

ภาคผนวกที่ 5
เอกสารสอบเทียบเครื่องมือตรวจวัด

ภาคผนวกที่ 5-1
เอกสารสอบเทียบคุณภาพอากาศในบรรยากาศ

CERTIFICATE OF CALIBRATION

Certificate No. : COF-016-68

Page 1 of 2 Pages

MEASUREMENT ITEM : Top Load Orifice
MANUFACTURER : TISCH
MODEL/TYPE : TE-5025A
SERIAL NUMBER : 710725
ID NUMBER : -
CONDITION AS-RECEIVED : Used item
CUSTOMER : Pacific Laboratory Co., Ltd.
14/5358 Moo14, T.Bang Bua Thong, A.Bang Bua Thong,
Nonthaburi 11110, Thailand.

RECEIVED DATE : 02 May 2025
MEASUREMENT DATE : 13 May 2025
ISSUE DATE : 13 May 2025

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature	: 23.0 ± 3.0	°C
Relative Humidity	: 55.0 ± 15.0	%RH
Atmospheric Pressure	: 1010 ± 10	hPa

CALIBRATION CONDITION:

Preconditioning : 24 hours at ambient conditions.
Measurement Condition : The average values during measurement are 23.3 °C and 53.1 %RH.

NOTED: The certificate is valid only to the item calibrated on date and place of calibration.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibration procedure:

The Orifice gas flow device was calibrated against Standard Rotary Displacement Meter (Roots Meter) Model G65/IMC/W2 dp. The WI-CL-004 was used as a calibration guideline.

Traceability:

This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: MW-0016-25.

Uncertainty of Measurement:

The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor $k=2$, Which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM 'Evaluation of measurement data - Guide to the expression of uncertainty in measurement'

Calibrated by:

- ☐ Mr. Sorawit Thachalad
☒ Miss Jittraporn Lertsomphol



Approved signatory: _____

Mr. Parinya Booncharoen
Calibration Department Manager

MEASUREMENT RESULTS:

The Orifice gas flow device was calibrated by direct comparison method with the Standard Rotary Displacement Meter (Roots Meter). The Humid air was used as a medium in the system. The standard conditions are 25°C (298.15 K) and 760 mmHg for standard temperature and standard pressure respectively.

Table 1: The results of Q Standard calibration data

Plate	Flow rate m^3/min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Δp_{meter} mmHg	$\Delta p_{Orifice}$ inH ₂ O	γ	Standard Flow [Q_s] m^3/min
1	0.706	753.337	23.01	22.02	50.559	1.718	1.309	0.659
2	0.999	753.260	23.23	22.54	63.590	3.318	1.819	0.914
3	1.119	753.236	23.25	22.52	43.489	4.417	2.098	1.054
4	1.168	753.147	23.32	22.75	32.399	4.968	2.225	1.116
5	1.411	753.149	23.33	22.84	29.194	7.361	2.708	1.354

Slope (m): **2.01373**
 Intercept (b): **-0.02108**
 Correlation coefficient (r): **0.99983**
 Uncertainty ($k=2$): **0.015** m^3/min

Table 2: The results of Q actual calibration data

Plate	Flow rate m^3/min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Δp_{meter} mmHg	$\Delta p_{Orifice}$ inH ₂ O	γ	Standard Flow [Q_s] m^3/min
1	0.706	753.337	23.01	22.02	50.559	1.718	0.822	0.661
2	0.999	753.260	23.23	22.54	63.590	3.318	1.143	0.917
3	1.119	753.236	23.25	22.52	43.489	4.417	1.318	1.057
4	1.168	753.147	23.32	22.75	32.399	4.968	1.398	1.120
5	1.411	753.149	23.33	22.84	29.194	7.361	1.702	1.358

Slope (m): **1.26127**
 Intercept (b): **-0.01323**
 Correlation coefficient (r): **0.99983**
 Uncertainty ($k=2$): **0.015** m^3/min

End of Certificate of Calibration



PERFORMANCE TEST REPORT

General Information

Instrument: SO₂ Analyzer
Brand / Model: Thermo Environmental / 43C
Serial No.: 43C-65967-3510
Principle: UV Fluorescence
Measurement Range: 0 - 500 ppb

Report No.: AQMCAL-008/2025
Calibration Date: August 3, 2025
Calibration By: Prasert K.

Calibration System

Calibration Unit

Gas Dilutor: Thermo Environmental / 146C
Serial No.: 00400P
Zero Air Generator: API / 701
Serial No.: 148

Certified Gas Cylinder

Gas Grade: EPA Protocol
Cylinder No.: LL164665
Expired Date: 21/10/2025

Gases Concentration

SO₂ 45.11 ppm
NO 45.01 ppm
CO 4511 ppm

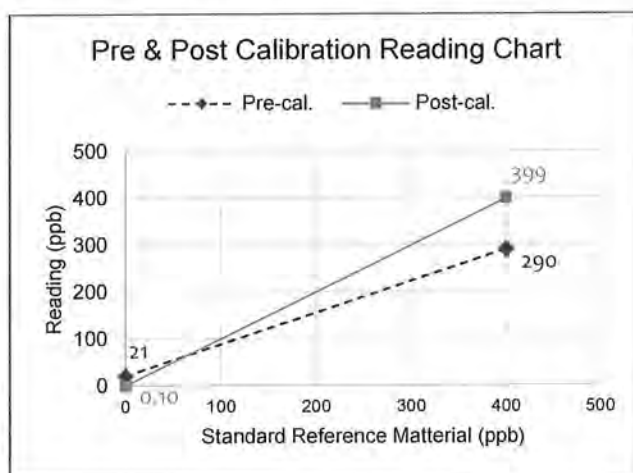
Environmental Condition

Temperature (°C): 32 **Relative Humidity (%):** 54 **Pressure (mmHg):** 754

Calibration Result

Task	Gas	Unit	Zero			Span		
			SRM	Reading	Drift	SRM	Reading	Drift
Pre-cal	SO ₂	ppb	0.0	21	21	400	290	-110
Post-cal	SO ₂	ppb	0.0	0.1	0.1	400	399	-1

The calibration of the ambient air analyzer is based on the calibration procedure of US EPA published in 40 CFR Parts 50, 53 and 58.



Authority Signature

(Sompong Kiatiporn)

บริษัท เอ็นควิปส์ จำกัด

หมู่บ้านกฤติกา เลขที่ 79/130 ซ.ประชาอุทิศ 4 แขวงตอมเมือง เขตตอมเมือง กรุงเทพฯ 10210

โทรศัพท์: 02 9281288 โทรสาร: 02 9281289 อีเมล: sales@enquips.com

PERFORMANCE TEST REPORT

Issued for: Pacific Laboratory Co., Ltd.

14/5358 Moo 14, Bang Bua Thong Sub-district, Bang Bua Thong District,
Nonthaburi 11110.

Calibration Instrument

Destination: Ambient Air Analyzer

Manufacture: 1) Thermo Electron Corporation, USA.

Model 43C SO₂ Analyzer

2) Thermo Electron Corporation, USA.

Model 48C CO Analyzer

This report includes: 3 pages

Date: August 3, 2025

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ห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์ Blue Consultant Limited Partnership

32/751 ถนนประชาอุทิศ แขวงทุ่งครุ เขตทุ่งครุ กรุงเทพฯ 10140

โทร.0-2873-6045-6 โทรสาร 0-2873-6046

ห้องปฏิบัติการวิเคราะห์เอกซเรย์อนุญาตลงวันที่ 22 สิงหาคม 2566

CALIBRATION REPORT

Equipment : SO₂ Analyzer
Serial No. : 2712

Brand/Model: Teledyne-API/T100
Date of Calibrate : April 3, 2025

Reference Standard

Certification Date: October 29, 2019


Component: SO₂: 55.62 ppm , NO: 57.21 ppm , CO : 4,551 ppm

Cylinder No.: EB0128767

Expiry Date: October 29, 2027

Calibration Check (Before adjust)						
Serial No.	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)
2712	0.3	0	0.3	398.2	400	-1.8
Calibration Check (After adjust)						
Serial No.	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)
2712	0	0	0	400	400	0

ในนามห้องปฏิบัติการห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์
Blue Consultant Limited Partnership



(นางสาวนิตดา อนันต์สุวรรณชัย)

ผู้จัดการห้องปฏิบัติการ

ห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์ Blue Consultant Limited Partnership

32/751 ถนนประชาอุทิศ แขวงทุ่งครุ เขตทุ่งครุ กรุงเทพฯ 10140

โทร.0-2873-6045-6 โทรสาร 0-2873-6046

ห้องปฏิบัติการวิเคราะห์เอกซเรย์นิวเคลียร์ วันที่ 22 สิงหาคม 2566

CALIBRATION REPORT

Equipment : NOx Analyzer

Serial No. : 3205

Brand/Model: Teledyne-API/T200

Date of Calibrate : August 28, 2025

Reference Standard

Certification Date: October 29, 2019

Component: SO2: 55.62 ppm , NO: 57.21 ppm , CO : 4,551 ppm

Cylinder No.: EB0128767

Expiry Date: October 29, 2027

Calibration Check (Before adjust)						
Serial No.	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)
	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx
3205	4.1/1.1/5.2	0/0/0	4.1/1.1/5.2	401.2/3.6/404.8	400/0/400	1.2/3.6/4.8
Calibration Check (After adjust)						
Serial No.	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)
	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx
3205	0/0/0	0/0/0	0/0/0	400/0/400	400/0/400	0/0/0

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.....

(นางสาวนิตดา อนันต์สุวรรณชัย)

ผู้จัดการห้องปฏิบัติการ

ห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์ Blue Consultant Limited Partnership

32/751 ถนนประชาอุทิศ แขวงทุ่งครุ เขตทุ่งครุ กรุงเทพฯ 10140

โทร.0-2873-6045-6 โทรสาร 0-2873-6046

ห้องปฏิบัติการวิเคราะห์เอกชนใบอนุญาตลงวันที่ 22 สิงหาคม 2566

CALIBRATION REPORT

Equipment : NOx Analyzer

Serial No. : 4088

Brand/Model: Teledyne-API/T200

Date of Calibrate : September 2, 2025

Reference Standard

Certification Date: October 29, 2019

Component: SO2: 55.62 ppm , NO: 57.21 ppm , CO : 4,551 ppm

Cylinder No.: EB0128767

Expiry Date: October 29, 2027

Calibration Check (Before adjust)						
Serial No.	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)
	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx
4088	3.5/1.2/4.7	0/0/0	3.5/1.2/4.7	400.8/3.2/404.0	400/0/400	0.8/3.2/4.0
Calibration Check (After adjust)						
Serial No.	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)
	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx	NO/NO2/NOx
4088	0/0/0	0/0/0	0/0/0	400/0/400	400/0/400	0/0/0

ในนามห้องปฏิบัติการห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์

.....

(นางสาวนิตดา อนันต์สุวรรณชัย)

ผู้จัดการห้องปฏิบัติการ

ภาคผนวกที่ 5-2
เอกสารสอบเทียบ
ปริมาณสารเจือปนในอากาศที่ระบายออกจากปล่อง

Envi Equipment Service Co., Ltd.

110254 Moo 3, Tambon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110
Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No.: E25-010002
Page.: 1 of 6

CERTIFICATE OF CALIBRATION

Customer : Pacific Laboratory Co., Ltd.
Address : 14/5358 Moo 14, Tambon Bang Bua Thong, Amphoe Bang Bua Thong, Nonthaburi 11110
Description of Equipment : Console meter
Manufacturer : Apex Instrument
Model Number : XC-572-V
Serial Number : 1107043
ID./Control No. : -
Environment Conditions : Temperature (25 ± 2) °C
Humidity (50 ± 15) % RH
Cal. Date : 09/01/2025
Issue Date : 09/01/2025

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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

Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level

Calibrated by : Mr. Sanya Sangnil

Approved by :

(Mr. Mana Fuekthong)
Technical Manager



Certificate No. : E25-010002
Page : 2 of 6

METHOD 5 CONSOLE CALIBRATION USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425 5-POINT METRIC UNIT

Meter Console Information			Calibration Conditions			Factors/Conversions		
Console Model Number	XC-572-V		Date	Time	09/01/2025 11:00 AM	Std Temp	293	K
Console Serial Number	1107043		Calibration Reference No.		SER25-010002	Std Press	760	mm Hg
DGM Model Number	SK25EX		Barometric Pressure		761.24	K ₁	0.386	
DGM Serial Number	00007055		Calibration Meter Gamma		1.001	Console Leak Check		
						PASS		

Calibration Data											
Metering Console						Calibration Meter					
Run Time	DGM Orifice DH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final		
(Q)	(P _{at})	(V _{in})	(V _{out})	(t _{in})	(t _{out})	(V _{in})	(V _{out})	(t _{in})	(t _{out})		
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C		
12.62	13.0	319.7790	319.9190	24	24	266.87546	267.01374	26	26		
12.60	13.0	319.9190	320.0590	24	24	267.01374	267.15202	26	26		
8.58	26.0	320.0650	320.2050	25	25	267.16202	267.29798	26	26		
8.55	26.0	320.2050	320.3450	25	25	267.29798	267.43438	26	26		
14.48	40.0	320.3520	320.6370	26	26	267.45138	267.73112	26	26		
14.15	40.0	320.6320	320.9120	27	27	267.73112	268.00934	25	25		
10.53	70.0	320.9240	321.2040	27	27	268.02034	268.29638	25	25		
10.50	70.0	321.2040	321.4840	28	28	268.29638	268.57036	25	25		
9.48	90.0	321.4950	321.7750	28	28	268.52536	268.80124	25	25		
9.43	90.0	321.7750	322.0550	28	28	268.80124	269.07608	25	25		



Certificate No. : E25-010002
Page : 3 of 6

**METHOD 5 CONSOLE CALIBRATION
USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425
5-POINT METRIC UNIT**

Meter Console Information				Calibration Conditions				Factors/Conversions			
Console Model Number	XC-572-V	Date	09/01/2025	Time	11:00 AM	Std Temp	293	K			
Console Serial Number	1107043	Calibration Reference No.	SER25-010002	Barometric Pressure	761.24 mmHg	Std Press	760	mm Hg			
DGM Model Number	SK25EX	Calibration Meter Gamma	1.001			K _i	0.386				
DGM Serial Number	00007055								Console Leak Check	PASS	

Calibration Data

Standardized Data										Dry Gas Meter	
Dry Gas Meter		Calibration Meter		Calibration Factor		Flowrate		Std & Corr		Variation	
(V _{std})	(Q _{std})	(V _{ref})	(Q _{ref})	Value	(Y)	Std	(Q _{std/corr})	Value	(ΔY)	(ΔH _g)	(ΔH _g)
m ³	m ³ /min	m ³	m ³ /min			m ³ /min				mm H ₂ O	
0.138	0.011	0.136	0.011	0.987	0.008	0.011	0.011	49.742	0.011	1.250	
0.138	0.011	0.136	0.011	0.987	0.008	0.011	0.011	49.611	0.011	1.119	
0.138	0.016	0.134	0.016	0.970	-0.010	0.016	0.016	47.749	0.016	-0.743	
0.138	0.016	0.134	0.016	0.973	-0.006	0.016	0.016	47.073	0.016	-1.419	
0.281	0.019	0.275	0.019	0.979	0.000	0.019	0.019	49.540	0.019	1.048	
0.277	0.020	0.274	0.019	0.991	0.012	0.019	0.019	47.644	0.019	-0.848	
0.278	0.026	0.272	0.026	0.980	0.001	0.026	0.026	47.207	0.026	-1.285	
0.278	0.026	0.270	0.026	0.973	-0.006	0.026	0.026	47.616	0.026	-0.876	
0.278	0.029	0.272	0.029	0.978	-0.001	0.029	0.029	49.443	0.029	0.951	
0.278	0.029	0.271	0.029	0.974	-0.005	0.029	0.029	49.294	0.029	0.802	
Y Average										48.492	ΔH _g Average

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.

For ΔH_g, orifice pressure differential that equates to 0.75 cfm (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.



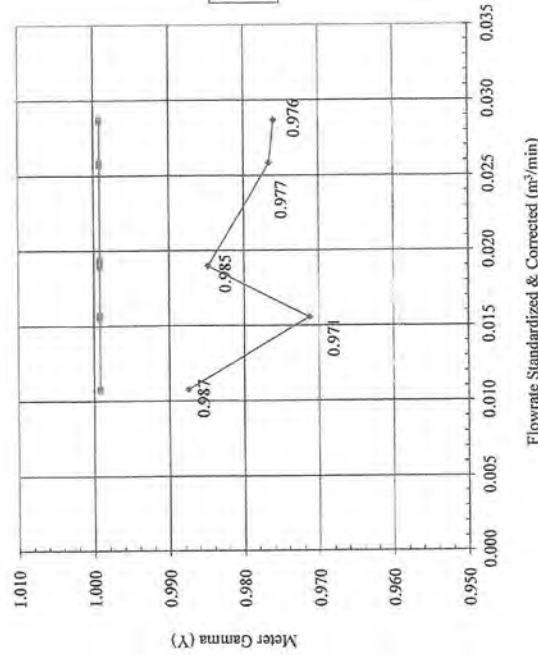
Certificate No. : E25-010002
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Meter Console Information				Calibration Conditions				Factors/Conversions			
Console Model Number	XC-572-V	Date	09/01/2025	Time	11:00 AM	Std Temp	293	K			
Console Serial Number	1107043	Calibration Reference No.	SER25-010002	Barometric Pressure	761.24 mmHg	Std Press	760	mm Hg			
DGM Model Number	SK25EX	Calibration Meter Gamma	1.001			K _i	0.386				
DGM Serial Number	00007055								Console Leak Check	PASS	

Calibration Date: 9-1-2025

Calibration Reference No: SER25-010002

Meter Gamma vs Flowrate



Console Serial: 1107043

Console Model: XC-572-V

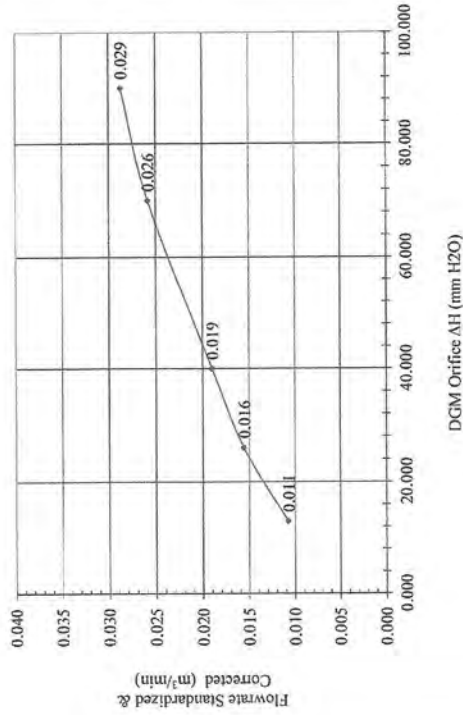


Meter Console Information			Calibration Conditions			Factors/Conversions	
Console Model Number	XC-572-V		Date	Time	09/01/2025	11:00 AM	Std Temp 293 K
Console Serial Number	1107043		Calibration Reference No.	SER25-010002			Std Press 760 mm Hg
DGM Model Number	SK25EX		Barometric Pressure	761.24 mmHg			K _f 0.386
DGM Serial Number	00007055		Calibration Meter Gamma	1.001			Console Leak Check PASS

Calibration Date: 9-1-2025

Calibration Reference No: SER25-010002

Meter Pressure vs Flowrate



Console Serial: 1107043

Console Model: XC-572-V



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information			Calibration Conditions		
Console Model Number	XC-572-V		Date	Time	09/01/2025 01:15 PM
Console Serial Number	1107043		Calibration Reference No.	SER25-010002	
DGM Model Number	SK25EX		Reference Thermometer	DIGICON	
DGM Serial Number	00007055		Serial Number	183169105	
Meter Box Model Number	JENCO 765 KF				
Meter Box Serial Number	JC 11500				

Results													
Console Thermocouple Simulator													
Channel and test point		Meter Box Channel Temperature Reading (°C)											
		-18.0	25.0	38.0	93.0	149.0	260.0	371.0	482.0	593.0	816.0	1038.0	
Stack		-19.0	24.0	37.0	92.0	147.0	257.0	369.0	479.0	591.0	814.0	1037.0	
Aux		-19.0	24.0	37.0	92.0	147.0							
Probe		-19.0	24.0	37.0	92.0	147.0							
Filter		-19.0	24.0	37.0	92.0	147.0							
Oven		-19.0	24.0	37.0	92.0	147.0							
Exit		-19.0	24.0	37.0	92.0	147.0							

Tolerance Range			
Stack	± 1.50%	Absolute	
Probe	± 3.0 °C		Meter ± 3.0 °C
Filter	± 3.0 °C		Exit ± 2.0 °C



Enviro Equipment Service Co., Ltd.

110/254 Moo 3, Tambon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110
Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No. : E25-010003
Page. : 1 of 3

CERTIFICATE OF CALIBRATION

Customer : Pacific Laboratory Co., Ltd.
Address : 14/5358 Moo 14, Tambon Bang Bua Thong, Amphoe Bang Bua Thong, Nonthaburi 11110
Description of Equipment : Standard Probe Method 5
Manufacturer : Apex Instrument
Model Number : PS-4HV
Serial Number : -
ID./Control No. : -
Environment Conditions : Temperature (25 ± 2) °C
Humidity (50 ± 15) % RH
Cal. Date : 09/01/2025
Issue Date : 09/01/2025

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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

Result of Calibration

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Calibrated by : Mr. Sanya Sangnil

Approved by :

(Mr. Mana Fuekhtud)
Technical Manager

Certificate No. : E25-010003
Page. : 2 of 3

CALIBRATION RESULTS

S-Type Geometric Pitot Tube Calibration

Sampling System Equipment Information

Probe Model : PS-4HV
Probe Number : -
Pitot Number : -
Pitot Tube Type : S-type

Calibration Condition

Date : 9 January 2025
Barometric Pressure : 761.24 mm Hg
Digital Caliper : CD-6" ASX
Serial number : A18008059

Pitot tube/Probe: # PS-4HV			
Parameter	Value	Allowable Range	Check
Assembly level?	Yes	Yes	Pass
Ports Damage?	No	No	Pass
$\alpha 1$	0	$-10^\circ < \alpha 1 < +10^\circ$	Pass
$\alpha 2$	1	$-10^\circ < \alpha 2 < +10^\circ$	Pass
B1	0	$-5^\circ < B1 < +5^\circ$	Pass
B2	0	$-5^\circ < B2 < +5^\circ$	Pass
γ	0	N/A	-
θ	0	N/A	-
Dt	0.375	.188" to .375"	Pass
A	0.9525	$2.1Dt \leq A \leq 3Dt$	Pass
A/2Dt	1.270	$1.05 \leq A/Dt \leq 1.5$	Pass
Z = A tan γ	0.044	$Z \leq .125"$	Pass
W = A tan θ	0.019	$W \leq .031"$	Pass

Remark:

I certified that probe model: PS-4HV meets or exceeds all specifications, criteria and/or applicable design and is hereby assigned a pitot tube certification factor of 0.84. See 40 CFR Pt. 60, App. A, EPA Method 2.

THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information		Calibration Conditions	
Probe Model Number	PS-4HV	Date	09/01/2025 03:20 PM
Probe Serial Number	-	Calibration Reference No.	E25-010002
Meter Box Model Number	JENCO 765 KF	Reference Thermometer	DIGICON
Meter Box Serial Number	JC: 11500	Serial Number	183169105

Thermocouple of Standard Probe method 5 = length 4 foot			
Set Point	Reference Thermocouple	Probe Thermocouple	Difference
100	100.0	98.0	0.54
250	250.0	248.0	0.38
300	300.0	297.0	0.52
350	350.0	347.0	0.48



Certificate of Calibration



CUSTOMER

Name
Pacific Laboratory Co., Ltd.
Address
14/5358 Moo 14, Tambon Bang Bua Thong,
Amphoe Bang Bua Thong, Nonthaburi 11110
Department/ Division/ Vessel
N/A

UNIT UNDER CALIBRATION (UUC)	Cert. No. SE-CM25SER568
------------------------------	-------------------------

Description
Flue gas analyzer
Manufacturers
Testo Model 310
S/N.42891142
Measuring Range
O2 : 0-21 %Vol, CO : 0-4000 PPM

Cal. Date	: 15-Oct-25
Cal. Due	: 14-Oct-26
Work Order No.	: SE-CM25SER568
Cal. Temp.	: 25.0 ± 1°C
Cal. Humidity	: 55.0 ± 10 %RH

Reference Standard

Description	Cert. No.	Expired Date
- TSG Standard Nitrogen = 99.99 %Vol	DNHQ-44747-169649-10	18-Jul-28
- Linde Mixture Gas in Nitrogen	1495/25	28-May-27
Component : CO = 100 PPM, O2 = 18 %		

Function Setup

Items	O2	CO
Low alarm	None	None
High alarm	None	None
Unit	%Vol	PPM

Test Result

Visual Check	Criteria	Result	Operation Check	Criteria	Result
Structure	Proper	Good	Battery storage	Function	Pass
Indication, Symbol and letter	Proper	Good	Suction pump	Function	Pass
Gas sampling hose & probe	Proper	Good			


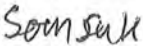

Calibration Result

Parameter	Zero						Span						Respond time Sec.		Judgment	Note
	Std.	Acc.	Before	Cal.	After	Err.	Std.	Acc.	Before	Cal.	After	Err.	Acc.	Read		
O2 (%Vol)	0.0	± 1.5	0.0	0.0	0.0	0.0	18.0	± 1.0	18.3	18.0	18.0	0.0	≤30	11.0	Pass	- Respond time must be within 30 sec. to reach to 90% of Std. concentration.
CO (PPM)	0.0	0.0	0.0	0.0	0.0	0.0	100.0	± 5.0	95.0	100.0	100.0	0.0	≤30	13.0	Pass	

Std. = Standard, Read = Reading, Cal. = Calibrate, Acc. = Acceptance, Err. = Error, Sec. = Second

Comment/ Suggestion :

This UUC that has been tested and calibrated to meet the manufacturer's published specifications in accordance with our quality control system. The standards used for calibration are on record and traceable to the National Institute of Standard and Technology (NIST), and have accuracies equal to or greater than the UUC being tested. This result of calibration was found accurated as show on date and place of calibration only.

Engineer Signatory	Approval Signatory	Company Stamp
		 Call Me CALL ME ENGINEER CO., LTD.
Mr. Rattanasak Yunbuapar (Technical Specialist) Date : 15-Oct-25	Mr. Somsak Wangdeeklang (Gases Division Chief) Date : 15-Oct-25	



BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
99/9 Moo 2, Maha Sawat, Phutthamonthon, Nakhon Pathom 73170, Thailand.
Tel: +66 3424 5299 Fax: +66 3424 5250
E-mail: bkk@becthai.com Website: www.becthai.com



Certificate No. : CAL-25-437

Page : 1 of 3

CERTIFICATE OF CALIBRATION

Equipment	:	Spectrophotometer
Manufacturer	:	Thermo Scientific
Model	:	Genesys 10S VIS
Serial No.	:	2E8R020104
ID No.	:	0402-0101-13
Customer	:	Emex Association Co., Ltd.
	:	27,29 Soi Rama 2 Soi 30,
	:	Rama 2 Road, Bangmod,
	:	Jomthong, Bangkok 10150
Location	:	ห้องปฏิบัติการ 4
Date of Receipt	:	18 July 2025
Date of Calibration	:	18 July 2025
Date of Issue	:	21 July 2025
Ambient Temperature	:	(25±10) °C
Relative Humidity	:	(60±20) %
Condition As-Received	:	Used Item
Calibrated by		Approved by
Mr.Palawat Lunchak		<i>Chintana</i>
Calibration Engineer		(Ms. Jintana Sangthajarnlap)
		Calibration Manager

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

This certificate may not be reproduced other than in full, except with the prior written consent of the Calibration Manager.

Indicated values are valid for the state of the Spectrophotometer at the time of calibration.

ISSUE: 6 REV:5

FM-CAL-39/2



ห้องปฏิบัติการวิเคราะห์แก๊ส

เลขทะเบียน ว-244



ห้องปฏิบัติการวิเคราะห์แก๊ส

เลขทะเบียน ว-244

20/02/25



BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
99/9 Moo 2, Maha Sawat, Phrutthamonthon, Nakhon Pathom. 73170, Thailand.
Tel: +66 3424 5299 Fax: +66 3424 5250
E-mail: bkk@becthai.com Website: www.becthai.com

Certificate No. : CAL-25-437

Page : 2 of 3

CALIBRATION REPORT

Conditions of this result of calibration

Material	Model	Serial No.	Cart.No.	Due date
Holmium Glass Filter	RM4-HG	24563	128818	3 February 2027
Didymium Glass Filter	RM-DG	24562	128816	3 February 2027
Neutral Density Filter	RM-1N2N3N	24568	128830	3 February 2027

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

The Sarnae Scientific Ltd. Accredited Calibration Laboratory No. 0659.

3. Method of calibration :

The calibration procedure was carried out according to ASTM E275-08 (2022) and ASTM E925-08 (2014).

4. Result of calibration :

() without adjustment () after adjustment

5. Equipment Specifications:

Spectral Bandwidth :	5	nm
Data Interval :	1	nm
Scan Speed :	Slow	nm/min



BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
99/9 Moo 2, Maha Sawat, Phrutthamonthon, Nakhon Pathom. 73170, Thailand.
Tel: +66 3424 5299 Fax: +66 3424 5250
E-mail: bkk@becthai.com Website: www.becthai.com

Certificate No. : CAL-25-437

Page : 3 of 3

CALIBRATION REPORT

Wavelength Calibration

Certified Values of Reference Material	Nominal Value (nm)	UUC*Reading (nm)	Error (nm)	Uncertainty of Measurement (\pm nm)	k Factor
381.40	381.40	382.0	0.60	0.59	2.00
528.59	528.59	529.0	0.41	0.59	2.00
879.68	879.68	879.0	-0.68	0.59	2.00

Photometric Calibration for Visible

Wavelength (nm)	Certified Values of Reference Material (A)	UUC* Reading (A)	Error (A)	Uncertainty of Measurement (\pm A)	k Factor
420.0	Zero	0.000	0.0000	0.0028	2.00
	0.5834	0.584	0.0006	0.0045	2.00
	0.7246	0.724	-0.0006	0.0045	2.00
	1.0381	1.035	-0.0011	0.0045	2.00
440.0	Zero	0.000	0.0000	0.0028	2.00
	0.5863	0.587	0.0007	0.0045	2.00
	0.7103	0.709	-0.0013	0.0045	2.00
	1.0154	1.014	-0.0014	0.0045	2.00
465.0	Zero	0.000	0.0000	0.0028	2.00
	0.5256	0.526	0.0004	0.0045	2.00
	0.8679	0.867	-0.0009	0.0045	2.00
	0.9541	0.953	-0.0011	0.0045	2.00
546.1 (546.0)	Zero	0.000	0.0000	0.0028	2.00
	0.522	0.523	0.0010	0.0045	2.00
	0.6938	0.693	-0.0008	0.0045	2.00
	0.9818	0.981	-0.0008	0.0045	2.00
590.0	Zero	0.000	0.0000	0.0028	2.00
	0.5563	0.556	-0.0003	0.0045	2.00
	0.7504	0.749	-0.0014	0.0045	2.00
	1.0735	1.071	-0.0025	0.0045	2.00
635.0	Zero	0.000	0.0000	0.0028	2.00
	0.5641	0.563	-0.0011	0.0045	2.00
	0.7305	0.728	-0.0025	0.0045	2.00
	1.0444	1.042	-0.0024	0.0045	2.00

Remark : Each individual filter is measured against the empty filter holder (blank) used to zero the Spectrophotometer.

Note:

UUC* : Unit Under Calibration

- End of Report -

ISSUE: 6 REV:5

FM-CAL-33/2



EMEX Environmental and Medical Expert
EMEX ASSOCIATION CO., LTD.
ห้องปฏิบัติการวิเคราะห์เครื่องมือ
เลขทะเบียน 7-244
20/02/24

ISSUE: 6 REV:5

FM-CAL-33/2

ภาคผนวกที่ 5-3
เอกสารสอบเทียบปริมาณความเข้มข้นละอองและสารเคมี
ในบรรยากาศการทำงาน

Personal Pump Calibration Report

Calibrate No. : CP479/2568

Calibrate Date : October 2, 2025

Equipment Type	: Personal Pump
Calibration Type	: DRYCAL DC-LITE FLOWMETER
Volume for Calibration	: 2.0 l/min
Environment Conditions	: 29.0 Deg C.
Environment Pressure	: 758.0 mmHg.
Customer Name	: บริษัท โรงงานเหล็กกรุงเทพฯ จำกัด

Customer Name : บริษัท โรงงานเหล็กกรุงเทพฯ จำกัด

[illegible]

Calibration By

(Miss Sakuna Supparot)
Technician



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 : AIR FLOW METER
MANUFACTURER : BIOS INTERNATIONAL
MODEL / TYPE : DCL-M
SERIAL NO. : 104699
CLID. NO. : 212402514
JOB CONTROL NO. : 241226137823
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : PACIFIC LABORATORY CO., LTD.
14/5358 MOO 14 TAMBOL BANG BUA THONG
AMPHOE BANG BUA THONG NONTABURI 11110

DATE OF RECEIVED : 26 December 2024

DATE OF ISSUED : 03 January 2025

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

Calibrated By :

Supphakit Sakuntaharn
Calibration Engineer

Approved By :

Mongkol Yotsoontorn
Authorized Signatory
03 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. Q24137823

F3-011-05/12-23

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@clcalibration



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	:	AIR FLOW METER
MANUFACTURER	:	BIOS INTERNATIONAL
MODEL / TYPE	:	DCL-M
SERIAL NO.	:	104699
DATE OF CALIBRATION	:	27 December 2024

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-CPPF-03**. The calibration was performed by comparison with Gas Flow Meter which refers to the standard condition of 101.325 kPa and $0 ^\circ\text{C}$.

REFERENCE STANDARD USED :

1. Gas Flow Meter, Alicat Scientific Model M-500SCCM-D-DB15 S/N. 261329.
2. Gas Flow Meter, Alicat Scientific Model M-5SLPM-D-DB15 S/N. 261330.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Chell Instrument Ltd.
Certificate No. N037063, Due Date 26 February 2025.
2. The measurements are traceable to International System of Units (SI), through Chell Instruments Ltd.
Certificate No. N037064, Due Date 26 February 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table 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. Q24137823

F3-011-05/12-23

page 2 of 3



@clcalibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

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



CONDITION OF CALIBRATION ITEM : 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 air flow meter.

CALIBRATION DATA

AIR FLOW METER RESULT

Test point (L/min)	STD Applied (L/min)	DUC Reading (L/min)	Correction (L/min)	Uncertainty ± (L/min)
0.0100	0.0104	0.0101	+0.0003	0.0021
1.5000	1.4996	1.4728	+0.0268	0.0300
3.0000	3.0002	2.9837	+0.0165	0.0300

Technical Note. Media of Gas : Air

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 012 Page 48 of 67

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

End of Certificate

Certificate No. Q24137823

F3-011-05/12-23

page 3 of 3



@clccalibration

CAL

Calibratech Co.,Ltd.

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

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



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-200468-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co.,Ltd.

14/5358 Moo 14, T.Bang Bua Thong, A.Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Electronic Balance

Manufacturer : SHIMADZU

Model : AP225WD

Serial No. : D316301828

ID No. : LAB-BL-003

Capacity : 220000 mg

Resolution : 0.01mg/102000mg, 0.1mg/220000mg

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

Ambient Temperature : (27.3 to 27.4) °C

Relative Humidity : (53.6 to 53.7) %

Air Pressure : 1003.0 mbar

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 25 July 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)

Approved by :

(Satja Sangkhum)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-200468-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (mg)	Correction (mg)	Uncertainty \pm (mg)
1	0.01	0.012
10	0.00	0.012
50	0.01	0.012
100	0.01	0.014
1000	0.00	0.026
2000	0.01	0.034
5000	0.00	0.043
20000	0.00	0.071
50000	0.01	0.11
100000	0.00	0.20
150000	0.0	0.38
200000	0.0	0.38

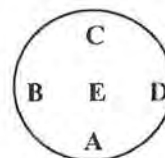
This result of calibration was found accurate as shown on date and place of calibration only.

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 : 50000 mg

A	B	C	D	E	
0.01	0.01	0.02	0.02	0.00	mg



Repeatability

Load test : 200000 mg

Stdev. : 0.053 mg

- o0o -



Metrohm

Compliance Service

Calibration Certificate (CC) for

925 Eco IC

Instrument details

Type:	19250020
Serial No.:	252043/ME (1925002005484)
Manufacturer:	Metrohm AG Ionenstrasse CH-9100 Herisau Switzerland
Firmware:	5.850.0114
Customer instrument ID:	N/A
System Designation Number:	CAL250643/ME

Customer details

Name of company:	Pacific laboratory co.,ltd.
Address:	14/5358 Moo 14 Bang Bua Thong,Bang Bua Thong District, Nonthaburi 11110,Thailand
Department:	Laboratory
Responsible person:	คุณทวีชัย
Calibration place:	Laboratory, Pacific laboratory co.,ltd.

Date and time of calibration:	22/08/2025 ~11:16
-------------------------------	-------------------

Calibration Certificate (CC)

Introduction

The instrument stated above has been inspected in accordance with the corresponding test instructions of Metrohm Ltd. Servicing instructions are compiled and checked for correctness with account taken of the technical apparatus and ambient conditions available to the service engineer at the servicing location. This Calibration Certificate (CC) declares the results regarding calibration and operational status obtained when carrying out the test instructions referred to below

Calibration status

We certify that the instrument stated above meets or exceeds the electrical specifications at the points tested. Test equipment is calibrated and traceable back to national and/or international standards (ISO 17025, NIST).

Operational status

We certify that the instrument stated above executes the instrument's specific functions tested except where detailed overleaf.

Declaration

Document

Test instructions used:	C.1 Test instructions for 925 Eco IC, Version 1.1
-------------------------	---

Reference standards

Type / Model	Manufacturer	Serial No. / Batch No.	Certificate No.	Due date / Expiry date
Millimeter	Fluke	56010242	E112405458	08/12/2025
High pressure gauge	Metrohm	3495450188913	CAL0252-24C0139	15/12/2025

Protocol

Instrument had to be repaired beforehand	Yes	No
If yes, see Calibration Certificate (CC) No.:	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Instrument had to be readjusted beforehand	<input type="checkbox"/>	<input checked="" type="checkbox"/>
If yes, see Calibration Certificate (CC) No.:		



Document Type	Calibration Certificate (CC)
Description	CC for 925 Eco IC
Document ID	CC 925 Version 1.1 / 8.925.3002EN



Document Type	Calibration Certificate (CC)
Description	CC for 925 Eco IC
Document ID	CC 925 Version 1.1 / 8.925.3002EN

Conclusion of test results

Instrument satisfies the specified technical requirements

Recommended date for next maintenance:

Yes ☒ No ☐

Comments

Metrohm representative

Metrohm representative confirms correct execution of instrument calibration

Date	Name	Signature
22/08/2025	Mr. Athakorn Punya	<i>Athakorn P.</i>

Yes ☒ No ☐

Customer representative

Customer representative accepts results of instrument calibration

Date	Name	Signature
22/08/2025	สุภาวดี งามคำ	<i>สุภาวดี งามคำ</i>

Yes ☒ No ☐

Test results

No.	Title	Comments	Pass	
			Yes	No
100	Visual test		<input checked="" type="checkbox"/>	<input type="checkbox"/>
101	Safety test		<input checked="" type="checkbox"/>	<input type="checkbox"/>
102	LED		<input checked="" type="checkbox"/>	<input type="checkbox"/>
103	Fan		<input checked="" type="checkbox"/>	<input type="checkbox"/>
104	Communication		<input checked="" type="checkbox"/>	<input type="checkbox"/>
105	Column plug interface		<input checked="" type="checkbox"/>	<input type="checkbox"/>

No.	Title	Comments	Pass	
			Yes	No
106	IC pump			N/A
106.1	Installation		<input checked="" type="checkbox"/>	<input type="checkbox"/>
106.2	Pump head detection		<input checked="" type="checkbox"/>	<input type="checkbox"/>
106.3	Deaerate		<input checked="" type="checkbox"/>	<input type="checkbox"/>
106.4	Pump dynamics		<input checked="" type="checkbox"/>	<input type="checkbox"/>

No.	Title	Comments	Yes	No	Pass
106.5 Pulsation					
Standard pump head Macro pump head	Maximum [MPa]	Difference [%]			
	13.47	13.02	<5.0	<input type="checkbox"/>	<input type="checkbox"/>
	N/A	N/A	<10.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
106.6 Pressure transducer					
	Nominal value [MPa]	Measured value [MPa]	Tolerance [%]		
	13.12	13.00	± 10.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>
106.7 Flow rate					
	Nominal value [mL]	Measured value [mL]	Tolerance [mL]		
Standard pump head Macro pump head	4.0	4.1	± 0.2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	20.0	N/A	± 1.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>
106.8 Shut off at minimum pressure					
			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
106.9 Shut off at maximum pressure					
			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
106.10 Leak test					
	Maximum [MPa]	Minimum [MPa]	Difference [MPa]		
	17.08	16.52	<1.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>

No.	Title	Comments	Pass		
			Yes	No	N/A
107	Injector				
	107.1 Switching operation		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No.	Title		Yes	No	N/A
108	MSM				
	108.1 Switching operation		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No.	Title	Comments	Yes	No	N/A
109	Peristaltic pump				
	109.1 Rotation CW		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	109.2 Rotation CCW		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	109.3 Speed control		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CC.925 Document history

Date	Version	Author	Description/Changes
14.12.2016	1.0	pr	Creation of document 8.925.3002EN
31.03.2021	1.1	pr	Test no. 103 Fan depends on the installed power supply version according C.3 notice of modification CRM-28908.

End of CC Document

ภาคผนวกที่ 5-4
เอกสารสอบเทียบระดับความดังเสียง
(Sound Level Meter)



APTITECH CALIBRATION CO., LTD.

50/40 Moo 5 T. Lat Sawai, A. Lamlukka, Pathumthani 12150
Tel. +66 2103-6290 Fax. +66 2103-6291
Email. sales@aptitech-cal.com



CERTIFICATE OF CALIBRATION

Certificate Number : EI250284

Customer : Pacific Laboratory Co.,Ltd.
Address : 14/5358 Moo 14 Tambol Bang Bua Thong Amphoe Bang Thong, Nonthaburi 11110

Description	: Sound Level Meter	W/O Number	: EI250284
Manufacturer	: Scarlet Tech	Calibration Location	: Laboratory
Model	: ST-11D	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 820967	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 31-Jan-2025

This certifies that the above instrument was calibrated in compliance with the Calibration Systems Requirement of ISO/IEC 17025:2017 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to National Institute of Metrology (Thailand) and/or other recognized national measurement institutes which realizes the units of measurement according to the International System of Units (SI Unit).

Measurement uncertainties at the time of test are given where applicable. They are calculated in accordance with the method described in The Expression of Uncertainty and Confidence in Measurement (M3003).

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$ such that the coverage probability corresponds to approximately 95%. This result of calibration was found accurate as shown on date and place of calibration only.

Standard Equipments

Description	Serial No.	Certificate No.	Traceability	Due Date
Sound Level Calibrator	141011576	CP20240179EA	TISI: 22-LB0119	14-May-25

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 03-Feb-2025

Issued Date : 06-Feb-2025

Calibrated By : Ms. Hathaichanok Kaewsrilai

- ☒ Mr. Anuwat Simsiriwat [Laboratory Manager]
☐ Mr. Kornupong Suksamran [Technical Manager]

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CALIBRATION REPORT

Certificate Number : EI250284

Calibration Method

The Unit Under Calibration (UUC) was calibrated by comparison measurement with sound level calibrator. The calibration has been accomplished in an ambient environment controlled, base on the in-house calibration procedure. The identification of the laboratory's calibration procedure employed are CP-7.2-01-107

Calibration Results

Appearance and function of use : Good
Results of Calibration : Without any adjustment
Sound Level Calibration
- Frequency Weighting : A
- Resolution : 0.1 dB

Sound Level Measurement (Slow Mode)

Parameter	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LFp	20-140 dB	93.86 dB	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB
LSp	20-140 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB
LIp	20-140 dB	93.86 dB	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.5 dB	-0.37 dB	0.60 dB

Sound Level Measurement (Fast Mode)

Parameter	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LFp	20-140 dB	93.86 dB	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LSp	20-140 dB	93.86 dB	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB
LIp	20-140 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB

--- End of Certificate ---

Sound Level Meter Calibration Report

Calibrate No. : SLM 158/2568

Calibrate Date : October 1, 2025

Equipment	:	Sound Calibrator
Manufacturer	:	Soundtek
Model/Type	:	ST-120
Serial No.	:	211203764
Sound Pressure Level	:	94 and 114 dB
Accuracy	:	94 ± 0.3dB and 114 ± 0.5dB
Frequency	:	1000Hz ± 1%
Customer Name	:	บริษัท โรงงานเหล็กกรุงเทพ จำกัด

[illegible]

Approved By

Public Laboratory Co., Ltd.
Sakuna S.
(Miss Sakuna Supparot)
Technician



Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsi-Nakornnayok Rd., Bungyeetho, Thunyaburi,
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Certificate of Calibration

Page 1 of 3

Certificate Number : EL40431/25

Control Number : PCAL153035

Customer Control : -

Description : Sound Calibrator

Manufacturer : SOUNDTEK

Model : ST-120

Serial Number : 211203764

Customer : Pacific Laboratory Co., Ltd.

14/5358 Moo 14, Tambol Bang Bua Thong, Amphoe Bang Bua Thong,
Nonthaburi 11110

Date of Receipt : 16-Jul-25

Date of Calibration : 16-Jul-25

Calibration Location : Electrical Laboratory

Environment : Temperature $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$
: Relative Humidity $50\% \pm 20\%$

Calibration Method : Calibration Procedure Number CP-EL35

Calibration Results : See data attached

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

This certificate is issued in accordance with ISO/IEC17025 and the conditions of accreditation granted by the Accreditation Body which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. The results relate only to the item calibrated.

This certificate shall not be reproduced other than in full except without the prior written approval of the Head of Calibration Laboratory of Professional Calibration & Services Co., Ltd.

Calibrated By

Ms. Janjira Intapat

Authorized Signature

(Mr. Jumnong Junphong)

23-Jul-25

Issued Date



Professional Calibration & Services Co., Ltd.

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Calibration Report

Certificate Number : **EL40431/25**

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Meter	030606101	ANAB : AC-2590	EL11791/25	11-Mar-26
Sound Calibrator	125626778	NSC : Calibration 0037	EEL.BP. 99/0168	23-Jan-26

Condition as received : Normal

Definitions :-

- * ANAB - The ANSI National Accreditation Board
- * NSC - National Standardization Council of Thailand



Professional Calibration & Services Co., Ltd.

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Calibration Report

Certificate No.: EL40431/25

Page : 3 of 3

Calibration Results

Sound Pressure Level Accuracy

Nominal Value	Measured Value	UUC Error	Uncertainty (±)
94 dB	94.01 dB	-0.01 dB	0.18 dB
114 dB	114.08 dB	-0.08 dB	0.17 dB

...End...



PN-Tech Instruments Co., Ltd.

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Email : info.pntechinstruments@gmail.com, info@pntech-i.com



CERTIFICATE OF CALIBRATION

Certificate Number : PNT08-25-144-1

Page : 1 of 3

Customer : Pacific Laboratory Co.,Ltd.
: 14/5358 Moo 14 Tambol Bang Bua Thong
: Amphoe Bang Thong, Nonthaburi 11110

Description of Equipment : Sound Level Meter
Manufacturer : ACO
Model Number : Type 6236
Serial Number : 222021
ID Number : N/A
Calibration Location : In-Lab
Ambient Temperature : 23.7 °C (± 3.0 °C)
Ambient Humidity : 55.4 %RH (± 20.0 %RH)
Received Date : 28-Aug-25
Calibration Date : 01-Sep-25
Procedure : CP-43-EL

This certifies that the above instrument was calibrated in compliance with the calibration systems requirement of ISO/IEC 17025 : 2017 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to National Institute of Metrology (Thailand) and/or other recognized national measurement institutes which realizes the units of measurement according to the International System of Units (SI Unit).

A binary decision rule, utilizing simple acceptance criteria is used for the determination of compliance statements. Result are reported without factoring in the effects of measurement uncertainty.

Issued Date : 04-Sep-25

Calibration by : Mr.Paitoon Chungklueng

Approved by :

Quality Assurance : Mr.Natthaphol Boonmee

Mr.Paitoon Chungklueng
Authorized Signatory



PN-Tech Instruments Co., Ltd.

100/64 Moo.6 T.Ladsawai R.Lamlukka Pathumthani 12160

Tel. 092-824-2461, 061-993-6478 www.pntech-i.com

Email : info.pntinstruments@gmail.com, info@pntech-i.com



CALIBRATION REPORT

Certificate Number : PNT08-25-144-1

Page : 2 of 3

Standard Equipment Used

<u>Equip. No.</u>	<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
PNS-043	Sound Level Calibrator	N949786	EL64654/24	23-Dec-25

Traceability

This certificate is traceable to the International System of Unit (SI Unit) maintained at ;

- *Professional Calibration & Services Co., Ltd.*



CALIBRATION REPORT

Certificate Number : PNT08-25-144-1

Page : 3 of 3

Results of Calibration : (/) Without Adjustment () With Adjustment

Function : Sound Level Measurement : (Test Mode Slow)

UUC Range : 40 to 130 dB

Resolution : 0.1 dB

Function	Standard Value (dB)	UUC Reading (dB)	UUC Error (dB)	Uncertainty (±) (dB)
LA	94.27	94.1	-0.17	0.28
	114.30	114.1	-0.20	0.28
LC	94.27	94.0	-0.27	0.28
	114.30	114.1	-0.20	0.28

Function : Sound Level Measurement : (Test Mode Fast)

UUC Range : 40 to 130 dB

Resolution : 0.1 dB

Function	Standard Value (dB)	UUC Reading (dB)	UUC Error (dB)	Uncertainty (±) (dB)
LA	94.27	94.1	-0.17	0.28
	114.30	114.1	-0.20	0.28
LC	94.27	94.1	-0.17	0.28
	114.30	114.1	-0.20	0.28

**** End of Certificate****



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CERTIFICATE OF CALIBRATION

Certificate Number : SC250020

Customer : Pacific Laboratory Co.,Ltd.
Address : 14/5358 Moo 14 Tambol Bang Bua Thong, Amphoe Bang Thong,
Nonthaburi 11110

Description	: Sound Level Meter	W/O Number	: SC250020
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222049	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 06-Jan-25

This certifies that the above instrument was calibrated in compliance with the Calibration Systems Requirement of ISO/IEC 17025:2017 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to National Institute of Metrology (Thailand) and/or other recognized national measurement institutes which realizes the units of measurement according to the International System of Units (SI Unit).

Measurement uncertainties at the time of test are given where applicable. They are calculated in accordance with the method described in The Expression of Uncertainty and Confidence in Measurement (M3003).

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$ such that the coverage probability corresponds to approximately 95%. This result of calibration was found accurate as shown on date and place of calibration only.

Standard Equipments

Description	Serial No.	Certificate No.	Traceability	Due Date
Sound Level Calibrator	141011576	CP20230261EA	TISI: 22-LB0119	14-May-25

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 08-Jan-2025

Issued Date : 13-Jan-2025

Calibrated By : Ms. Hathaichanok Kaewsrirai

☒ Mr. Anuwat Simsiriwat [Laboratory Manager]

☐ Mr. Kornupong Suksamran [Technical Manager]

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CALIBRATION REPORT

Certificate Number : SC250020

Calibration Method

The Unit Under Calibration (UUC) was calibrated by comparison measurement with sound level calibrator. The calibration has been accomplished in an ambient environment controlled, base on the in-house calibration procedure. The identification of the laboratory's calibration procedure employed are CP-7.2-01-107

Calibration Results

Appearance and function of use : Good
Results of Calibration : Without any adjustment

Sound Level Measurement (Slow Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.0 dB	0.14 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB

Sound Level Measurement (Fast Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB

--- End of Certificate ---



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CERTIFICATE OF CALIBRATION

Certificate Number : EI250214

Customer : Pacific Laboratory Co.,Ltd.
Address : 14/5358 Moo 14 Tambol Bang Bua Thong Amphoe Bang Thong, Nonthaburi 11110

Description	: Sound Level Meter	W/O Number	: EI250214
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222137	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 21-Jan-25

This certifies that the above instrument was calibrated in compliance with the Calibration Systems Requirement of ISO/IEC 17025:2017 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to National Institute of Metrology (Thailand) and/or other recognized national measurement institutes which realizes the units of measurement according to the International System of Units (SI Unit).

Measurement uncertainties at the time of test are given where applicable. They are calculated in accordance with the method described in The Expression of Uncertainty and Confidence in Measurement (M3003).

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$ such that the coverage probability corresponds to approximately 95%. This result of calibration was found accurate as shown on date and place of calibration only.

Standard Equipments

Description	Serial No.	Certificate No.	Traceability	Due Date
Sound Level Calibrator	141011576	CP20240179EA	TISI: 22-LB0119	14-May-25

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 27-Jan-2025

Issued Date : 30-Jan-2025

Calibrated By : Ms. Hathaichanok Kaewsrirai

☒ Mr. Anuwat Simsiriwat | Laboratory Manager |

☐ Mr. Kornupong Suksamran | Technical Manager |

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CALIBRATION REPORT

Certificate Number : EI250214

Calibration Method

The Unit Under Calibration (UUC) was calibrated by comparison measurement with sound level calibrator. The calibration has been accomplished in an ambient environment controlled, base on the in-house calibration procedure. The identification of the laboratory's calibration procedure employed are CP-7.2-01-107

Calibration Results

Appearance and function of use : Good
Results of Calibration : Without any adjustment

Sound Level Measurement (Slow Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.2 dB	0.34 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB

Sound Level Measurement (Fast Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB

--- End of Certificate ---



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CERTIFICATE OF CALIBRATION

Certificate Number : SC240297

Customer : Pacific Laboratory Co.,Ltd.
Address : 14/5358 Moo 14 Tambol Bang Bua Thong, Amphoe Bang Thong, Nonthaburi 11110

Description	: Sound Level Meter	W/O Number	: SC240297
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222020	Ambient Humidity	: 50 ± 15 %RH
ID. Number	: N/A	Received Date	: 16-Dec-24

This certifies that the above instrument was calibrated in compliance with the Calibration Systems Requirement of ISO/IEC 17025:2017 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to National Institute of Metrology (Thailand) and/or other recognized national measurement institutes which realizes the units of measurement according to the International System of Units (SI Unit).

Measurement uncertainties at the time of test are given where applicable. They are calculated in accordance with the method described in The Expression of Uncertainty and Confidence in Measurement (M3003).

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$ such that the coverage probability corresponds to approximately 95%. This result of calibration was found accurate as shown on date and place of calibration only.

Standard Equipments

Description	Serial No.	Certificate No.	Traceability	Due Date
Sound Level Calibrator	141011576	CP20240179EA	TISI: 22-LB0119	14-May-25

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 17-Dec-2024

Issued Date : 20-Dec-2024

Calibrated By : Mr.Worachot Thongthin

- ☒ Mr. Anuwat Simsiriwat [Laboratory Manager]
☐ Mr. Nattaphol Boonmee [Quality Manager]

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CALIBRATION REPORT

Certificate Number : SC240297

Calibration Method

The Unit Under Calibration (UUC) was calibrated by comparison measurement with sound level calibrator. The calibration has been accomplished in an ambient environment controlled, base on the in-house calibration procedure. The identification of the laboratory's calibration procedure employed are CP-7.2-01-107

Calibration Results

Appearance and function of use : Good
Results of Calibration : Without any adjustment

Sound Level Measurement (Slow Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.5 dB	-0.37 dB	0.60 dB

Sound Level Measurement (Fast Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.5 dB	-0.37 dB	0.60 dB

--- End of Certificate ---



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CERTIFICATE OF CALIBRATION

Certificate Number : EI250282

Customer : Pacific Laboratory Co.,Ltd.
Address : 14/5358 Moo 14 Tambol Bang Bua Thong Amphoe Bang Thong, Nonthaburi 11110

Description	: Sound Level Meter	W/O Number	: EI250282
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222174	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 31-Jan-25

This certifies that the above instrument was calibrated in compliance with the Calibration Systems Requirement of ISO/IEC 17025:2017 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to National Institute of Metrology (Thailand) and/or other recognized national measurement institutes which realizes the units of measurement according to the International System of Units (SI Unit).

Measurement uncertainties at the time of test are given where applicable. They are calculated in accordance with the method described in The Expression of Uncertainty and Confidence in Measurement (M3003).

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$ such that the coverage probability corresponds to approximately 95%. This result of calibration was found accurate as shown on date and place of calibration only.

Standard Equipments

Description	Serial No.	Certificate No.	Traceability	Due Date
Sound Level Calibrator	141011576	CP20240179EA	TISI: 22-LB0119	14-May-25

Authority of Calibration

Approved Signatory

Calibration Date : 03-Feb-2025

Issued Date : 06-Feb-2025

Calibrated By : Ms. Hathaichanok Kaewsrisai

☒ Mr. Anuwat Simsiriwat [Laboratory Manager]

☐ Mr. Kornupong Suksamran [Technical Manager]

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CALIBRATION REPORT

Certificate Number : EI250282

Calibration Method

The Unit Under Calibration (UUC) was calibrated by comparison measurement with sound level calibrator. The calibration has been accomplished in an ambient environment controlled, base on the in-house calibration procedure. The identification of the laboratory's calibration procedure employed are CP-7.2-01-107

Calibration Results

Appearance and function of use : Good
Results of Calibration : Without any adjustment

Sound Level Measurement (Slow Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(\pm) Uncertainty
LA	40-130 dB	93.86 dB	94.2 dB	0.34 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB

Sound Level Measurement (Fast Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(\pm) Uncertainty
LA	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB

--- End of Certificate ---



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Email: sales@aptitech-cal.com



CERTIFICATE OF CALIBRATION

Certificate Number : SC240293

Customer : Pacific Laboratory Co.,Ltd.
Address : 14/5358 Moo 14 Tambol Bang Bua Thong, Amphoe Bang Thong, Nonthaburi 11110

Description	: Sound Level Meter	W/O Number	: SC240293
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222016	Ambient Humidity	: 50 ± 15 %RH
ID. Number	: N/A	Received Date	: 16-Dec-24

This certifies that the above instrument was calibrated in compliance with the Calibration Systems Requirement of ISO/IEC 17025:2017 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to National Institute of Metrology (Thailand) and/or other recognized national measurement institutes which realizes the units of measurement according to the International System of Units (SI Unit).

Measurement uncertainties at the time of test are given where applicable. They are calculated in accordance with the method described in The Expression of Uncertainty and Confidence in Measurement (M3003).

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$ such that the coverage probability corresponds to approximately 95%. This result of calibration was found accurate as shown on date and place of calibration only.

Standard Equipments

Description	Serial No.	Certificate No.	Traceability	Due Date
Sound Level Calibrator	141011576	CP20240179EA	TISI: 22-LB0119	14-May-25

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 17-Dec-2024

Issued Date : 20-Dec-2024

Calibrated By : Mr.Worachot Thongthin

- ☒ Mr. Anuwat Simsiriwat [Laboratory Manager]
☐ Mr. Nattaphol Boonmee [Quality Manager]

Calibration certificates without signatures are not valid. This certificate applied to only the item identified and shall not be reproduced other than in full, without the specific written approval by APTITECH CALIBRATION CO., LTD.

CALIBRATION REPORT

Certificate Number : SC240293

Calibration Method

The Unit Under Calibration (UUC) was calibrated by comparison measurement with sound level calibrator. The calibration has been accomplished in an ambient environment controlled, base on the in-house calibration procedure. The identification of the laboratory's calibration procedure employed are CP-7.2-01-107

Calibration Results

Appearance and function of use : Good
Results of Calibration : Without any adjustment

Sound Level Measurement (Slow Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB

Sound Level Measurement (Fast Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB

--- End of Certificate ---

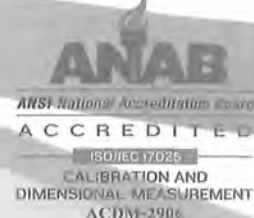


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CERTIFICATE OF CALIBRATION

Certificate Number : SC250014

Customer : Pacific Laboratory Co.,Ltd.
Address : 14/5358 Moo 14 Tambol Bang Bua Thong, Amphoe Bang Thong,
Nonthaburi 11110

Description	: Sound Level Meter	W/O Number	: SC250014
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222042	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 06-Jan-25

This certifies that the above instrument was calibrated in compliance with the Calibration Systems Requirement of ISO/IEC 17025:2017 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to National Institute of Metrology (Thailand) and/or other recognized national measurement institutes which realizes the units of measurement according to the International System of Units (SI Unit).

Measurement uncertainties at the time of test are given where applicable. They are calculated in accordance with the method described in The Expression of Uncertainty and Confidence in Measurement (M3003).

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$ such that the coverage probability corresponds to approximately 95%. This result of calibration was found accurate as shown on date and place of calibration only.

Standard Equipments

Description	Serial No.	Certificate No.	Traceability	Due Date
Sound Level Calibrator	141011576	CP20230261EA	TISI: 22-LB0119	14-May-25

APTITECH

Authority of Calibration

Approved Signatory

- ☒ Mr. Anuwat Simsiriwat [Laboratory Manager]
☐ Mr. Kornupong Suksamran [Technical Manager]

Calibration Date : 08-Jan-2025

Issued Date : 13-Jan-2025

Calibrated By : Ms. Hathaichanok Kaewsrirai

Calibration certificates without signatures are not valid. This certificate applied to only the item identified and shall not be reproduced other than in full, without the specific written approval by APTITECH CALIBRATION CO., LTD.



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CALIBRATION REPORT

Certificate Number : SC250014

Calibration Method

The Unit Under Calibration (UUC) was calibrated by comparison measurement with sound level calibrator. The calibration has been accomplished in an ambient environment controlled, base on the in-house calibration procedure. The identification of the laboratory's calibration procedure employed are CP-7.2-01-107

Calibration Results

Appearance and function of use : Good
Results of Calibration : Without any adjustment

Sound Level Measurement (Slow Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB

Sound Level Measurement (Fast Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB

--- End of Certificate ---



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CERTIFICATE OF CALIBRATION

Certificate Number : EI250215

Customer : Pacific Laboratory Co.,Ltd.
Address : 14/5358 Moo 14 Tambol Bang Bua Thong Amphoe Bang Thong, Nonthaburi 11110

Description	: Sound Level Meter	W/O Number	: EI250215
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222138	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 21-Jan-25

This certifies that the above instrument was calibrated in compliance with the Calibration Systems Requirement of ISO/IEC 17025:2017 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to National Institute of Metrology (Thailand) and/or other recognized national measurement institutes which realizes the units of measurement according to the International System of Units (SI Unit).

Measurement uncertainties at the time of test are given where applicable. They are calculated in accordance with the method described in The Expression of Uncertainty and Confidence in Measurement (M3003).

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$ such that the coverage probability corresponds to approximately 95%. This result of calibration was found accurate as shown on date and place of calibration only.

Standard Equipments

Description	Serial No.	Certificate No.	Traceability	Due Date
Sound Level Calibrator	141011576	CP20240179EA	TISI: 22-LB0119	14-May-25

APTITECH

Authority of Calibration

Approved Signatory

- ☒ Mr. Anuwat Simsiriwat [Laboratory Manager]
☐ Mr. Kornupong Suksamran [Technical Manager]

Calibration Date : 27-Jan-2025

Issued Date : 30-Jan-2025

Calibrated By : Ms. Hathaichanok Kaewsrirai

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CALIBRATION REPORT

Certificate Number : EI250215

Calibration Method

The Unit Under Calibration (UUC) was calibrated by comparison measurement with sound level calibrator. The calibration has been accomplished in an ambient environment controlled, base on the in-house calibration procedure. The identification of the laboratory's calibration procedure employed are CP-7.2-01-107

Calibration Results

Appearance and function of use : Good
Results of Calibration : Without any adjustment

Sound Level Measurement (Slow Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB

Sound Level Measurement (Fast Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.5 dB	-0.37 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.5 dB	-0.37 dB	0.60 dB

--- End of Certificate ---



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CERTIFICATE OF CALIBRATION

Certificate Number : EI250280

Customer : Pacific Laboratory Co.,Ltd.
Address : 14/5358 Moo 14 Tambol Bang Bua Thong Amphoe Bang Thong, Nonthaburi 11110

Description	: Sound Level Meter	W/O Number	: EI250280
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222170	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 31-Jan-25

This certifies that the above instrument was calibrated in compliance with the Calibration Systems Requirement of ISO/IEC 17025:2017 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to National Institute of Metrology (Thailand) and/or other recognized national measurement institutes which realizes the units of measurement according to the International System of Units (SI Unit).

Measurement uncertainties at the time of test are given where applicable. They are calculated in accordance with the method described in The Expression of Uncertainty and Confidence in Measurement (M3003).

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$ such that the coverage probability corresponds to approximately 95%. This result of calibration was found accurate as shown on date and place of calibration only.

Standard Equipments

Description	Serial No.	Certificate No.	Traceability	Due Date
Sound Level Calibrator	141011576	CP20240179EA	TISI: 22-LB0119	14-May-25

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 03-Feb-2025

Issued Date : 06-Feb-2025

Calibrated By : Ms. Hathaichanok Kaewsrisai

☒ Mr. Anuwat Simsiriwat [Laboratory Manager]

☐ Mr. Kornupong Suksamran [Technical Manager]

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CALIBRATION REPORT

Certificate Number : EI250280

Calibration Method

The Unit Under Calibration (UUC) was calibrated by comparison measurement with sound level calibrator. The calibration has been accomplished in an ambient environment controlled, base on the in-house calibration procedure. The identification of the laboratory's calibration procedure employed are CP-7.2-01-107

Calibration Results

Appearance and function of use : Good
Results of Calibration : Without any adjustment

Sound Level Measurement (Slow Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB

Sound Level Measurement (Fast Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB

--- End of Certificate ---



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CERTIFICATE OF CALIBRATION

Certificate Number : SC250015

Customer : Pacific Laboratory Co.,Ltd.
Address : 14/5358 Moo 14 Tambol Bang Bua Thong, Amphoe Bang Thong,
Nonthaburi 11110

Description	: Sound Level Meter	W/O Number	: SC250015
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222044	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 06-Jan-25

This certifies that the above instrument was calibrated in compliance with the Calibration Systems Requirement of ISO/IEC 17025:2017 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to National Institute of Metrology (Thailand) and/or other recognized national measurement institutes which realizes the units of measurement according to the International System of Units (SI Unit).

Measurement uncertainties at the time of test are given where applicable. They are calculated in accordance with the method described in The Expression of Uncertainty and Confidence in Measurement (M3003).

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by coverage factor $k=2$ such that the coverage probability corresponds to approximately 95%. This result of calibration was found accurate as shown on date and place of calibration only.

Standard Equipments

Description	Serial No.	Certificate No.	Traceability	Due Date
Sound Level Calibrator	141011576	CP20230261EA	TISI: 22-LB0119	14-May-25



Authority of Calibration

Approved Signatory

- ☒ Mr. Anuwat Simsiriwat | Laboratory Manager |
☐ Mr. Kornupong Suksamran | Technical Manager |

Calibration Date : 08-Jan-2025

Issued Date : 13-Jan-2025

Calibrated By : Ms. Hathaichanok Kaewsrisai

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CALIBRATION REPORT

Certificate Number : SC250015

Calibration Method

The Unit Under Calibration (UUC) was calibrated by comparison measurement with sound level calibrator. The calibration has been accomplished in an ambient environment controlled, base on the in-house calibration procedure. The identification of the laboratory's calibration procedure employed are CP-7.2-01-107

Calibration Results

Appearance and function of use : Good
Results of Calibration : Without any adjustment

Sound Level Measurement (Slow Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.0 dB	0.14 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB

Sound Level Measurement (Fast Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.0 dB	0.14 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.0 dB	0.14 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB

--- End of Certificate ---



PN-Tech Instruments Co., Ltd.

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Email : info.pntechinstruments@gmail.com, info@pntech-i.com



CERTIFICATE OF CALIBRATION

Certificate Number : PNT08-25-144-2

Page : 1 of 3

Customer : Pacific Laboratory Co.,Ltd.
: 14/5358 Moo 14 Tambol Bang Bua Thong
: Amphoe Bang Thong, Nonthaburi 11110

Description of Equipment : Sound Level Meter
Manufacturer : ACO
Model Number : Type 6236
Serial Number : 222131
ID Number : N/A
Calibration Location : In-Lab
Ambient Temperature : 23.7 °C (± 3.0 °C)
Ambient Humidity : 55.4 %RH (± 20.0 %RH)
Received Date : 28-Aug-25
Calibration Date : 01-Sep-25
Procedure : CP-43-EL

This certifies that the above instrument was calibrated in compliance with the calibration systems requirement of ISO/IEC 17025 : 2017 in accordance with referenced procedures. Standards used to perform this calibration are certified by or traceable to National Institute of Metrology (Thailand) and/or other recognized national measurement institutes which realizes the units of measurement according to the International System of Units (SI Unit).

A binary decision rule, utilizing simple acceptance criteria is used for the determination of compliance statements. Result are reported without factoring in the effects of measurement uncertainty.

Issued Date : 04-Sep-25

Calibration by : Mr.Paitoon Chungkluang

Approved by :

Quality Assurance : Mr.Natthaphol Boonmee

Mr.Paitoon Chungkluang
Authorized Signatory



PN-Tech Instruments Co., Ltd.

100/64 Moo.6 T.Ladsawai R.Lamlukka Pathumthani 12150

Tel. 092-824-2461, 061-993-6478 www.pntech-i.com

Email : info.pntinstruments@gmail.com, info@pntech-i.com



CALIBRATION REPORT

Certificate Number : PNT08-25-144-2

Page : 2 of 3

Standard Equipment Used

<u>Equip. No.</u>	<u>Equipment Name</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
PNS-043	Sound Level Calibrator	N949786	EL64654/24	23-Dec-25

Traceability

This certificate is traceable to the International System of Unit (SI Unit) maintained at ;

- *Professional Calibration & Services Co., Ltd.*



PN-Tech Instruments Co., Ltd.

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CALIBRATION REPORT

Certificate Number : PNT08-25-144-2

Page : 3 of 3

Results of Calibration : (/) Without Adjustment () With Adjustment

Function : Sound Level Measurement : (Test Mode Slow)

UUC Range : 40 to 130 dB

Resolution : 0.1 dB

Function	Standard Value (dB)	UUC Reading (dB)	UUC Error (dB)	Uncertainty (±) (dB)
LA	94.27	94.2	-0.07	0.28
	114.30	114.2	-0.10	0.28
LC	94.27	94.2	-0.07	0.28
	114.30	114.2	-0.10	0.28

Function : Sound Level Measurement : (Test Mode Fast)

UUC Range : 40 to 130 dB

Resolution : 0.1 dB

Function	Standard Value (dB)	UUC Reading (dB)	UUC Error (dB)	Uncertainty (±) (dB)
LA	94.27	94.2	-0.07	0.28
	114.30	114.1	-0.20	0.28
LC	94.27	94.2	-0.07	0.28
	114.30	114.2	-0.10	0.28

**** End of Certificate****

ภาคผนวกที่ 5-5
เอกสารสอบเทียบสภาพความร้อน (Heat Stress)

Factory Calibration Certificate

Instrument information

Name	WET BULB GLOBE TEMPERATURE (WBGT) METER
Series No	3162503048
Type	JT2011-E2A

Integrity check of instrument

Appearance	✓
Parts integrity	✓
Screen display or touch	✓
Instrument button	✓
Power supply	✓
battery	✓
Data storage and export	✓
Deviation degree of comparison test with standard instrument	✓

Calibration Results

UUC Sensor	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
WET	25.0	25.1	-0.1	0.2
	30.0	29.8	0.2	0.2
	35.0	34.9	0.1	0.2
	40.0	40.2	-0.2	0.2
	45.0	44.9	0.1	0.2
DRY	25.0	24.8	0.2	0.2
	30.0	29.9	0.1	0.2
	35.0	35.2	-0.2	0.2
	40.0	40.1	-0.1	0.2
	45.0	44.8	0.2	0.2
GLOBE	25.0	24.9	0.1	0.2
	30.0	30.1	-0.1	0.2
	35.0	34.8	0.2	0.2
	40.0	39.8	0.2	0.2
	45.0	44.9	0.1	0.2

Environmental conditions: temperature: 26 °C±2°C, relative humidity: 30% RH±10RH%

Reference Standard : Standard Mercury Thermometers, Manufacturer: BGRI, Model: STA, SN: 2-56,
Calibrated Date: 30 March 2021, Calibration Certificate No. : RA21H-AB1000009
This Certificate is traceable to NCMT North China, Certificate No.: RA20J-AK000073

Calibration Engineer: _____

Date: _____



Factory Calibration Certificate

JANTYTECH
建通科技

Instrument information

Name	WET BULB GLOBE TEMPERATURE (WBGT) METER
Series No	3162501034
Type	JT2011-E2A

Integrity check of instrument

Appearance	√
Parts integrity	√
Screen display or touch	√
Instrument button	√
Power supply	√
battery	√
Data storage and export	√
Deviation degree of comparison test with standard instrument	√

Calibration Results

UUC Sensor	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
WET	25.0	25.2	-0.2	0.2
	30.0	29.8	0.2	0.2
	35.0	34.9	0.1	0.2
	40.0	40.1	-0.1	0.2
	45.0	44.8	0.2	0.2
DRY	25.0	24.8	0.2	0.2
	30.0	30.2	-0.2	0.2
	35.0	35.2	-0.2	0.2
	40.0	40.2	-0.2	0.2
	45.0	44.9	0.1	0.2
GLOBE	25.0	24.8	0.2	0.2
	30.0	29.9	0.1	0.2
	35.0	34.9	0.1	0.2
	40.0	40.1	-0.1	0.2
	45.0	44.8	0.2	0.2

Environmental conditions: temperature: 26 °C±2°C, relative humidity: 30% RH±10RH%

Reference Standard : Standard Mercury Thermometers , Manufacturer: BGRI, Model: STA, SN: 2-56,

Calibrated Date: 30 March 2021, Calibration Certificate No. : RA21H-AB1000009

This Certificate is traceable to NCMT North China, Certificate No.: RA20J-AK000073

Calibration Engineer:

Date: January 20, 2025



ภาคผนวกที่ 5-6
เอกสารสอบเทียบคุณภาพน้ำทิ้ง

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-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-420078-1 **Page : 1 of 2**

Submitted by : Pacific Laboratory Co., Ltd.
14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : pH Meter with electrode
pH meter
Manufacturer : Eutech Model : pH 700
Range : N/A pH Resolution : 0.01 pH
Serial No. : 2841305 ID No. : LAB-PH-002
Electrode
Model : N/A Serial No. : 3172493

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd.
Ambient Temperature : (25.0 to 26.0)^o C
Relative Humidity : (40 to 45) %

Date of Received : 30 July 2024
Date of Calibration : 30 July 2024
Date of Issue : 03 August 2024
Calibrated by : Permpon Chanpu
Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)


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

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00307/66	23 Aug 2025	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.008	61293328	986281	25 Apr 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.986	61281486	986283	25 Apr 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
9.997	61281073	986282	25 Apr 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by : 
(Surachai Premthong)
Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-420078-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (\pm mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	177.5	0.0	0.12
	0.0000	7	7.00	0.1	-0.1	0.086
	-177.4800	10	10.00	-177.4	-0.1	0.12

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (\pm pH)
4, 7, 10	4.008	4.01	0.00	0.0097
	6.986	7.00	-0.01	0.011
	9.997	10.01	-0.01	0.014

Remark

UUC : Unit Under Calibration

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

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

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NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-420078-2

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A pH

Resolution : 0.01 pH

Serial No. : 2841305

ID No. : LAB-PH-002

Electrode

Model : N/A

Serial No. : 3052953

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

Ambient Temperature : (25.0 to 26.0)°C

Relative Humidity : (40 to 45) %

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 03 August 2024

Calibrated by : Permpoon Chanpu

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

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

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00307/66	23 Aug 2025	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.008	61293328	986281	25 Apr 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.986	61281486	986283	25 Apr 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
9.997	61281073	986282	25 Apr 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-420078-2

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (± mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	177.5	0.0	0.12
	0.0000	7	7.00	0.1	-0.1	0.086
	-177.4800	10	10.00	-177.4	-0.1	0.12

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.008	4.01	0.00	0.0097
	6.986	7.00	-0.01	0.011
	9.997	10.01	-0.01	0.014

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 67-400424-1 **Page : 1 of 2**

Submitted by : Pacific Laboratory Co., Ltd
14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Digital Thermometer with Thermistor probe
Temperature Indicator
Manufacturer : Eutech Model : pH 700
Range : N/A °C Resolution : 0.1 °C
Serial No. : 2841305 ID No. : LAB-PH-002
Thermistor probe
Model : N/A Sheath Material : Stainless
Diameter : 3 mm. Length : 115 mm.
Serial No. : PHSTEMB01P 304 ID No. : LAB-PH-002

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd
Ambient Temperature : (25.0 to 25.6) °C
Relative Humidity : (45 to 47) %
Line Voltage : (220.0 to 222.0) VAC

Date of Received : 30 July 2024
Date of Calibration : 30 July 2024
Date of Issue : 03 August 2024
Calibrated by : Permpon Chanpu
Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4003 by compared with PRT in the liquid bath at the constant controlled temperature.
The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400002	TT-0074-22	23 Aug 2025	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400033	22E569	25 Apr 2025	National Institute of Metrology Thailand (NIMT)

Approved by :



(Bunjerd Masri)

Supervisor

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Certificate of Calibration

Certificate No. : 67-400424-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
115	25.005	24.8	0.2	0.19

Remark

UUC : Unit Under Calibration

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

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

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B



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NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-200273-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

14/5358 Moo 14, T.Bang Bua Thong, A.Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Electronic Balance

Manufacturer : SHIMADZU

Model : AP225WD

Serial No. : D316301828

ID No. : LAB-BL-003

Capacity : 220000 mg

Resolution : 0.01mg/102000mg, 0.1mg/220000mg

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

Ambient Temperature : (26.2 to 26.4) °C

Relative Humidity : (34.0 to 35.4) %

Air Pressure : 1007.0 mbar

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 31 July 2024

Calibrated by : Akaradath Thippichai

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

Edition 7 - November 2022

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02232088	08 Nov 2024	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

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Certificate of Calibration

Certificate No. : 67-200273-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (mg)	Correction (mg)	Uncertainty \pm (mg)
1	0.01	0.012
10	0.01	0.012
50	0.01	0.012
100	0.01	0.014
1000	0.00	0.026
2000	0.01	0.034
5000	0.00	0.043
20000	0.00	0.071
50000	0.01	0.11
100000	0.00	0.20
150000	0.0	0.38
200000	0.0	0.38

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 : 50000 mg

A	B	C	D	E	
0.00	0.00	0.01	0.00	0.00	mg



Repeatability

Load test : 200000 mg

Stdev. : 0.053 mg

A handwritten signature in black ink, appearing to be 'ABJ'.

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NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-400454-3

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd

14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : Aqua Lytic

Model : TC 135S

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 0614/000033

ID No. : LAB-IB-001

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

Ambient Temperature : (25.5 to 26.0) °C

Relative Humidity : (40 to 45) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 03 August 2024

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units
Standard Digital Thermometer with RTD Probe

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400029 & 400043	67-400245-1	27 Oct 2024	National Institute of Metrology Thailand (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

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Certificate of Calibration

Certificate No. : 67-400454-3

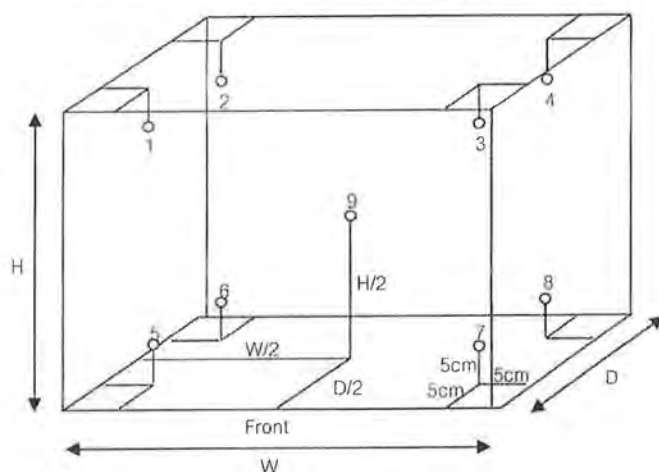
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.51 m

D = 0.04 m

H = 0.70 m

Capacity = 0.02 m³

Test Point ("C)	Setting Temperature ("C)	Indicating Temperature ("C)	Measured Temperature ("C) @ Sensor No.									Uncertainty (± "C)
			1	2	3	4	5	6	7	8	9	
20.0	20.5	20.5	20.07	19.92	19.95	19.93	19.93	19.92	19.92	19.96	19.88	0.67

Test Point ("C)	Setting Temperature ("C)	Indicating Temperature ("C)	Measured Uniformity ("C)	Measured Stability ("C)	Overall Variation ("C)
20.0	20.5	20.5	0.41	0.33	0.70

Remark The uncertainty is not combine uniformity of the air chamber

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

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

- o0o -



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NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-400454-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd

14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Temperature controlled enclosure (Oven)

Manufacturer : Memmert

Model : UN 55

Range : N/A °C

Resolution : 0.1 °C

Serial No. : B214.1879

ID No. : LAB-OV-001

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

Ambient Temperature : (30.0 to 31.3) °C

Relative Humidity : (60 to 65) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 03 August 2024

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No.

Cert. No.

Due Date

Traceability

400029 & 400030 67-400246-1

25 Oct 2024

National Institute of Metrology Thailand (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-400454-1

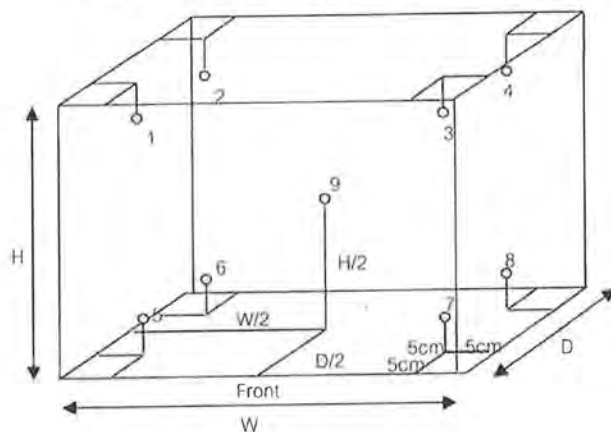
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.40 m

Capacity = 0.05 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
104.0	107.0	107.0	105.1	104.9	104.8	104.8	102.9	103.6	103.7	104.1	103.9	0.84
180.0	184.0	184.0	180.5	180.5	180.3	179.7	176.8	177.2	178.1	181.2	179.5	1.4

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	107.0	107.0	1.4	0.4	2.5
180.0	184.0	184.0	3.3	0.7	5.6

Remark The uncertainty is not combine uniformity of the air chamber

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

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

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NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-400454-2

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd

14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Water Bath

Manufacturer : Memmert

Model : WNB 22

Range : N/A °C

Resolution : 0.1 °C

Serial No. : L514.0184

ID No. : LAB-WB-001

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

Ambient Temperature : (30.0 to 31.3) °C

Relative Humidity : (60 to 65) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 03 August 2024

Calibrated by : Permpon Chanpu

Calibration Method : This instrument was calibrated by In-house method CAL-M4006 based on ASTM E715-80
The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units
Standard Digital Thermometer with RTD probe

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400029 & 400031	67-400244-1	24 Oct 2024	National Institute of Metrology Thailand (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

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Certificate of Calibration

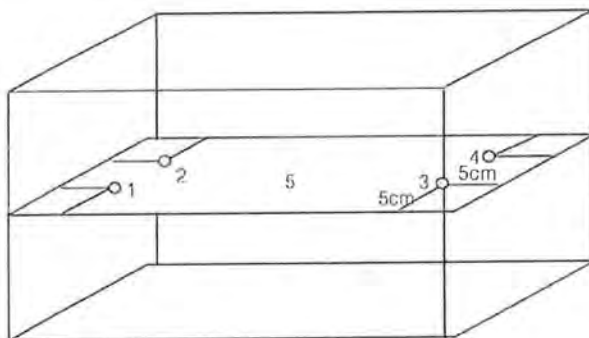
Certificate No. : 67-400454-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Temperature (° C) @ Sensor					Uncertainty (± ° C)	Measured Uniformity (° C)	Measured Stability (° C)
			No.							
			1	2	3	4	5			
65.0	65.0	65.0	64.61	64.70	64.66	64.64	64.68	0.18	0.12	0.05
95.0	95.0	95.0	94.60	94.69	94.70	94.61	94.70	0.18	0.15	0.03

Remark The uncertainty is not combine uniformity of the water bath

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

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

- o0o -



Certificate of Calibration

Certificate No. : 68-420062-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A

pH

Resolution : 0.01 pH

Serial No. : 2841305

ID No. : LAB-PH-002

Electrode

Model : N/A

Serial No. : 3172493

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

Ambient Temperature : (23.5 to 25.0)°C

Relative Humidity : (50 to 55) %

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

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

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

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00307/66	23 Aug 2025	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.007	61314276	1081108	28 Feb 2027	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.965	61318175	1081110	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61325043	1081109	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :



(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-420062-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (\pm mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	177.5	0.0	0.12
	0.0000	7	7.00	0.1	-0.1	0.086
	-177.4800	10	10.00	-177.4	-0.1	0.12

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (\pm pH)
4, 7, 10	4.007	4.01	0.00	0.0097
	6.965	7.00	-0.03	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 68-420062-2

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A

pH

Resolution : 0.01 pH

Serial No. : 2841305

ID No. : LAB-PH-002

Electrode

Model : N/A

Serial No. : 3052953

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

Ambient Temperature : (23.5 to 25.0) °C

Relative Humidity : (50 to 55) %

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

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

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

1. Multiproduct Calibrator

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400005	SG-E-00307/66	23 Aug 2025	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

<u>pH</u>	<u>Cert. No.</u>	<u>Lot No.</u>	<u>Exp. Date</u>	<u>Traceability</u>
4.007	61314276	1081108	28 Feb 2027	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.965	61318175	1081110	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61325043	1081109	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :



(Permpon Chanpu)

Supervisor

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Certificate of Calibration

Certificate No. : 68-420062-2

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (± mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	177.5	0.0	0.12
	0.0000	7	7.00	0.1	-0.1	0.086
	-177.4800	10	10.00	-177.4	-0.1	0.12

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.007	4.01	0.00	0.0097
	6.965	7.00	-0.03	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 68-400421-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.
14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Temperature Indicator with Thermistor Probe

Temperature Indicator

Manufacturer :	Eutech	Model :	pH 700
Range :	N/A °C	Resolution :	0.1 °C
Serial No. :	2841305	ID No. :	LAB-PH-002

Thermistor probe

Model :	N/A	Sheath Material :	Stainless
Diameter :	3 mm.	Length :	115 mm.
Serial No. :	PHSTEMB01P 049	ID No. :	LAB-PH-002

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

Ambient Temperature :	(23.5 to 25.0) °C
Relative Humidity :	(50 to 55) %
Line Voltage :	(220.0 to 221.0) VAC

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4003 by compared with PRT in the liquid bath at the constant controlled temperature.

The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400016	TT-1019-25	13 May 2027	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400033	24E633	21 Feb 2026	National Institute of Metrology Thailand (NIMT)

Approved by :



(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL

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. : 68-400421-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
115	25.002	24.9	0.1	0.19

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. : 68-200468-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co.,Ltd.

14/5358 Moo 14, T.Bang Bua Thong, A.Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Electronic Balance

Manufacturer : SHIMADZU

Model : AP225WD

Serial No. : D316301828

ID No. : LAB-BL-003

Capacity : 220000 mg

Resolution : 0.01mg/102000mg, 0.1mg/220000mg

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

Ambient Temperature : (27.3 to 27.4) °C

Relative Humidity : (53.6 to 53.7) %

Air Pressure : 1003.0 mbar

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 25 July 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)

Approved by :



(Satja Sangkhun)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-200468-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (mg)	Correction (mg)	Uncertainty \pm (mg)
1	0.01	0.012
10	0.00	0.012
50	0.01	0.012
100	0.01	0.014
1000	0.00	0.026
2000	0.01	0.034
5000	0.00	0.043
20000	0.00	0.071
50000	0.01	0.11
100000	0.00	0.20
150000	0.0	0.38
200000	0.0	0.38

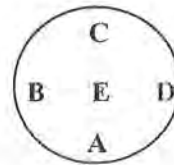
This result of calibration was found accurate as shown on date and place of calibration only.

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 : 50000 mg

A	B	C	D	E	
0.01	0.01	0.02	0.02	0.00	mg



Repeatability

Load test : 200000 mg

Stdev. : 0.053 mg

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Certificate of Calibration

Certificate No. : 68-400420-3

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : Aqua Lytic

Model : TC 135S

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 0614/000033

ID No. : LAB-IB-001

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

Ambient Temperature : (23.0 to 24.5) °C

Relative Humidity : (40 to 45) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with RTD Probe

ID No.	Cert. No.	Due Date	Traceability
400029 & 400048	68-400063-1	01 Aug 2025	National Institute of Metrology Thailand (NIMT)

Approved by :



(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400420-3

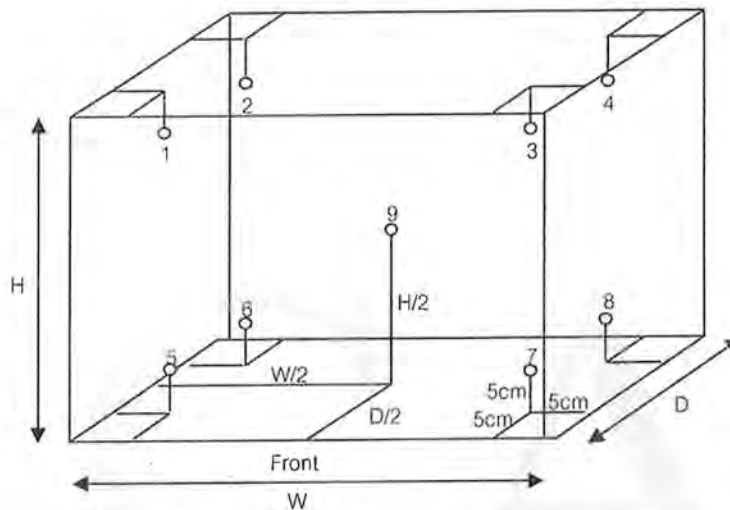
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.51 m

D = 0.04 m

H = 0.70 m

Capacity = 0.02 m³

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Temperature (° C) @ Sensor No.									Uncertainty (± ° C)
			1	2	3	4	5	6	7	8	9	
20.0	20.5	20.5	20.10	19.94	19.99	19.96	19.92	19.90	20.02	19.99	19.87	0.69

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Uniformity (° C)	Measured Stability (° C)	Overall Variation (° C)
20.0	20.5	20.5	0.43	0.36	0.78

Remark The uncertainty is not combine uniformity of the air chamber

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

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

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Certificate of Calibration

Certificate No. : 68-400420-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.
14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Temperature controlled enclosure (Oven)
Manufacturer : Memmert
Range : N/A °C
Serial No. : B214.1879
Model : UN 55
Resolution : 0.1 °C
ID No. : LAB-OV-001

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd.
Ambient Temperature : (31.0 to 31.8) °C
Relative Humidity : (50 to 55) %
Line Voltage : (220.0 to 222.0) V

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units
Standard Digital Thermometer with Thermocouple probe

ID No.	Cert. No.	Due Date	Traceability
400029 & 400032	68-400217-1	28 Oct 2025	National Institute of Metrology Thailand (NIMT)

Approved by :



(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400420-1

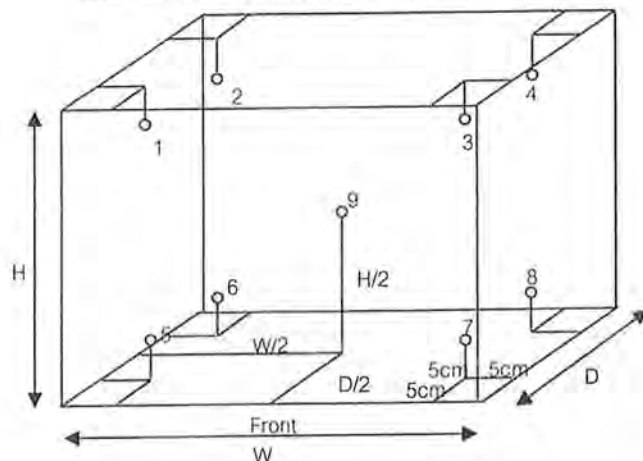
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.40 m

Capacity = 0.05 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
104.0	107.0	107.0	105.1	105.1	104.9	104.9	102.9	104.4	103.5	104.4	104.5	0.87
180.0	184.0	184.0	181.2	180.9	180.7	180.9	177.2	177.1	178.5	179.8	180.3	1.4

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	107.0	107.0	1.8	0.3	2.6
180.0	184.0	184.0	3.6	0.6	4.6

Remark The uncertainty is not combine uniformity of the air chamber

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

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

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Certificate of Calibration

Certificate No. : 68-400420-2 **Page : 1 of 2**

Submitted by : Pacific Laboratory Co., Ltd.
14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Water Bath
 Manufacturer : Memmert Model : WNB 22
 Range : N/A °C Resolution : 0.1 °C
 Serial No. : L514.0184 ID No. : LAB-WB-001

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd.
 Ambient Temperature : (31.0 to 31.8) °C
 Relative Humidity : (50 to 55) %
 Line Voltage : (220.0 to 222.0) V

Date of Received : 21 July 2025
Date of Calibration : 21 July 2025
Date of Issue : 24 July 2025
Calibrated by : Permpoon Chanpu

Calibration Method : This instrument was calibrated by In-house method CAL-M4006 based on ASTM E715-80
 The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units
 Standard Digital Thermometer with RTD probe

ID No.	Cert. No.	Due Date	Traceability
400029 & 400031	68-400214-1	25 Oct 2025	National Institute of Metrology Thailand (NIMT)

Approved by :



(Permpoon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

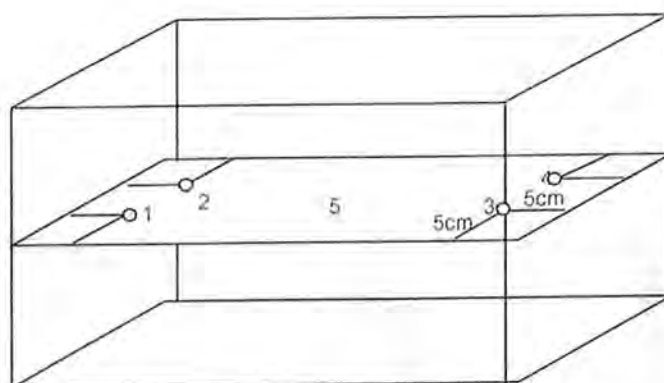
Certificate No. : 68-400420-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Temperature (° C) @ Sensor No.					Uncertainty (± ° C)	Measured Uniformity (° C)	Measured Stability (° C)
			1	2	3	4	5			
65.0	65.0	65.0	64.62	64.64	64.64	64.63	64.63	0.18	0.05	0.03
95.0	95.0	95.0	94.60	94.61	94.63	94.68	94.58	0.18	0.17	0.05

Remark The uncertainty is not combine uniformity of the water bath

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

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

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