 (pH)

Sample Test Results

Electrode Serial No.: 9X1K0003

Model: 9615S

Manufacturer: HORIBA

Standard Buffer Solution (pH)	Unit Under Calibration (pH)	Difference (pH)	Uncertainty of Measurement (pH)	Coverage Factor (<i>k</i>)
4.007	3.995	-0.012	0.011	2.43
6.965	6.970	0.005	0.011	2.07
10.010	10.019	0.009	0.0089	2.06

Temperature Electrode

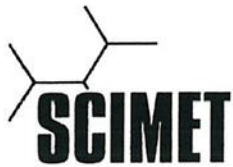
Dimension of Probe;

Length : 100 mm
Diameter : 12 mm
Immersion Depth : 80 mm

STD. Reading (°C)	UUC. Reading (°C)	Correction of UUC (°C)	Uncertainty of Measurement (±°C)	Coverage Factor (<i>k</i>)
25.03	25.0	0.03	0.20	2.00

* Calibration Marked for Electrode Test" Not TISI Accredited " in this Certificate have been included for completeness.

The End of Certificate



ใบตรวจสอบสภาพเครื่อง pH Meter

เลขที่ใบงาน: KSMT2501044

ชนิดเครื่องมือ: pH METER

รุ่น: F-74BW

หมายเลขเครื่อง: B41J0001

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
19 Mar 2025			19 Mar 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Swicth)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. อิเล็กโทรด (Electrode and Connection Cable)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สายอิเล็กโทรด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	8. ระดับสารละลายใน Electrode (Level KCl)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. ขาจับอิเล็กโทรด (Stand)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

เพิ่มเติม/ข้อแนะนำ :

Mr. Dumrong Boonsopon
Service Engineer



SCIMET Co., Ltd.
818/124 Udomsuk Rd., Rangna-Nuea,
Bangna, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
<https://www.scimet.co.th>



Certificate No. C17250552

Calibration Certificate

Equipment:	Cooled Incubator	Job No.:	KSMT2503905
Model:	BIC-140	Received Date:	06 October 2025
Serial No.(or ID):	100613-1 (ELABBODC140N01)	Issued Date:	09 October 2025
Manufacturer:	M-LAB	Page:	1 of 3
Ventilation Valve:	None		
Shelves(pc.):	5		

Customer

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

Calibration Place

Envilab Co., Ltd. (B300 CH1 ROOM)
540, 540/1 Soi Bangkhuae 7, Bangkhuae, Bangkhuae, Bangkok 10160

Calibration Date

06 October 2025

Environment Condition

Temperature: 21.0 °C \pm 1.3 °C
Humidity: 53.6 %RH \pm 3.8 %RH

The Method used

In-house method, WI17, based on G-20-1/02-08 (E)

Traceability

This certificate is traceable to the SI Units maintained by
National Institute of Metrology (NIMT), Thailand through
SCIMET Co.,Ltd. Certificate No. C23250017

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

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

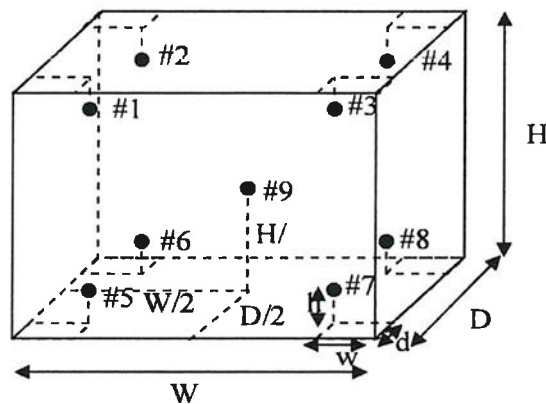
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SCIMET Co., Ltd.



Condition of reference standards instruments:

<u>Instruments</u>	<u>Model</u>	<u>S/N or ID.</u>	<u>Certificate No.</u>	<u>Due Date</u>
Datalogger 3	34970A	MY44075238	C23250017	28-Jan-2026

Condition of Calibration Item : In Condition



Standard Installation Locations

Volume (Calibration Zone)= 57 (Liters)

Inside chamber: $W = 38$ (cm) $D = 32$ (cm) $H = 114$ (cm)

Standard Locations (#1, #2, #3, #4): $w = 5$ (cm) $d = 5$ (cm) $h = 11$ (cm)

Standard Locations (#5, #6, #7, #8): $w = 5$ (cm) $d = 5$ (cm) $h = 11$ (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	201	202	203	204	205	206	207	208	209

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation: The difference of maximum and minimum measured temperature

Calibration Results:

Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 20.1 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	20.30	0.30	0.58
#2	20.40	0.40	0.59
#3	20.53	0.53	0.58
#4	19.55	-0.45	0.57
#5	20.09	0.09	0.66
#6	20.11	0.11	0.77
#7	20.12	0.12	0.64
#8	20.03	0.03	0.72
#9	20.11	0.11	0.63

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
20.0	20.0	20.1	20.30	20.40	20.53	19.55	20.09	20.11	20.12	20.03	20.11	0.77

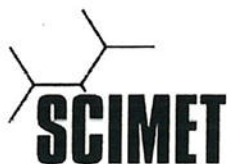
Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
20.1	0.70	0.50	1.57

Note: * Maximum uncertainty of the each position

The End of Certificate





Refer to Certificate No.: C17250552

Page: 1 of 1

Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, G20-1/02-08(E). Therefore, those parameters have not

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

- Decision rule :** ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk $< 50\%$ PFA.
- ☒ Choice B Non-binary statement with guard band ($w = 1 U$), Pass or Fail Specific Risk $< 2.5\%$ PFA and Condition Pass or Condition Fail Specific Risk $< 50\%$ PFA.
- ☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r U$).
- ; PFA: Probability of False Accept



Without adjustment

Desired Temperature : 20.0°C

Tolerances : 1.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 20.1 °C

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	20.30	0.30	0.58	1.0	Pass
#2	20.40	0.40	0.59	1.0	Pass
#3	20.53	0.53	0.58	1.0	Condition Pass
#4	19.55	-0.45	0.57	1.0	Condition Pass
#5	20.09	0.09	0.66	1.0	Pass
#6	20.11	0.11	0.77	1.0	Pass
#7	20.12	0.12	0.64	1.0	Pass
#8	20.03	0.03	0.72	1.0	Pass
#9	20.11	0.11	0.63	1.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

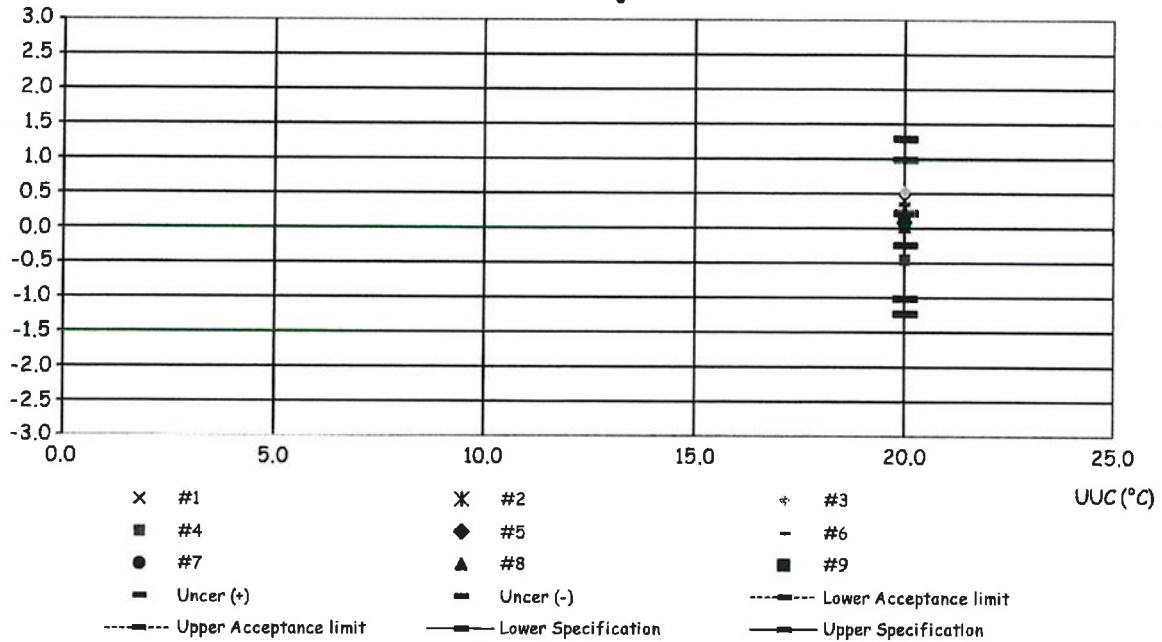
The End of Statements of Conform**บริษัท ขายน้ําท่ จำกัด (SCIMET CO., LTD.)**818/124 Udomsuk rd., Bangna-Nuea, Bangna, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

Corr_Distribution & Max_Measurement Uncertainty

Job_No. KSMT2503905

Without adjustment

Correction (°C)

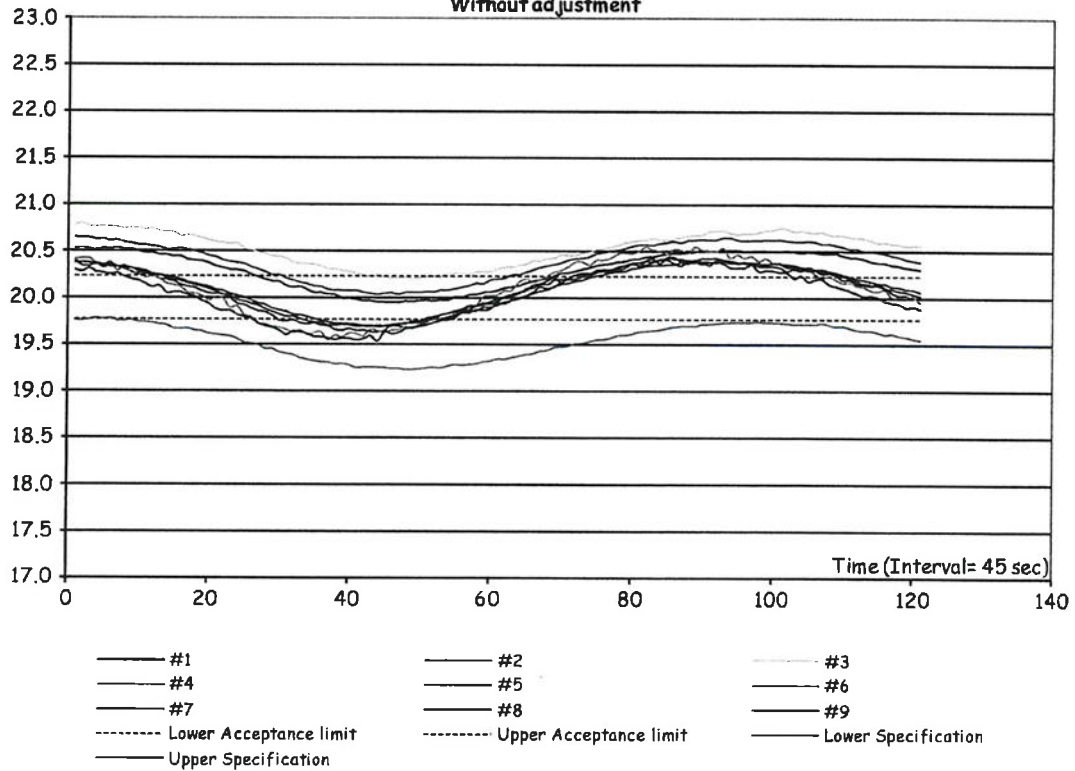


Temperature Distribution @ 20.0°C

Job_No. KSMT2503905

Without adjustment

Std(°C)





ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: KSMT2503905

ชนิดเครื่องมือ: Cooled Incubator

รุ่น: BIC-140

หมายเลขเครื่อง: 100613-1 (ELABBODC140N01)

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
06 Oct 2025			06 Oct 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน พัดลม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. สภาพ Lever of Ventilation valve	<input type="checkbox"/>	<input type="checkbox"/>	-
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาพ Door seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของระบบทำความร้อน	<input type="checkbox"/>	<input type="checkbox"/>	-
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	13. สภาพแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ :

Mr. Mongkolwat Hasanon

Service Engineer

บริษัท ชายนีเมก จำกัด (SCIMET CO., LTD.)

818/124 Udomsuk rd., Bangna-Nuea, Bangna, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239



Envilab Co., Ltd. ผู้จัดการฝ่ายควบคุมคุณภาพ



SCIMET Co., Ltd.
818/124 Udomsuk Rd., Bangna-Nuea,
Bangna, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
https://www.scimet.co.th



Certificate No. C17250395

Calibration Certificate

Equipment:	Hot Air Oven	Job No.:	KSMT2502802
Model:	UF55	Received Date:	07 July 2025
Serial No.(or ID):	B215.1147 (ELABHAOVEN1147)	Issued Date:	10 July 2025
Manufacturer:	Memmert	Page:	1 of 5
Ventilation Valve:	Closed		
Shelves(pc.):	2		

Customer

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

Calibration Place

Envilab Co., Ltd. (B306 CH2 ROOM)
540, 540/1 Soi Bangkhuae 7, Bangkhuae, Bangkhuae, Bangkok 10160

Calibration Date

07 July 2025

Environment Condition

Temperature: 31.1 °C ± 1.1 °C
Humidity: 59.3 %RH ± 5.0 %RH

The Method used

In-house method, WI17, based on G-20-1/02-08 (E)

Traceability

This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through SCIMET Co.,Ltd. Certificate No. C23250016

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

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

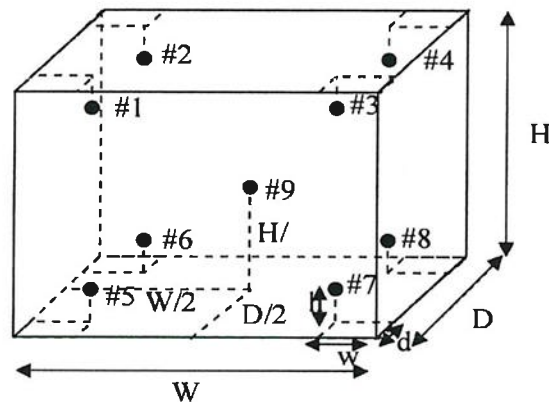
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SCIMET Co., Ltd.



Condition of reference standards Instruments:

<u>Instruments</u>	<u>Model</u>	<u>S/N or ID.</u>	<u>Certificate No.</u>	<u>Due Date</u>
Datalogger 1	34972A	MY59003249	C23250016	30-Jan-2026

Condition of Calibration item : In Condition



Standard Installation Locations

Volume (Calibration Zone)= 16 (Liters)

Inside chamber: $W = 40 \text{ (cm)}$ $D = 33 \text{ (cm)}$ $H = 40 \text{ (cm)}$

Standard Locations (#1, #2, #3, #4): $w = 6 \text{ (cm)}$ $d = 6 \text{ (cm)}$ $h = 6 \text{ (cm)}$

Standard Locations (#5, #6, #7, #8): $w = 6 \text{ (cm)}$ $d = 6 \text{ (cm)}$ $h = 6 \text{ (cm)}$

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	101	102	103	104	105	106	107	108	109

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation: The difference of maximum and minimum measured temperatures throughout observation time.

Calibration Results:

Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	104.09	0.09	0.39
#2	104.22	0.22	0.39
#3	104.02	0.02	0.39
#4	103.80	-0.20	0.39
#5	104.22	0.22	0.39
#6	104.19	0.19	0.39
#7	103.87	-0.13	0.39
#8	103.51	-0.49	0.39
#9	104.17	0.17	0.39

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
104.0	104.0	104.0	104.09	104.22	104.02	103.80	104.22	104.19	103.87	103.51	104.17	0.39

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
104.0	0.71	0.09	0.82

Note: * Maximum uncertainty of the each position

Without adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 110.0 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	110.13	0.13	0.39
#2	110.29	0.29	0.39
#3	110.06	0.06	0.39
#4	109.81	-0.19	0.39
#5	110.29	0.29	0.39
#6	110.26	0.26	0.39
#7	109.91	-0.09	0.39
#8	109.50	-0.50	0.39
#9	110.23	0.23	0.39

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
110.0	110.0	110.0	110.13	110.29	110.06	109.81	110.29	110.26	109.91	109.50	110.23	0.39

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
110.0	0.79	0.11	0.89

Note: * Maximum uncertainty of the each position

Without adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 180.0 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	180.18	0.18	0.46
#2	180.47	0.47	0.46
#3	180.00	0.00	0.46
#4	179.38	-0.62	0.47
#5	180.64	0.64	0.46
#6	180.60	0.60	0.47
#7	180.31	0.31	0.58
#8	179.09	-0.91	0.48
#9	180.52	0.52	0.46

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
180.0	180.0	180.0	180.18	180.47	180.00	179.38	180.64	180.60	180.31	179.09	180.52	0.58

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
180.0	1.52	0.30	1.77

Note: * Maximum uncertainty of the each position

The End of Certificate



Refer to Certificate No.: C17250395

Page: 1 of 2

Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, G20-1/02-08(E). Therefore, those parameters have not

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

- Decision rule :**
- ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk < 50% PFA.
 - ☒ Choice B Non-binary statement with guard band ($w = 1 U$), Pass or Fail Specific Risk < 2.5% PFA and Condition Pass or Condition Fail Specific Risk < 50% PFA.
 - ☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r U$) .
; PFA: Probability of False Accept



Without adjustment

Desired Temperature : 104.0°C

Tolerances : 1.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	104.09	0.09	0.39	1.0	Pass
#2	104.22	0.22	0.39	1.0	Pass
#3	104.02	0.02	0.39	1.0	Pass
#4	103.80	-0.20	0.39	1.0	Pass
#5	104.22	0.22	0.39	1.0	Pass
#6	104.19	0.19	0.39	1.0	Pass
#7	103.87	-0.13	0.39	1.0	Pass
#8	103.51	-0.49	0.39	1.0	Pass
#9	104.17	0.17	0.39	1.0	Pass

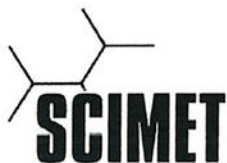
Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

บริษัท ขายน้แม่จํากัด (SCIMET CO., LTD.)

818/124 Udomsuk rd., Bangna-Nuea, Bangna, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239





Refer to Certificate No.: C17250395

Page: 2 of 2

Statements of conformity:(Cont.)**Without adjustment (Cont.)****Desired Temperature : 110.0°C****Tolerances : 1.0 °C****Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 110.0 °C**

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	110.13	0.13	0.39	1.0	Pass
#2	110.29	0.29	0.39	1.0	Pass
#3	110.06	0.06	0.39	1.0	Pass
#4	109.81	-0.19	0.39	1.0	Pass
#5	110.29	0.29	0.39	1.0	Pass
#6	110.26	0.26	0.39	1.0	Pass
#7	109.91	-0.09	0.39	1.0	Pass
#8	109.50	-0.50	0.39	1.0	Pass
#9	110.23	0.23	0.39	1.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

Without adjustment**Desired Temperature : 180.0°C****Tolerances : 2.0 °C****Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 180.0 °C**

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	180.18	0.18	0.46	2.0	Pass
#2	180.47	0.47	0.46	2.0	Pass
#3	180.00	0.00	0.46	2.0	Pass
#4	179.38	-0.62	0.47	2.0	Pass
#5	180.64	0.64	0.46	2.0	Pass
#6	180.60	0.60	0.47	2.0	Pass
#7	180.31	0.31	0.58	2.0	Pass
#8	179.09	-0.91	0.48	2.0	Pass
#9	180.52	0.52	0.46	2.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

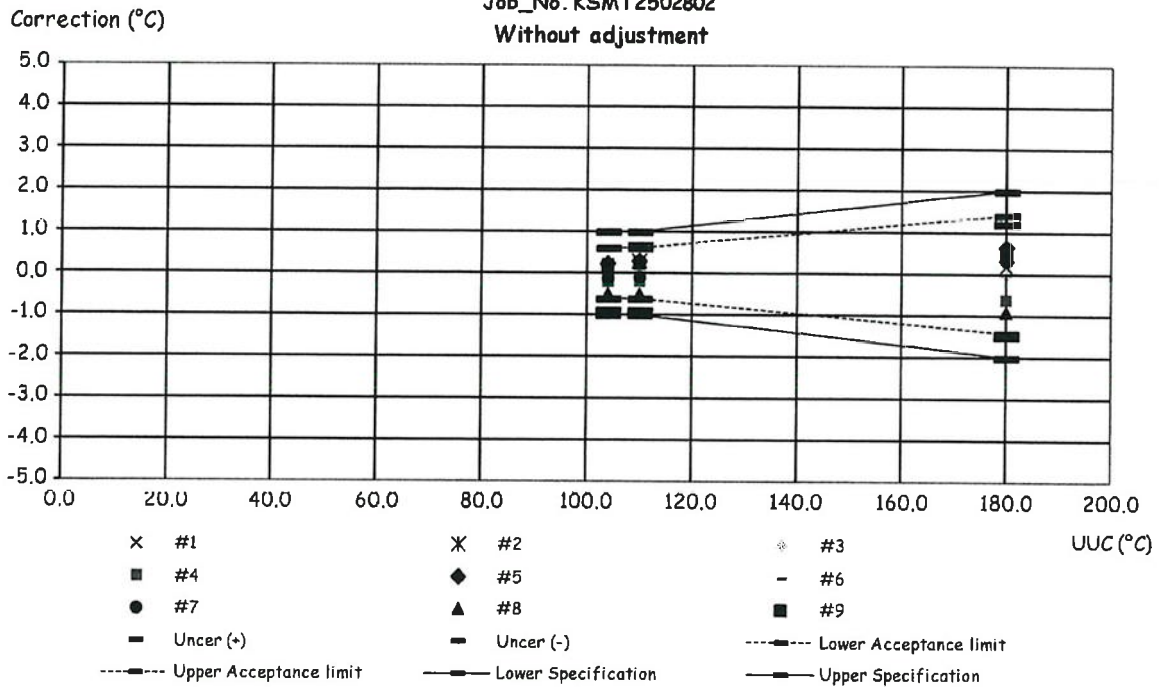
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity**บริษัท ชัยนิเมท จำกัด (SCIMET CO., LTD.)**818/124 Udomsuk rd., Bangna-Nuea, Bangna, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

Corr_Distribution & Max_Measurement Uncertainty

Job_No. KSMT2502802

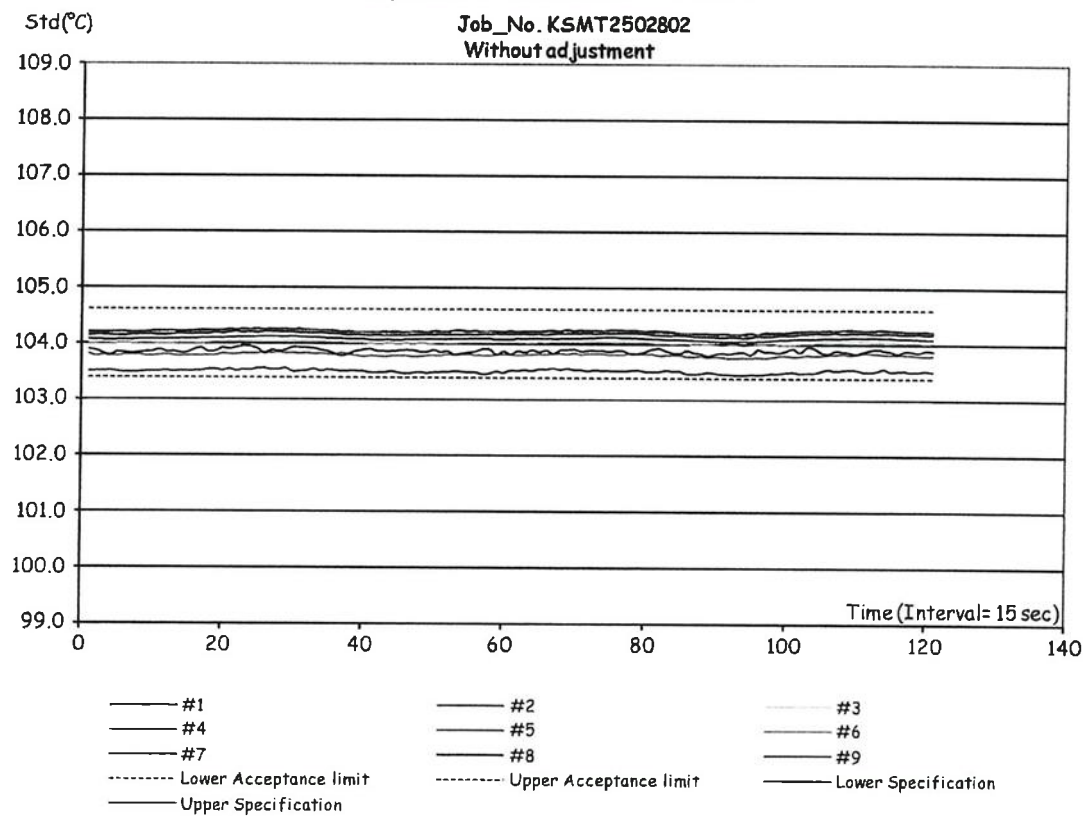
Without adjustment

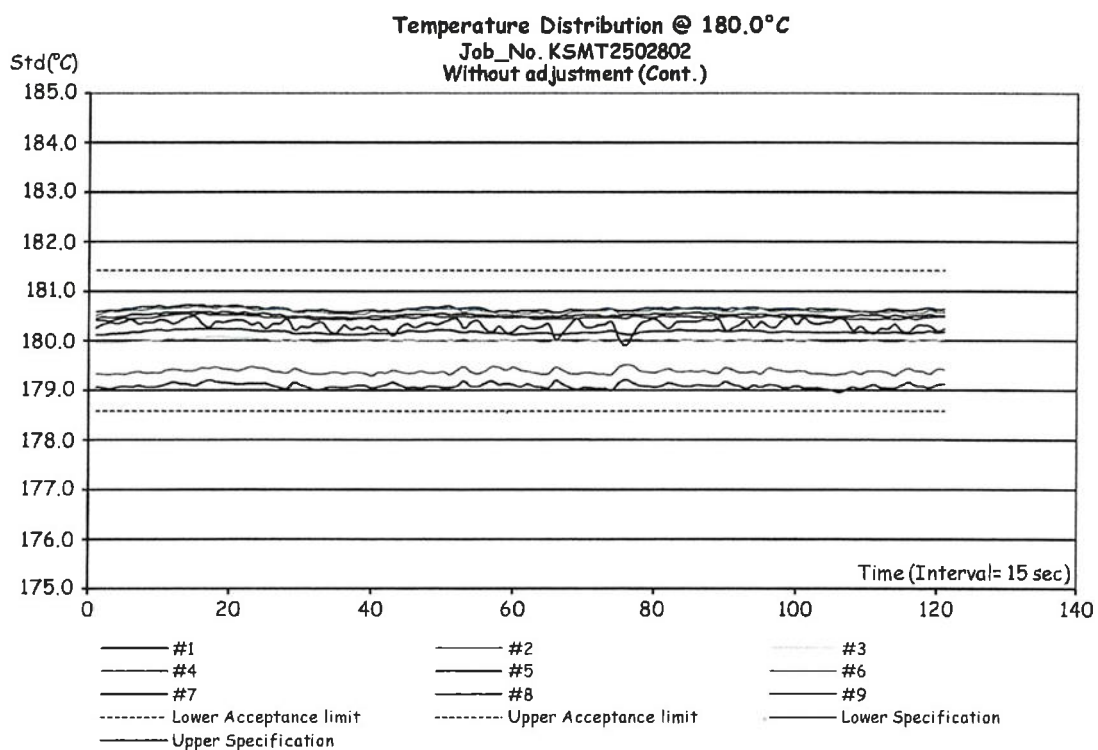
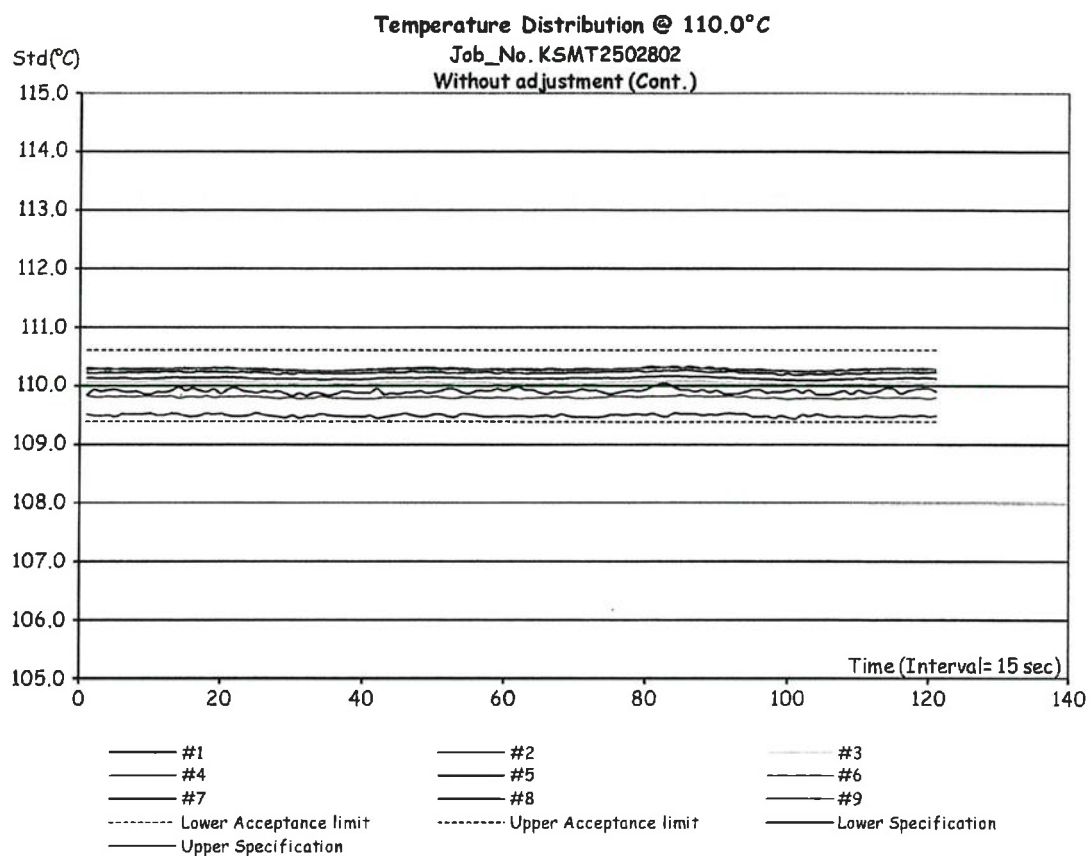


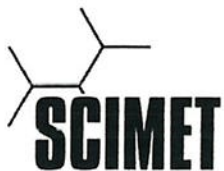
Temperature Distribution @ 104.0°C

Job_No. KSMT2502802

Without adjustment







ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: KSMT2502802

ชนิดเครื่องมือ: Hot Air Oven

รุ่น: UF55

หมายเลขเครื่อง: B215.1147 (ELABHAOVEN1147)

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
07 Jul 2025			07 Jul 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน พัดลม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	100%
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. สภาพ Lever of Ventilation valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาพ Door seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input type="checkbox"/>	<input type="checkbox"/>	-
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของระบบทำความร้อน	<input type="checkbox"/>	<input type="checkbox"/>	-
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	13. สภาพแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ :

Mr. Mongkolwat Hasanon

Service Engineer

บริษัท ชายนัมเมก จำกัด (SCIMET CO., LTD.)

818/124 Udomsuk rd., Bangna-Nuea, Bangna, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239



CAL

Calibratech Co.,Ltd.

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

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



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-300233-5

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Measuring Pipette

Manufacturer : witeg

Class : A

Capacity : 25 ml

Graduation : 0.1 ml

ID No. : G-WW-014/23

Environment : Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1008.0 mbar.

Date of Received : 14 March 2025

Date of Calibration : 18 March 2025

Date of Issue : 18 March 2025

Calibrated by : Areerat Sornbun

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

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

Electronic Balance

ID No.

Cert. No.

Due Date

Traceability

241005

67-200410-4

02 Jun 2025

National Institute of Metrology (Thailand) (NIMT)

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

CAL

Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 68-300233-5

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

Delivery Time : 15.09 sec.

Nominal Volume (ml)	Measuring Volume (ml)
1	1.0096
10	9.9778
25	24.9769

Uncertainty of measurement with in \pm 0.0067 ml

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

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

- o0o -

CAL

Calibratech Co.,Ltd.

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

Tel.(02) 964-6211 Fax.(02) 964-5153, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-300237-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Cylinder

Manufacturer : BOROSIL

Class : A

Capacity : 50 ml

Graduation : 1 ml

ID No. : C-WW-004/24

Environment : Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1015.8 mbar.

Date of Received : 14 March 2025

Date of Calibration : 18 March 2025

Date of Issue : 18 March 2025

Calibrated by : Areerat Sombun

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

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

Electronic Balance

ID No.

Cert. No.

Due Date

Traceability

241002

67-200410-1

02 Jun 2025

National Institute of Metrology (Thailand) (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 68-300237-2

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	30.07
50	50.08

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%

- oOo -

CAL

Calibratech Co.,Ltd.

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

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



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-300237-5

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

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

Equipment : Cylinder

Manufacturer : PYREX

Class : A

Capacity : 500 ml

Graduation : 5 ml

ID No. : C-WW-005/21

Environment : Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1015.9 mbar.

Date of Received : 14 March 2025

Date of Calibration : 18 March 2025

Date of Issue : 18 March 2025

Calibrated by : Areerat Sombun

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

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

Electronic Balance

ID No.

Cert. No.

Due Date

Traceability

241002

67-200410-1

02 Jun 2025

National Institute of Metrology (Thailand) (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-300237-5

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)
250	250.80
500	500.66

Uncertainty of measurement with in \pm 0.12 ml

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

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

- o0o -

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

Certificate of Calibration

Certificate No. : 68-400323-1

Page : 1 of 2

Submitted by : Envilab Co., Ltd.

540,540/1 Soi Bangkhae7, Bangkhae, Bangkok 10160

Equipment : COD Reactor

Manufacturer : Hanna

Model : HI839800

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 06480040101

ID No. : ELABHI83980001

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

Relative Humidity : (50 ± 15) %

Date of Received : 28 May 2025

Date of Calibration : 31 May 2025

Date of Issue : 31 May 2025

Calibrated by : Sarawut Sangiamging

Calibration Method : This instrument was calibrated by In-house method direct measurement with Standard Digital Thermometer with TC Type T probe

The temperature scale used was based on ITS-90

Reference Standard Instruments :

Standard Digital Thermometer with TC Probe

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400046 & 400023	68-400148-1	02 Oct 2025	National Institute of Metrology Thailand (NIMT)
400046 & 400028	68-400148-3	01 Oct 2025	National Institute of Metrology Thailand (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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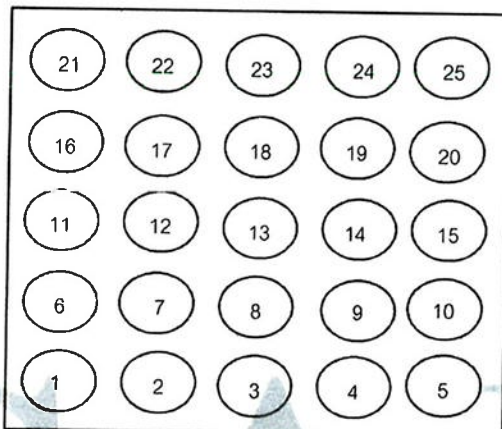
Certificate of Calibration

Certificate No. : 68-400323-1

Page : 2 of 2

Result of Calibration : Without Adjustment

Function : Temperature measurement



Controller

Test Point (° C)	UUC Setting (° C)	UUC Reading (° C)	Standard Reading at Position (° C)									
			1	2	3	4	5	6	7	8	9	10
150.0	150.0	150.0	149.0	149.2	149.4	149.6	148.6	149.0	150.3	149.7	149.6	149.8

Test Point (° C)	UUC Setting (° C)	UUC Reading (° C)	Standard Reading at Position (° C)									
			11	12	13	14	15	16	17	18	19	20
150.0	150.0	150.0	149.4	149.5	150.2	150.0	149.1	149.1	150.0	150.1	150.1	148.7

Test Point (° C)	UUC Setting (° C)	UUC Reading (° C)	Standard Reading at Position (° C)					Uncertainty (± ° C)
			21	22	23	24	25	
150.0	150.0	150.0	148.6	148.7	149.6	148.9	148.6	0.79

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

- o0o -



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

214 Bangwaek Rd. Bangpai Bangkae Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Page 1 of 2

Certificate No. : S2025040468-0002

Date Issued : 25-Apr-25

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

Equipment : Lab Refrigerator (TMF-PLR221)

Manufacturer : Thermo Scientific

Model : PLR221

Serial No. : 2210M319042801

ID No./Tag No. : ELABREFRIGEN02

Date Received : 24-Apr-25

Date Calibrated : 24-Apr-25

Calibrated by : Chanon Konyawong

Calibration Method or Calibration Procedure Used

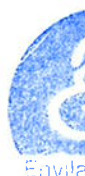
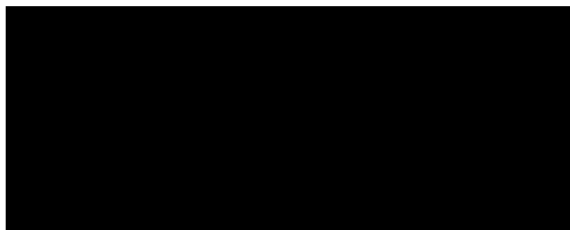
Standard method : CP-05 TLAS G-20.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

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Certificate No. : S2025040468-0002

Environment : Ambient Temperature : Start record 25.4 °C, Stop record 25.7 °C
Relative Humidity : Start record 50.5 %RH, Stop record 50.4 %RH

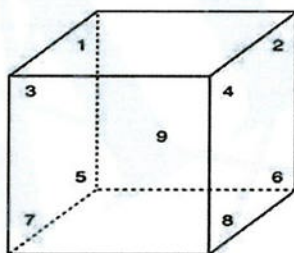
Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
4	4	4	1.29	0.55	2.68

Without adjustment

Calibration Temperature (°C)	STD No. 1 (°C)	STD No. 2 (°C)	STD No. 3 (°C)	STD No. 4 (°C)	STD No. 5 (°C)	STD No. 6 (°C)	STD No. 7 (°C)	STD No. 8 (°C)	STD No. 9 (°C)	Uncertainty ⁴ (±°C)
4	4.29	4.11	4.12	4.05	4.32	4.38	4.05	4.07	4.00	1.6

Note : Probe No. 9 is Reference Probe

Setting Air Fresh No. -



Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202412300-0027 for Temperature Indicator with Sensor Serial No. US37020317, Due 09-Sep-25

Notes : 1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.

2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.

3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.

4. The uncertainty of measurement is included temperature stability.

5. The temperature uniformity, stability, overall variation and indicating temperature is applicable to all air or gas filled temperature controlled enclosures at atmospheric pressure.

End of Certificate



CAL

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



Certificate of Calibration

Certificate No. : 68-200034-1

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 : (20.4 to 21.0) °C
Relative Humidity : (41.9 to 42.9) %
Air Pressure : 1014.0 mbar

Date of Received : 28 January 2025

Date of Calibration : 28 January 2025

Date of Issue : 30 January 2025

Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 7 - November 2022

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

Standard Weights

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
E261-E2624	C02242009	07 Nov 2025	National Institute of Metrology (Thailand), (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-200034-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.01	0.0000	0.00012
0.1	0.0001	0.00012
1	0.0000	0.00013
2	0.0001	0.00013
5	0.0000	0.00013
10	0.0000	0.00013
20	-0.0001	0.00014
50	-0.0001	0.00015
100	-0.0001	0.00020
200	-0.0001	0.00038

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

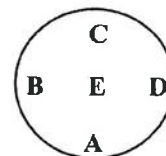
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.06$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

A B C D E

0.0004 0.0004 0.0005 0.0004 0.0000 g



Repeatability

Load test : 200 g

Stdev. : 0.00005 g

- o0o -

CAL

Calibratech Co.,Ltd.

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

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



Certificate of Calibration

Certificate No. : 68-200066-2

Page : 1 of 2

Submitted by : Envilab Co., Ltd.
540, 540/1 Soi Bangkhuae7, Bangkhuae, Bangkok 10160

Equipment : Electronic Balance
Manufacturer : METTLER TOLEDO Model : XSR205DU
Serial No. : B911363567 ID No. : ELABBALANCEN06
Capacity : 220 g Resolution : 0.00001g/81g, 0.0001g/220g

Environment : On site calibration was carried out at the B304 Balance Room, Envilab Co., Ltd.
Ambient Temperature : (21.2 to 21.5) °C
Relative Humidity : (51.4 to 56.2) %
Air Pressure : 1011.0 mbar

Date of Received : 17 February 2025

Date of Calibration : 17 February 2025

Date of Issue : 19 February 2025

Calibrated by : Satja Sangkhum

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 7 - November 2022

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

Standard Weights

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
E261-E2624	C02242009	07 Nov 2025	National Institute of Metrology (Thailand), (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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

Certificate of Calibration

Certificate No. : 68-200066-2

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)
0.1	0.00000	0.000016
0.5	0.00000	0.000022
1	0.00000	0.000026
2	-0.00001	0.000034
5	-0.00001	0.000043
10	0.00000	0.000053
50	-0.00002	0.00011
100	0.0000	0.00020
150	0.0000	0.00038
200	0.0000	0.00038

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

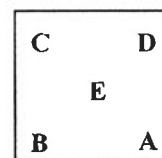
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

A	B	C	D	E
-0.00001	-0.00001	0.00003	0.00003	0.00000

g

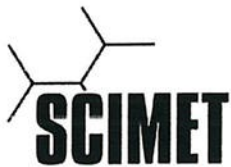


Repeatability

Load test : 200 g

Stdev. : 0.000032 g

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SCIMET Co., Ltd.
818/124 Udomsuk Rd., Bangna-Nuea,
Bangna, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
<https://www.scimet.co.th>



Certificate No. C17250533

Calibration Certificate

Equipment:

Oven
Model: ED53
Serial No.(or ID): 13-02277 (ELABHAOVEN2277)
Manufacturer: BINDER
Ventilation Valve: Closed
Shelves(pc.): 2

Job No.: KSMT2503907
Received Date: 24 September 2025
Issued Date: 28 September 2025
Page: 1 of 5

Customer

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

Calibration Place

Envilab Co., Ltd. (B306 CH2 ROOM)
540, 540/1 Soi Bangkhuae 7, Bangkhuae, Bangkhuae, Bangkok 10160

Calibration Date

24 September 2025

Environment Condition

Temperature: 31.7 °C ± 1.4 °C
Humidity: 66.4 %RH ± 5.5 %RH

The Method used

In-house method, WI17, based on G-20-1/02-08 (E)

Traceability

This certificate is traceable to the SI Units maintained by
National Institute of Metrology (NIMT), Thailand through
SCIMET Co.,Ltd. Certificate No. C23250017

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

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

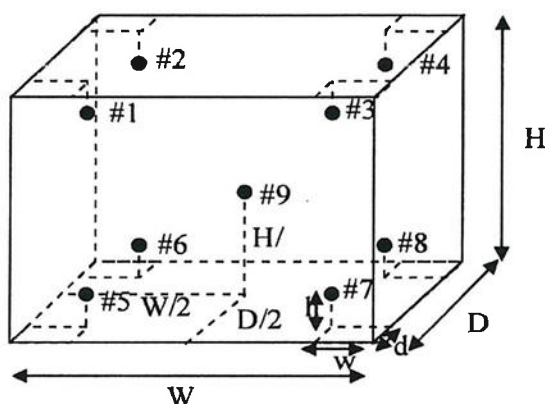
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SCIMET Co., Ltd.



Condition of reference standards instruments:

<u>Instruments</u>	<u>Model</u>	<u>S/N or ID.</u>	<u>Certificate No.</u>	<u>Due Date</u>
Datalogger 3	34970A	MY44075238	C23250017	28-Jan-2026

Condition of Calibration item : In Condition



Standard Installation Locations

Volume (Calibration Zone)= 21 (Liters)

Inside chamber: $W = 40$ (cm) $D = 33$ (cm) $H = 40$ (cm)

Standard Locations (#1, #2, #3, #4): $w = 5$ (cm) $d = 5$ (cm) $h = 5$ (cm)

Standard Locations (#5, #6, #7, #8): $w = 5$ (cm) $d = 5$ (cm) $h = 5$ (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	101	102	103	104	105	106	107	108	109

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation: The difference of maximum and minimum measured temperatures throughout observation time.

Calibration Results:

Before adjustment

Desired (°C)	Setting (°C)	Indicating (°C)	#1 (°C)	#2 (°C)	#3 (°C)	#4 (°C)	#5 (°C)	#6 (°C)	#7 (°C)	#8 (°C)	#9 (°C)
85.0	85.0	85.0	88.23	89.43	88.81	87.59	86.56	86.24	86.17	86.11	86.36

After adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 85.0 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	85.78	0.78	1.1
#2	88.39	3.39	1.1
#3	86.61	1.61	1.1
#4	85.58	0.58	1.1
#5	84.39	-0.61	1.1
#6	84.15	-0.85	1.1
#7	83.99	-1.01	1.1
#8	83.99	-1.01	1.1
#9	84.16	-0.84	1.1

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
85.0	85.0	85.0	85.78	88.39	86.61	85.58	84.39	84.15	83.99	83.99	84.16	1.1

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
85.0	4.50	0.21	4.68

Note: * Maximum uncertainty of the each position

After adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.5 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	104.15	0.15	1.2
#2	107.54	3.54	1.2
#3	105.15	1.15	1.2
#4	104.13	0.13	1.2
#5	103.02	-0.98	1.2
#6	102.63	-1.37	1.2
#7	102.48	-1.52	1.2
#8	102.44	-1.56	1.2
#9	102.69	-1.31	1.2

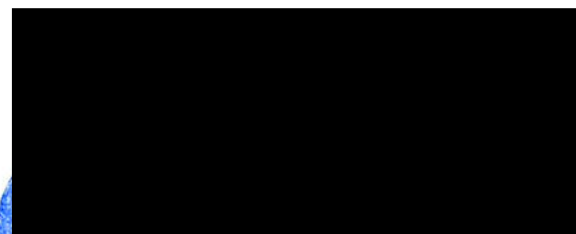
Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
104.0	104.5	104.5	104.15	107.54	105.15	104.13	103.02	102.63	102.48	102.44	102.69	1.2

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
104.5	4.99	0.16	5.27

Note: * Maximum uncertainty of the each position



After adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 181.5 °C

Locations	Measured Temperature (°C)	Correction (°C)	Uncertainty (± °C)
#1	180.06	0.06	1.3
#2	184.16	4.16	1.4
#3	181.54	1.54	1.3
#4	180.09	0.09	1.3
#5	179.50	-0.50	1.3
#6	180.39	0.39	1.5
#7	178.67	-1.33	1.3
#8	178.45	-1.55	1.3
#9	179.20	-0.80	1.3

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
180.0	181.5	181.5	180.06	184.16	181.54	180.09	179.50	180.39	178.67	178.45	179.20	1.5

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
181.5	5.46	0.68	6.45

Note: * Maximum uncertainty of the each position

The End of Certificate



Refer to Certificate No.: C17250533

Page: 1 of 2

Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, G20-1/02-08(E). Therefore, those parameters have not

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

Decision rule : ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk < 50% PFA.

☒ Choice B Non-binary statement with guard band ($w = 1$ U), Pass or Fail Specific Risk < 2.5% PFA and Condition Pass or Condition Fail Specific Risk < 50% PFA.

☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r$ U) .

; PFA: Probability of False Accept



After adjustment

Desired Temperature : 85.0°C

Tolerances : 3.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 85.0 °C

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	85.78	0.78	1.1	3.0	Pass
#2	88.39	3.39	1.1	3.0	Condition Fail
#3	86.61	1.61	1.1	3.0	Pass
#4	85.58	0.58	1.1	3.0	Pass
#5	84.39	-0.61	1.1	3.0	Pass
#6	84.15	-0.85	1.1	3.0	Pass
#7	83.99	-1.01	1.1	3.0	Pass
#8	83.99	-1.01	1.1	3.0	Pass
#9	84.16	-0.84	1.1	3.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

บริษัท ขายน้ําแข็ง (SCIMET CO., LTD.)

818/124 Udomsuk rd., Bangna-Nuea, Bangna, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

Statements of conformity:(Cont.)

After adjustment (Cont.)

Desired Temperature : 104.0°C

Tolerances : 3.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.5 °C

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	104.15	0.15	1.2	3.0	Pass
#2	107.54	3.54	1.2	3.0	Condition Fail
#3	105.15	1.15	1.2	3.0	Pass
#4	104.13	0.13	1.2	3.0	Pass
#5	103.02	-0.98	1.2	3.0	Pass
#6	102.63	-1.37	1.2	3.0	Pass
#7	102.48	-1.52	1.2	3.0	Pass
#8	102.44	-1.56	1.2	3.0	Pass
#9	102.69	-1.31	1.2	3.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

After adjustment (Cont.)

Desired Temperature : 180.0°C

Tolerances : 3.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 181.5 °C

Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	180.06	0.06	1.3	3.0	Pass
#2	184.16	4.16	1.4	3.0	Condition Fail
#3	181.54	1.54	1.3	3.0	Pass
#4	180.09	0.09	1.3	3.0	Pass
#5	179.50	-0.50	1.3	3.0	Pass
#6	180.39	0.39	1.5	3.0	Pass
#7	178.67	-1.33	1.3	3.0	Pass
#8	178.45	-1.55	1.3	3.0	Pass
#9	179.20	-0.80	1.3	3.0	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

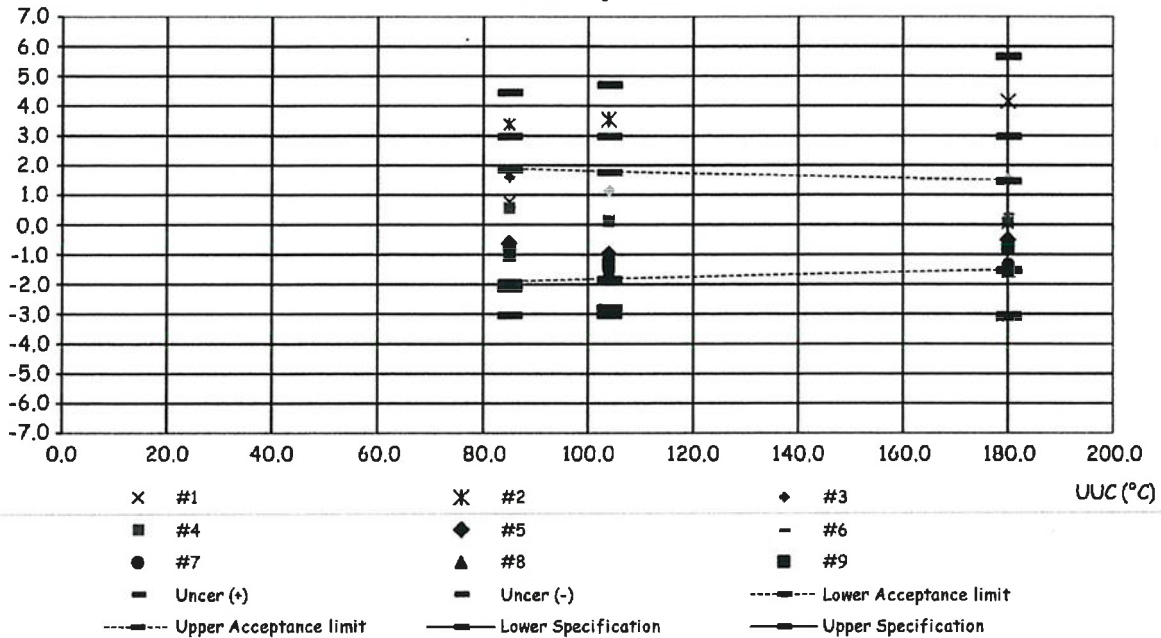
The End of Statements of Conformity

Corr_Distribution & Max_Measurement Uncertainty

Job_No. KSMT2503907

After adjustment

Correction (°C)

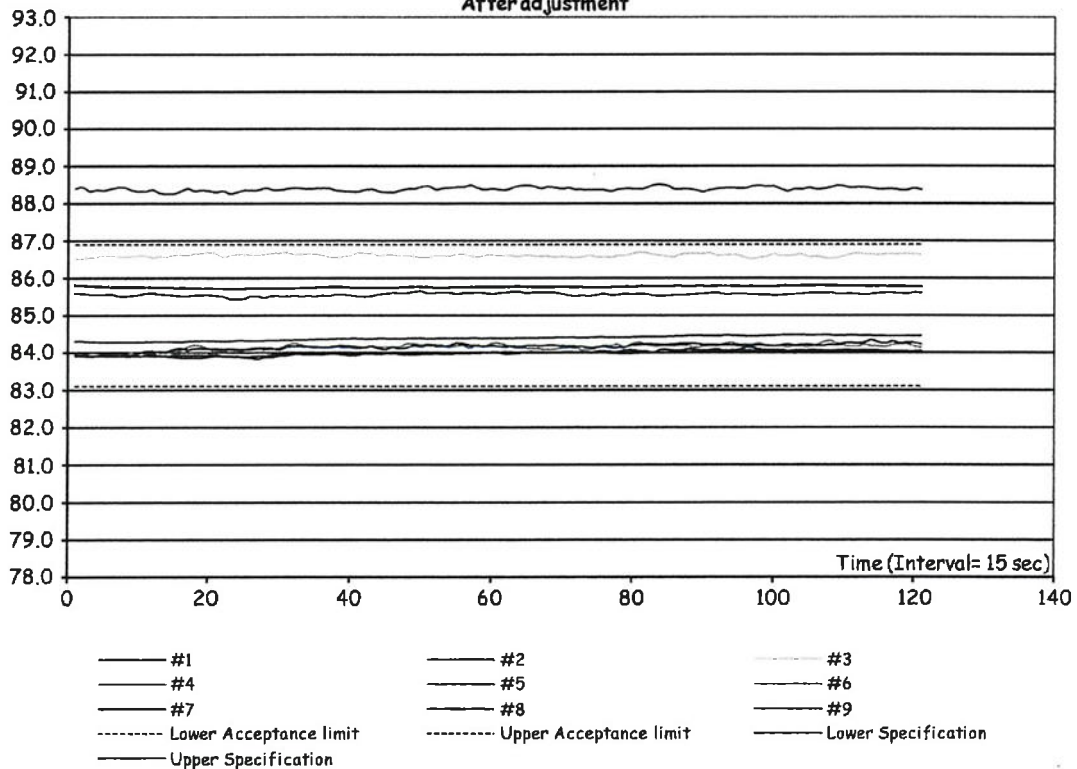


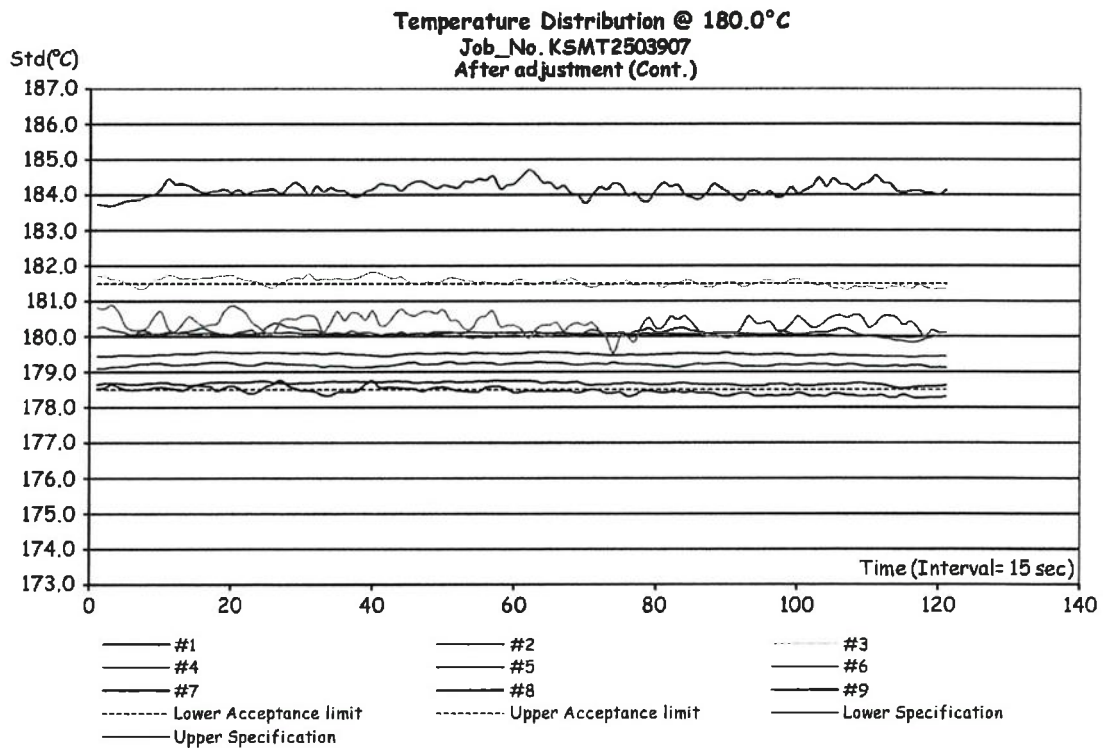
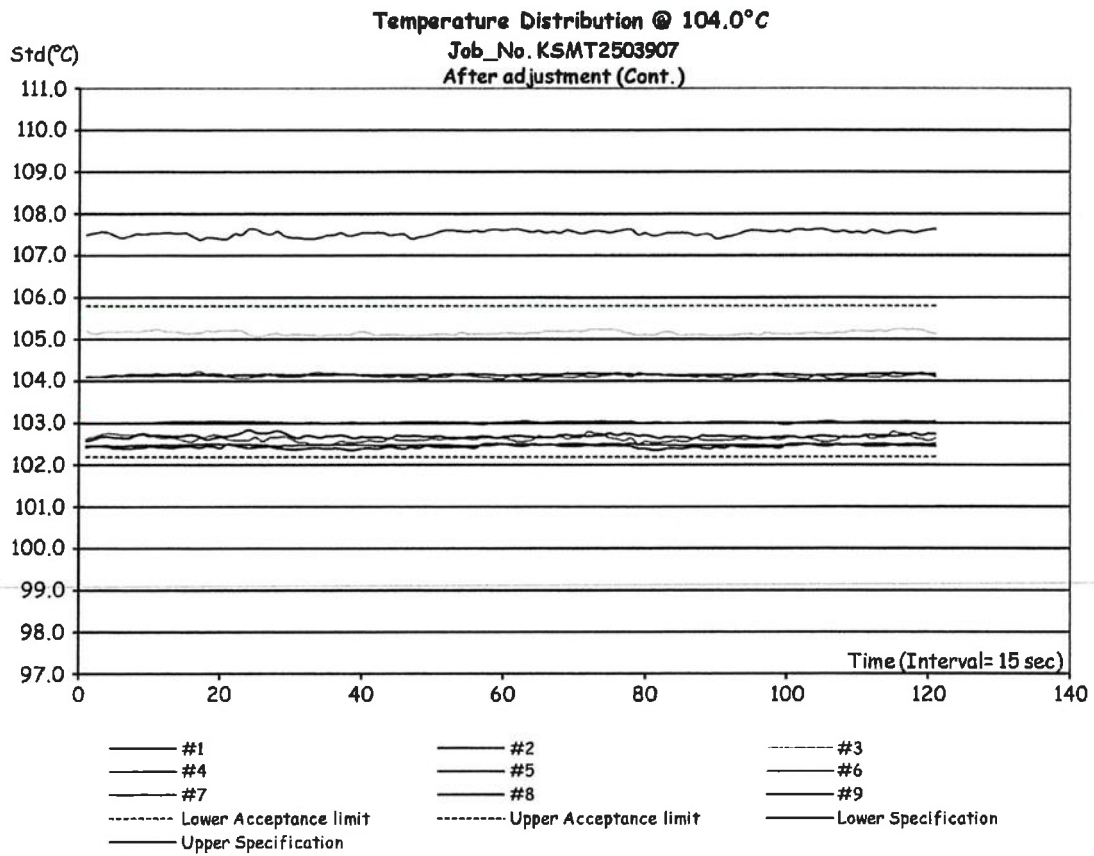
Temperature Distribution @ 85.0°C

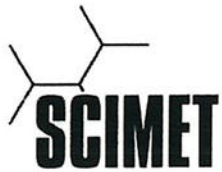
Job_No. KSMT2503907

After adjustment

Std(°C)







ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: KSMT2503907

ชนิดเครื่องมือ: Oven

รุ่น: ED53

หมายเลขเครื่อง: 13-02277 (ELABHAOVEN2277)

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
24 Sep 2025			24 Sep 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	*
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	*
<input type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน พัดลม	<input type="checkbox"/>	<input type="checkbox"/>	-
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. สภาพ Lever of Ventilation valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	**
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาพ Door seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input type="checkbox"/>	<input type="checkbox"/>	-
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของระบบทำความชื้น	<input type="checkbox"/>	<input type="checkbox"/>	-
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	13. สภาพแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ : * Control Modify Brand M-LAB

** Lever of Ventilation valve ปิดไม่สนิท

Mr. Mongkolwat Hasanon

Service Engineer

บริษัท ชายนัมเบก จำกัด (SCIMET CO., LTD.)

818/124 Udomsuk rd., Bangna-Nuea, Bangna, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.
- For customers using HF applications, the instrument should be returned to its standard sample introduction system.

Agilent CrossLab Start Up Services

SS

Agilent 5100 5110 ICP-OES Preventive Maintenance

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check **"Service not applicable"** check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the **Service Review** section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Completion section
- **Ask the customer to sign the Service Verification section including the customer's and your signature.**

Important Customer Web Links

- ✓ To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
 - Sample Prep and Containment
 - Chemical Standards
 - Analysis
 - Service and Support
 - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- **Need to place a service call?** Flexible Repair Options | Agilent

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and implementation of Service Notes
- ☒ Check for required firmware/software updates and verify with customers if they would like them installed.
- ☐ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it.
- ☒ Ask the customer to remove any samples from the ICP-OES sample introduction area, auto sampler or around the ICP-OES.



Instrument Maintenance

System Information.

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	G8015A / MY17490002
Instrument System Site and Location	Envilab Company Limited

List System Component Product Numbers		List the Serial Numbers of each Component
1.	G8410A	AU17393768
2.	G8015A	MY17490002
3.	G8481	1709-05327
4.		
5.		
6.		
7.		
8.		
9.		

ICP-OES Configuration Table		Circle the type or write in the type if other
Nebulizer Type	SeaSpray	OneNeb Ccnikal Other
Spray Chamber	Cyclonic Single Pass	Cyclonic Double Pass Other
Torch	Radial	Dual View Other
Torch Type	One Piece	Semi Demountable Fully Demountable Other
Injector Diameter	2.4mm 1.8mm	4mm 0.8mm Other
Injector Material	Quartz	Ceramic Other



SPS 3 Auto Sampler

Type text here

- ☒ **Service not applicable**
- ☐ Power cycle the autosampler and verify successful initialization.
- ☐ Inspect X and Z axis belts for wear. Replace is necessary.
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

SPS 4 Auto sampler

- ☐ **Service not applicable**
- ☒ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☒ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner.
- ☒ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☒ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☒ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles
- ☒ Test using customer's tray and move the sample probe to the sample vial 1, wash vial and rinse port and ensure that the probe is centered in the vial. If not use calibration wizard and calibrate the position.

SPS 4, 6, 7 Advanced Valve System

- ☐ **Service not applicable**
- ☐ Replace valve rotor seal
- ☐ Check fittings for signs of leaks
- ☐ Check tubing including autosampler tubing for kinks or excessive wear
- ☐ Check high flow pump for signs of leaks

Preventive Maintenance Procedures

Record Pre-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table – Pre-PM.

Clean and inspect ICP-OES system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☒ Replace high capacity air inlet dust filter element if installed.
- ☒ Remove and clean instrument water inlet filter.

Agilent Water Recirculator

- ☐ **Service not applicable**
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter if present.
- ☒ Re fill with Agilent Cool Clear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser.

Restore Instrument

- ☐ For HF applications, ask the customer to reinstall their sample introduction system.
- ☐ Leave system in an idle state: on and purging.
- ☐ Guidance: if the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☒ Complete the Signature Page with both Service Engineer and Customer signatures.

ADS 2 Advanced Dilution System (5110 only)

- ☒ SERVICE NOT APPLICABLE
- ☐ LOOK FOR ANY OBVIOUS EXTERNAL DAMAGE OR PROBLEMS.
- ☐ REPLACE VALVE ROTOR SEAL ON VALVES A AND B.
- ☐ REPLACE BOTH SYRINGES.
- ☐ REPLACE ACID VAPOR FILTER (WASTE VESSEL)
- ☐ REPLACE VENTING VALVE (DILUENT CARRIER BOTTLE)
- ☐ CHECK FITTINGS FOR SIGNS OF LEAKS.
- ☐ CHECK TUBING INCLUDING AUTOSAMPLER TUBING FOR KINKS OR EXCESSIVE WEAR.

ICP-OES adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.

Record Post-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above, run the following Instrument tests

- ☒ Subsystem Communications Test
- ☒ Air Flow
- ☒ Water Flow
- ☒ Gas Flows
- ☒ RF Generator
- ☒ Camera Test
- ☒ Optics Test
- ☒ Nebulizer Test

- ☒ Record the result in the Instrument Test Results Table

ICP-OES Status Results Table

Note: These measurements do not form part of any specification and are for reference only.

Measurement	Standby Mode	Plasma On
Mains Voltage	220.640	VAC 219.053
Mains Current	0.080	A 0.099
Instrument Temperature	23.2	°C 22.3
RF Air Flow (sensor speed)	7.0	Hz 20.0
Plasma Exhaust Temperature	No measurement	°C 46.5
Water Flow Oscillator	No measurement	L/min 1.51
Water Flow Detector	1.20	L/min 1.17
Water Inlet Temperature	18.3	°C 18.3
Polychromator Temperature	35.3	°C 35.0
CCD Temperature	-39.7	°C -39.8
Thermal Stabilizer	35.0	°C 35.0
Argon Supply Pressure	611.44	kPa 564.69
Purge Gas Supply Pressure*1	610.40	kPa 594.52
Option Gas Supply Pressure*1	-	kPa -
Zero Flow	No measurement	L/min 0.70
Zero Back Pressure	No measurement	kPa 280.74
Sample Gas Flow	No measurement	L/min 12.03
Carrier Gas Flow	No measurement	L/min 1.00
Makeup Gas Flow	No measurement	L/min 1203.4
Sample Current	No measurement	W 8.244
Sample Voltage	No measurement	A 194.614
Option installed	No measurement	V

Test Results

Instrument Performance Test Results Table

Note: These measurements do not form part of any specification and are for reference only.

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial*	Radial	Axial*
Zn 213.857 nm SRBR	2745.8	3632.4	14128.0	23024.3
Mn 257.610 nm SRBR	12504.7	26596.0	86470.0	215311.9
Al 396.152 nm SBR	5.0	14.9	584.1	2335.7
K 766.491 nm SBR	4.4	71.4	639.6	*1029.3

* Axial result is not applicable for G8016AA, G8012AA Radial View instruments.

Instrument Test Results Table

Note: The Instrument Test results are for systems using ICP Expert version 7.3 and above only.

Instrument Test	Result
Subsystem Communications Test	Pass
Air Flow	Pass
Water Flow	Pass
Gas Flows	Pass
RF Generator	Pass
Camera Test	Pass
Optics Test	Pass
Nebulizer test	Pass

Part Description	Part Number	Product or Model# where used	Quantity consumed
------------------	-------------	------------------------------	-------------------

Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

-Torch is broken. Should be replaced and should be spaerd.

Service Verification

Request Number: 007747651
Date Service Completed: June 26, 2025
Engineer Name: wan Onkhom
Customer Name:

Consumed PM Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
Axial Pre-Optic Window	G8010-68014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-68015	All	1
Agilent Cool Clear Coolant Fluid	5799-0037	Agilent Water Recirculator	N/A
Purge Gas Filter	G8010-60136	All	1
Air Inlet Filter	G8000-68002	All	1
High Capacity Air Filter	G8010-60189	Optional	N/A
Rotor seal for 6-7 port valve for AVS6/7	G8494-60002	G8494A/G8495, ADS 2	N/A
Rotor seal for 4 port valve for AVS4	G8493-60002	G8493A	N/A
Rinse solution to rinse station 2.5mm id x 1m	G8410-80123	SPS 4	N/A
Barb connector 2.5mm-1.5mm ID	G8410-80124	SPS 4	N/A
PVC waste tubing 8mm od x 5mm id, 2m	G8410-80122	SPS 4	N/A
Syringe, 5mL	5299-0037	ADS 2	N/A
Syringe, 10mL	5299-0038	ADS 2	N/A
Acid vapor filter	5043-1193	ADS 2	N/A
Venting valve	5043-1190	ADS 2	N/A
Additional Parts may be required from engineer's stock:			
X axis drive belt	5410047500	SPS 3	N/A
Z axis drive belt	5410047400	SPS 3	N/A
Peristaltic pump tubing, PVC SolvaFlex, 3 bridged,	3710049000	SPS 4	N/A

Consumed Parts Reference (Purchased by customer, not included as part of PM)

☐ Section Not Applicable

Part Description	Part Number	Product or Model# where used	Quantity consumed
------------------	-------------	------------------------------	-------------------

Agilent 5100, 5110 Preventive Maintenance Checklist

Service Engineer Signature:
Suwan C.

Customer Signature:

Total number of pages in this document:
15 pages



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

Certificate No. C27250001

Calibration Certificate

Equipment:	DO METER	Job No.:	KSMT2501049
Model:	HI9146	Received Date:	17 March 2025
Serial No.(or ID):	GOOO7931 (ELABDOHI914601)	Issued Date:	18 March 2025
Manufacturer:	HANNA	Page:	1 of 2
Condition:	In Condition		

Customer

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

Calibration Place

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

Calibration Date

17 March 2025

Environment Condition

Temperature: 23 °C ± 2 °C
Humidity: 50 %RH ± 15 %RH

The Method used

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

Traceability

This is certificate is traceable to SI Units , Sample test and
temperature test are assured through HANNA instruments
company certificate No. 26142, through Quality Reborn
Co.,LTD certificate No.C23240075

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

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

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



**Calibration Results:**

Electrode Serial No. -
Model : -
Brand : HANNA

Electrode Test

Atmospheric pressure measured while calibrating. 756.36 mmHg
Temperature measured while calibrating. (± 0.2 °C) 24.7 °C
The Oxygen Solubility was calculated from the ambient conditions. 8.27 \pm 0.03 mg/L
The Oxygen Solubility reading from the DO METER - mg/L

Sample Test

Standard Oxygen Solution	Unit Under Calibration Reading	Correction	Coverage Factor (<i>k</i>)	Uncertainty of Measurement (\pm)
0.0 %	0.0 %	0.0 %	2.00	0.20 %

Temperature Electrode**Dimension of Probe;**

Length : 85 mn.
Diameter : 18 mn.
Immersion Depth 80 mn.

STD. Reading (°C)	UUC. Reading (°C)	Correction of UUC (°C)	Coverage Factor (<i>k</i>)	Uncertainty of Measurement (\pm °C)
25.01	25.6	-0.59	2.00	0.15

The End of Certificate



ใบตรวจสอบสภาพเครื่อง Do Meter

เลขที่ใบงาน: KSMT2501049

ชนิดเครื่องมือ: DO METER

รุ่น: HI9146

หมายเลขเครื่อง: G0007931

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
17 Mar 2025			17 Mar 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Swicth)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. อิเล็กโทรด (Electrode and Connection Cable)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สายอิเล็กโทรด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. เชื้อนเซอร์อิเล็กโทรด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. ขาจับอิเล็กโทรด (Stand)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ :

Mr.Dumrong Boonsopon

Service Engineer

บริษัท ชายนัมเมท จำกัด (SCIMET CO., LTD.)

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