

ภาคผนวกที่ 5
เอกสารสอบเทียบเครื่องมือตรวจวัด

ภาคผนวกที่ 5-1
เอกสารสอบเทียบคุณภาพอากาศในบรรยากาศ

CERTIFICATE OF CALIBRATION

Certificate No. : CO-006-66

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 : 08 Jun 2023
MEASUREMENT DATE : 13 Jun 2023
ISSUE DATE : 13 Jun 2023

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 24.3 °C and 57.1 %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 (Rocks Meter) Model G65/MC/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 VSL (National Metrology Institute of Netherlands) via Certificate number: G2211901

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. Sorawat Thachalad
☒ Miss Jitraporn Lerisomphol



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	755.735	24.45	23.61	50.097	1.703	1.302	0.659
2	0.998	755.793	24.22	23.66	63.145	3.306	1.816	0.914
3	1.119	755.870	24.25	23.69	43.259	4.386	2.091	1.054
4	1.167	755.926	24.11	23.44	32.309	4.937	2.219	1.117
5	1.409	755.921	24.03	23.51	29.079	7.321	2.703	1.354

Slope (m): 2.01034
 Intercept (b): -0.02337
 Correlation coefficient (r): 0.99984
 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	755.735	24.45	23.61	50.097	1.703	0.819	0.661
2	0.998	755.793	24.22	23.66	63.145	3.306	1.141	0.916
3	1.119	755.870	24.25	23.69	43.259	4.386	1.314	1.057
4	1.167	755.926	24.11	23.44	32.309	4.937	1.393	1.120
5	1.409	755.921	24.03	23.51	29.079	7.321	1.697	1.357

Slope (m): 1.25919
 Intercept (b): -0.01471
 Correlation coefficient (r): 0.99983
 Uncertainty ($k=2$): 0.015 m^3/min

End of Certificate of Calibration



ENVIR SERVICE CO., LTD.

42 Ramintra 14 Yeak 9, Tha Raeng, Bang Khen, Bangkok 10230
Tel. 02-9435814-5 Fax. 02-9438201 www.envirservice.co.th

Analyzer Performance Test

Calibrated Date: 21 March 2023

Instruments Information

Analyzer Type : SO2 Analyzer

Model : 43C

Manufacturer : Thermo Environmental

Serial Number : 43C-58207-316

Calibrator Unit

Dilutor Model : Dasibi Model 5008

Serial Number : 705

ZERO AIR Generator : API MODEL 701

Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM

Sulphur Dioxide (SO2) 55.11 PPM

Carbon Monoxide (CO) 4,535 PPM

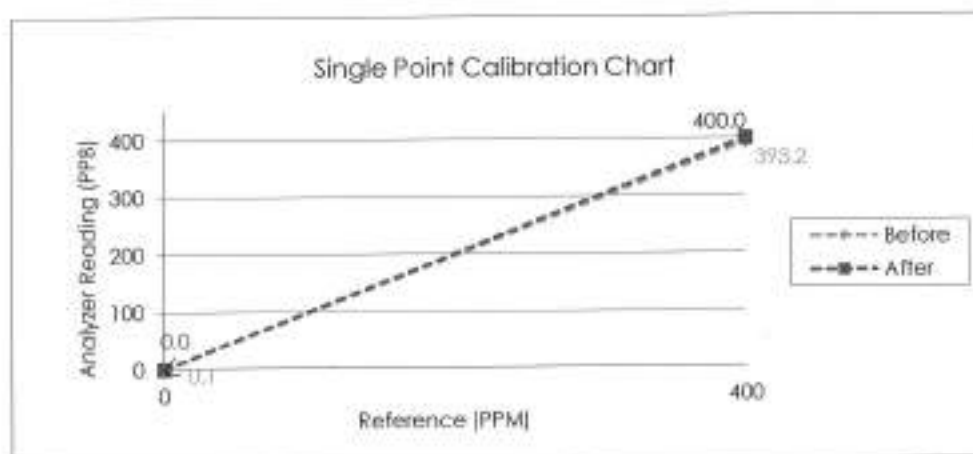
Cylinder number EB0129027

Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	393.2	-1.7
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทรานิเวศน์
MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL

ENVIR SERVICE CO., LTD.

42 Ramintra 14 Yeak 9, Tha Raeng, Bang Khen, Bangkok 10230
Tel. 02-9435814-5 Fax. 02-9438201 www.envirservice.co.th

Analyzer Performance Test

Calibrated Date: 21 March 2023

Instruments Information

Analyzer Type : SO2 Analyzer

Model : 43C

Manufacturer : Thermo Environmental

Serial Number : 43C-58286-317

Calibrator Unit

Dilutor Model : Dasibi Model 5008

Serial Number : 705

ZERO AIR Generator : API MODEL 701

Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM

Sulphur Dioxide (SO2) 55.11 PPM

Carbon Monoxide (CO) 4,535 PPM

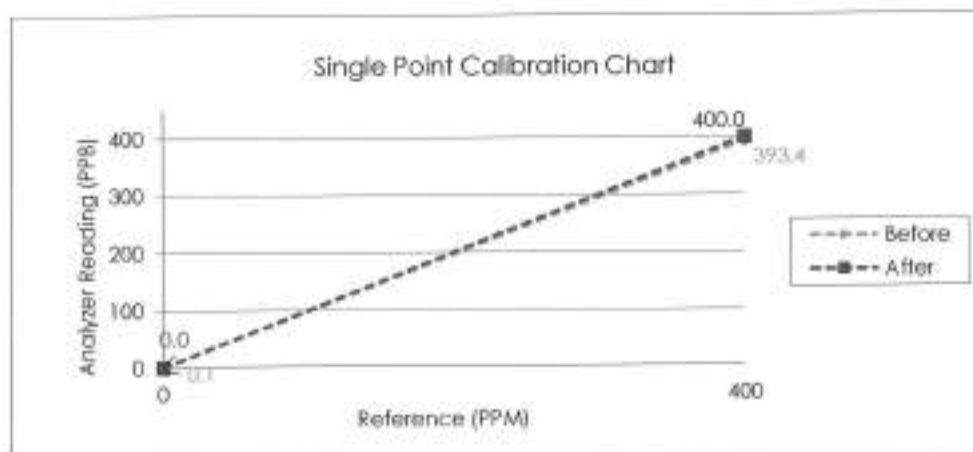
Cylinder number EB0129027

Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	393.4	-1.7
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทะนาถวัฒนา

MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL

MR. PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 21 March 2023

Instruments Information

Analyzer Type : NO-NO2-NOx Analyzer

Model : 42C

Manufacturer : Thermo Environmental

Serial Number : 42C-70412-365

Calibrator Unit

Dilutor Model : Dosibi Model 5008

Serial Number : 705

ZERO AIR Generator : API MODEL 701

Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM

Sulphur Dioxide (SO2) 55.11 PPM

Carbon Monoxide (CO) 4,535 PPM

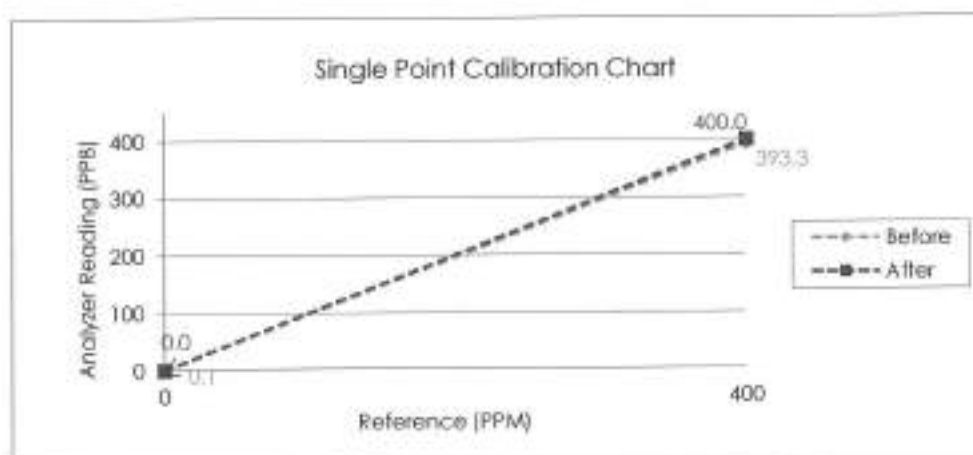
Cylinder number EB0129027

Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	393.3	-1.7
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By: กิตติศักดิ์ จันทรังษาวรรณ
MR. KITTISAK JANSANGWATTANA

Approve by: MR. PASAGORN SAMOL

ENVIR SERVICE CO., LTD.

42 Ramintra 14 Yeak 9, Tha Raeng, Bang Khen, Bangkok 10230
Tel. 02-9435814-5 Fax. 02-9438201 www.envirservice.co.th

Analyzer Performance Test

Calibrated Date: 21 March 2023

Instruments Information

Analyzer Type : NO-NO₂-NO_x Analyzer

Manufacturer : Thermo Environmental

Model : 42C

Serial Number : 42C-70626-366

Calibrator Unit

Dilutor Model : Dasibi Model 5008

Serial Number : 705

ZERO AIR Generator : API MODEL 701

Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM

Sulphur Dioxide (SO₂) 55.11 PPM

Carbon Monoxide (CO) 4,535 PPM

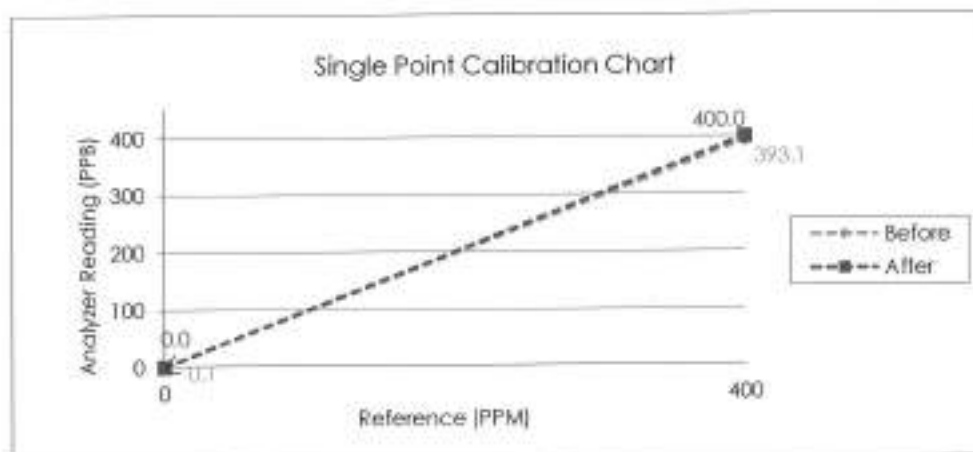
Cylinder number EB0129027

Expire Date: 29 Oct, 2027

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	393.1	-1.7
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : 

MR. KITTISAK JANSANGWATTANA

Approve by :


MR. PASAGORN SAMOL

ภาคผนวกที่ 5-2
เอกสารสอบเทียบ
ปริมาณสารเจือปนในอากาศที่ระบายออกจากปล่อง

Envi Equipment Service Co., Ltd.

110254 Mao 3, Yangon Bang Rak Phothara, Amphoe Bang Bua Thong, Nonthaburi 11110

Tel. 091 362 91 52, 089 478 7835

E-mail: sales@envi-ees.com

Certificate No.: E24-010009

Page: 1 of 6

CERTIFICATE OF CALIBRATION

Customer : Pacific Laboratory Co., Ltd.
Address : 145558 Mao 14, Tambon Bang Bua Thong, Amphoe Bang Bua Thong, Nonthaburi 11110

Description of Equipment : Console meter

Manufacturer : Apex Instrument

Model Number : MC-572-OV

Serial Number : 136033

ID/Control No. : -

Environment Conditions : Temperature (25 ± 2) °C

Humidity (58 ± 15) % RH

Cal. Date : 08/01/2024

Issue Date : 08/01/2024

Calibration Method or Calibration Procedures Used

(IEC 61010 Method (United States International Protection Agency))

This certificate is issued to the customer, which reflects the results of measurement according to the International System (SI) units (IEC).

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 measurement results are expressed by a coverage factor of k=2, providing a 95% confidence level.

Calibrated by : Mr. Saray Sangnui

Approved by :

(Mr. Man Phetthong)
Technical Manager



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

Meter Console Information			Calibration Condition			Factors/Corrections		
Console Model Number	XC-572-0V		Date	Time	08/01/2024	10:45 AM	Std Temp	295 K
Console Serial Number	1366033		Calibration Reference No.		54324-019002		Std Press	760 mm Hg
DGM Model Number	SK252X		Barometric Pressure		761.24	mmHg	K _c	0.286
DGM Serial Number	08009149		Calibration Meter Gamma		0.999		Console Leak Check	PASS

Calibration Data											
Metering Console						Calibration Meter					
Run Time	DGM Orifice Dia	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final		
Elapsed (Q)	(mm Hg)	(Nml)	(Nml)	(°C)	(°C)	(Nml)	(Nml)	(°C)	(°C)		
17.60	13.0	414.8050	415.0050	26	26	189.07242	189.16326	26	26		
17.60	13.0	415.0050	415.1450	26	26	189.16326	189.29454	26	26		
8.58	26.0	415.1450	415.2650	26	26	189.29454	189.44564	26	26		
8.58	26.0	415.2650	415.4350	27	27	189.44564	189.58478	26	26		
13.95	40.0	415.4350	415.7210	27	27	189.58478	189.87728	26	26		
13.95	40.0	415.7210	416.0010	27	27	189.87728	190.15784	26	26		
18.38	78.0	416.0010	416.2920	27	27	190.15784	190.44818	25	25		
18.38	78.0	416.2920	416.5720	27	27	190.44818	190.72616	25	25		
9.18	96.0	416.5720	416.8660	27	27	190.72616	191.01656	25	25		
9.18	96.0	416.8660	417.1480	27	27	191.01656	191.29332	25	25		



**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			
Console Model Number	NC-572-0V	1206033		Date	Time	08/01/2024	10:45 AM
Console Serial Number				Calibration Reference No.		10024-00002	
DGM Model Number	SK25EX			Barometric Pressure		761.24	mmHg
DGM Serial Number	00000149			Calibration Meter Gamma		0.999	
				Factory Calibration			
				Sat Temp	293	K	
				Sat Press	760	mm Hg	
				K ₁	0.386		
				Console Leak Check			
				PASS			

Calibration Data Results									
Standardized Data					Dry Gas Meter				
Dry Gas Meter (V _{actual}) (Q _{actual}) m ³ /min	Calibration Meter (V _{actual}) (Q _{actual}) m ³ /min	Calibration Factor		Flowrate (Q _{actual}) m ³ /min	Flowrate (Q _{actual}) m ³ /min		Variation (ΔH _g)	Variation (ΔH _g)	Average
		Value (V)	Variation (ΔV)		Sat & Corr (Q _{actual}) m ³ /min	Flowrate (Q _{actual}) m ³ /min			
0.138	0.011	0.138	0.011	1.004	0.012	0.911	48.015	1.968	
0.138	0.011	0.138	0.011	1.007	0.015	0.911	47.717	1.708	
0.138	0.016	0.137	0.016	0.982	0.080	0.916	45.590	-0.427	
0.138	0.016	0.136	0.016	0.990	-0.002	0.916	45.774	-0.312	
0.276	0.020	0.274	0.020	0.984	0.002	0.920	46.163	0.146	
0.276	0.020	0.275	0.020	0.997	0.005	0.920	45.874	-0.143	
0.278	0.027	0.274	0.026	0.987	-0.005	0.926	45.387	-0.510	
0.278	0.027	0.274	0.026	0.987	-0.005	0.926	45.320	-0.797	
0.278	0.031	0.273	0.026	0.981	-0.011	0.930	45.190	-0.827	
0.278	0.031	0.272	0.026	0.979	-0.012	0.930	45.410	-0.598	
				0.982	V Average		46.017	ΔH _g Average	

Note: For Calibration Factor V, 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.

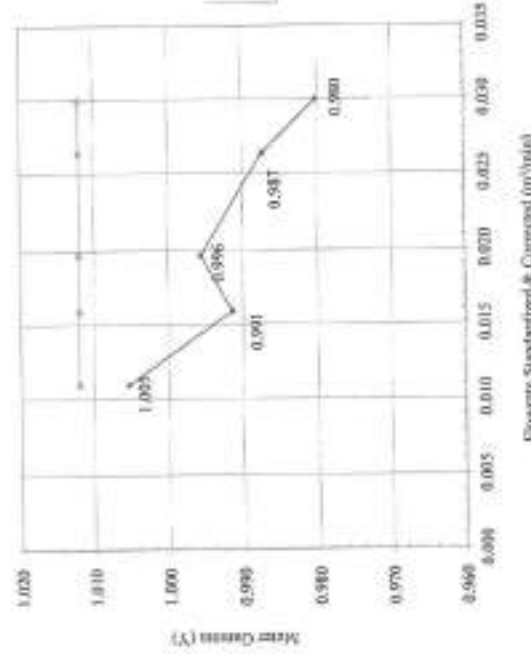
For ΔH_g, orifice pressure differential that equates to 0.75 cfm (0.0312 m³/min) at standard pressure and temperature, acceptable tolerance of individual values from the average is ±0.2 inches (5.1 mm).



Meter Console Information				Calibration Conditions				Factory Calibration			
Console Model Number	NC-572-0V	1206033		Date	Time	08/01/2024	10:45 AM	Sat Temp	293	K	
Console Serial Number				Calibration Reference No.		10024-00002		Sat Press	760	mm Hg	
DGM Model Number	SK25EX			Barometric Pressure		761.24	mmHg	K ₁	0.386		
DGM Serial Number	00000149			Calibration Meter Gamma		0.999		Console Leak Check			
								PASS			

Calibration Date: 8-1-2024 Calibration Reference No.: SE324-010009

Meter Gamma vs Flowrate



Console Serial: 1206033

Console Model: NC-572-0V



Meter Console Information			Calibration Conditions			Factory Certificate	
Console Model Number	XC-572-0V		Date	Time	18-05 A.M	Std Temp	K
Console Serial Number	1306033		Calibration Reference No.	SCR24-010003		Std Press	760 mm Hg
DGM Model Number	SK25EX		Barometric Pressure	761.24	mmHg	K ₁	0.386
DGM Serial Number	00009149		Calibration Meter Gamma	0.999		Console Link Check	
						PASS	

Calibration Date: 08/01/2024 Calibration Reference No: 00324-010009

Meter Pressure vs Flowrate



Console Serial: 1166033

Console Model: XC-572-0V



THERMOCOUPLES SYSTEM CALIBRATION

Sending Point Equipment Information			Calibration Conditions		
Console Model Number	XC-572-0V		Date	08/01/2024	01:25 PM
Console Serial Number	1306033		Calibration Reference No.	SCR24-010003	
DGM Model Number	SK25EX		Reference Thermometer	DG/ICON	
DGM Serial Number	00009149		Serial Number	183169105	
Meter Box Model Number	JENCO 765 KF				
Meter Box Serial Number	JC 13335				

Results									
Console Thermocouple Simulator									
Meter Box Channel Temperature Reading (°C)									
Channel and test point	-18.0	25.0	38.0	93.0	149.0	200.0	271.0	482.0	583.0
Stack	-18.0	24.0	37.0	91.0	147.0	257.0	370.0	482.0	583.0
Axis	-	-	-	-	-	-	-	-	-
Probe	-19.0	24.0	37.0	91.0	147.0	257.0	370.0	482.0	583.0
Filter	-19.0	24.0	37.0	91.0	147.0	257.0	370.0	482.0	583.0
Oven	-	-	-	-	-	-	-	-	-
Exit	-18.0	24.0	37.0	91.0	147.0	257.0	370.0	482.0	583.0

Tolerance Range

Stack	+ 1.50%	Absolute	Meter	+ 3.0 °C
Probe	+ 3.0 °C		Exit	+ 3.0 °C
Filter	+ 3.0 °C			



Proc. 1st

Technical Manager

[illegible]

THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Configuration Information	
Probe Model Number	PS-5HV
Probe Serial Number	-
Master Box Model Number	JENCO 765 KF
Master Box Serial Number	JC 13355

Calibration Conditions	
Date	08/02/2023
Time	03:20 PM
Calibration Reference No.	E24-010002
Reference Thermometer	DIGICON
Serial Number	183169105

Thermocouple of Standard Probe method 5 = length 5 foot			
Set Point	Reference Thermocouple	Probe Thermocouple	Difference
100	100.0	98.0	0.54
250	250.0	248.0	0.39
300	300.0	297.0	0.52
350	350.0	347.0	0.48



Envi Equipment Service Co., Ltd.
110254 Moo 3, Tambon Bang Rak Phrahan, Amphur Bang Bun Thong, Nonthaburi 11110
Tel. 099 362 9132, 089 478 7885
E-mail: sales@envi-ees.com

Certificate No.: E24-010010
Page: 1 of 2

CERTIFICATE OF CALIBRATION

Customer : Pacific Laboratory Co., Ltd.
Address : 145558 Moo 14, Tambon Bang Bun Thong, Amphur Bang Bun Thong, Nonthaburi 11110
Description of Equipment : Stainless Steel Nozzle
Manufacturer : Apex Instrument
Model Number : NS-SET-0000
Serial Number : -
ID./Control No. : -
Environment Conditions : Temperature (25 ± 2) °C
Humidity (50 ± 15) % RH
Cal. Date : 08/01/2024
Issue Date : 08/01/2024

Calibration Method or Calibration Procedure Used

ISO 17025:2017 (General Requirements for the Competence of Calibration and Testing Laboratories)
This certificate is issued in accordance with the rules of measurement according to the International System of Units (SI).

Result of Calibration

This certificate may not be reproduced without prior written approval of the Technical Manager, Envi Equipment Service Company Limited.
These reported uncertainties are expanded by a coverage factor of 2, providing a 95% confidence level.

Calibrated by : Mr. Sanya Sangnii

Approved by :

(Mr. Mera Puchan)
Technical Manager



CALIBRATION RESULTS

Sampling System Equipment Information

Nozzle Model : NS-SET-0000
Nozzle Number : -
Nozzle Type : Stainless Steel

Calibration Conditions

Date : 08 January 2023
Barometric Pressure : 761.34 mm Hg
Calibration Device : Verifier, 0.150 mm
Method Reference : U.S. EPA Method

Nozzle ID	Nozzle Diameter			Inferior ΔD mm	Superior $(D1 + D2 + D3) / 3$ mm
	D1 mm	D2 mm	D3 mm		
NS-6	3.97	3.99	3.92	0.012	3.913
NS-7	5.55	5.49	5.40	0.080	5.409
NS-9	7.14	7.02	7.02	0.060	7.026
NS-11	8.73	7.81	7.83	0.010	7.820
NS-13	10.31	10.18	10.19	0.010	10.190
NS-15	11.91	11.68	11.67	0.005	11.673
NS-17	13.49	13.46	13.44	0.012	13.453

Remarks:

D1, D2, D3 = Three difference nozzle diameters, mm; diameter must be within 0.025 mm
 ΔD = Maximum difference between any two diameters, must be ≤ 0.100 mm
 Avg = $(D1 + D2 + D3) / 3$



Certificate of Calibration



CUSTOMER

Name:
Pacific Laboratory Co., Ltd.
Address:
14/5058 Moo 14, Tambon Bang Bua Thong,
Amphoe Bang Bua Thong, Nonthaburi 11119
Department/ Division/ Vessel:
N/A

UNIT UNDER CALIBRATION (UUC)

Description:
Flue gas analyzer
Manufacturers:
Testo Model 310
S/N: A2808591
Measuring Range:
O₂ : 0-21 %Vol, CO : 0-4000 PPM

Cert. No. SE-CN245E8008

Cal. Date : 05-Jan-24
Cal. Due : 04-Jan-25
Work Order No. : SE-CN245E8008
Cal. Temp. : 25.0 ± 1 °C
Cal. Humidity : 55.0 ± 10 %RH

Reference Standard

Description	Cert. No.	Expiry Date
TSG Standard Nitrogen = 99.99 %Vol	DRH01-44747-169649-10	18-Jul-28
Trace Mixture Gas in Nitrogen	3278/22	17-Oct-24
Component : CO = 105 PPM, O ₂ = 18.1 %		

Function Setup

Items	O ₂	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						Response time Sec.		Judgment	Note
	Std.	Acc.	Before	Cal.	After	Err.	Std.	Acc.	Before	Cal.	After	Err.	Acc.	Read		
O ₂ (%Vol)	0.0	± 1.5	0.0	0.0	0.0	0.0	18.1	± 1.0	18.2	18.1	18.1	0.0	≤ 30	12.0	Pass	- Response 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	106.0	± 5.0	101.0	106.0	106.0	0.0	≤ 30	13.0	Pass	

Std. = Standard, Read = Reading, Cal. = Calibration, 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 accurate as shown in date and place of calibration only.

Engineer Signatory	Approval Signatory	Company Stamp
 Mr. Jattawarak Yundazap (Technical Specialist) Date : 05-Jan-24	 Mr. Chaisat Chuanthamthod (Gases Division Chief) Date : 05-Jan-24	 Call Me CALL ME ENGINEER CO., LTD.



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



Certificate No. C07230008

Calibration Certificate

Equipment: SPECTROPHOTOMETER

Model: DR3900

Serial No.(or ID): 2076219

Manufacturer: HACH

Condition: In Condition

Job No.: KSMT2300196

Received Date: 14 July 2023

Issued Date: 14 July 2023

Page: 1 of 3

Customer

Pacific Laboratory Co., Ltd.

14/5358 Moo 14, Bang Bua Thong, Bang Bua Thong, Nonthaburi 11110 Thailand

Calibration Place

Pacific Laboratory Co., Ltd.(ห้องปฏิบัติการทดสอบ Zone B)

14/5358 Moo 14, Bang Bua Thong, Bang Bua Thong, Nonthaburi 11110 Thailand

Calibration Date

14 July 2023

Environment Condition

Temperature: 29.9 °C ± 0.1 °C

Humidity: 62.4 %RH ± 0.4 %RH

The Method used

In-house method, WI07, based on ASTM E 275-08 and
ASTM E 387-04

Traceability

This certificate is traceable to the CRM maintained by National Institute
of Standards and Technology (NIST) through Siam Scientific Limited.

The standard for Wavelength Certificate No. 108691 and 108692

The standard for Photometric Certificate No. 109010

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

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

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


(Mr. Dumrong Boonsopon)

Person in charge




(Mr. Thalemgkeat Pongngam)
Authorized signatory

Calibration Results:

Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 5 nm and UUC at 5 nm

Standard Wavelength (nm)	Unit Under Calibration (nm)	Correction (nm)	Uncertainty of Measurement (± nm)
361.02	361	0.02	0.59
417.80	417	0.80	0.59
441.29	441	0.29	0.59
471.51	471	0.51	0.59
479.88	480	-0.12	0.59
513.75	514	-0.25	0.59
528.59	528	0.59	0.59
537.75	537	0.75	0.59
585.56	585	0.56	0.59
641.95	642	-0.05	0.59
684.70	684	0.70	0.59
747.61	747	0.61	0.59
807.04	807	0.04	0.59
879.68	879	0.68	0.59

Calibration Results:

Without Adjustment

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance (Abs)	Unit Under Calibration (Abs)	Correction (Abs)	Uncertainty of Measurement(\pm Abs)
420 nm	0.0000	0.000	0.0000	0.0045
	0.5617	0.560	0.0017	0.0045
	0.7392	0.737	0.0022	0.0045
	1.0550	1.054	0.0010	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.5513	0.550	0.0013	0.0045
	0.7230	0.721	0.0020	0.0045
	1.0324	1.031	0.0014	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.5036	0.505	-0.0014	0.0045
	0.6735	0.673	0.0005	0.0045
	0.9615	0.964	-0.0025	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.5176	0.517	0.0006	0.0045
	0.6930	0.691	0.0020	0.0045
	0.9908	0.990	0.0008	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.5530	0.552	0.0010	0.0045
	0.7196	0.717	0.0026	0.0045
	1.0301	1.027	0.0031	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.5370	0.536	0.0010	0.0045
	0.6862	0.684	0.0022	0.0045
	0.9822	0.981	0.0012	0.0045

The End of Certificate

ภาคผนวกที่ 5-3
เอกสารสอบเทียบปริมาณความเข้มข้นละอองและสารเคมี
ในบรรยากาศการทำงาน

Certificate of Calibration

Customer

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

Certificate No : 24-AFM-016

Request No : Req-2024-0078

Unit Under Calibration Details

Measurement Item : Air Flow Meter
Manufacturer : Bios
Model : DCL-M
Serial Number : 104699
ID : -

Sensor Model : Low Flow
Sensor Serial Number : 2014010014

Location of Calibration : LAB 4 AIR VELOCITY METER

Calibration Environment and Details

Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$
Humidity : $55\% \text{RH} \pm 20\% \text{RH}$
Barometric Pressure : $1013 \text{ hPa} \pm 10 \text{ hPa}$
Received Date : 9 January 2024
Calibration Date : 26 January 2024

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	12 July 2024
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	12 July 2024
Temperature meter	GT 11	08000057	Qreborn	27 February 2024
Pressure meter	CPG2400	41000KDU/651882	TPA	7 November 2023

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

Note :

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

Calibration By : me
Mr. Noppadon Luangart
Service Calibration Engineer

Approved By : ๒๗๕๗
Mr. Pacit Mathavorn
Calibration Engineer Supervisor
Issue Date : 26 January 2024

Certificate No : 24-AFM-016

Request No : Req-2024-0078

Result of Calibration :

Temperature (°C)	Pressure (kPa)	STD (l/min)	UUC (l/min)	Error (l/min)	Uncertainty (l/min)
23.10	101.30	0.050	0.0496	-0.0004	0.0033
23.20	101.32	0.100	0.0994	-0.0006	0.0028
23.30	101.33	0.199	0.1981	-0.0009	0.0056
23.00	101.31	1.001	1.000	-0.001	0.014
23.20	101.24	2.001	1.998	-0.003	0.028
23.40	101.19	3.002	3.008	0.006	0.043

Note

- STD : Standard UUC : Unit Under Calibration
 - UUC Reference Condition : At atmospheric pressure and room temperature condition
 - Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{\text{meas}} = Q_{\text{ref}} \times \frac{P_{\text{ref}}}{P_{\text{meas}}} \times \frac{T_{\text{meas}}}{T_{\text{ref}}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature
 Meas = Measurement Condition ref = Standard Condition

* Indicates non accredited

End of Certificate

CAL

Calibratech Co.,Ltd.

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

Tel:021964-6211 Fax:021964-5155 e-mail : calibratech.cal@yaho.com, calibratech.cal@hotmail.com



NSO-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 66-200247-2

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 : Electronic Balance

Manufacturer : SHIMADZU

Model : AP225WD

Serial No. : D316301828

ID No. : LAB-BL-003

Capacity : 220 g

Resolution : 0.00001g/102g, 0.0001g/220g

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

Ambient Temperature : (25.1 to 25.4) °C

Relative Humidity : (62.3 to 64.8) %

Air Pressure : 1007.0 mbar

Date of Received : 31 July 2023

Date of Calibration : 31 July 2023

Date of Issue : 02 August 2023

Calibrated by : Akaradath Thippichai

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

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02222345	10 Nov 2023	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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



CAL

Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 66-200247-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.001	0.00001	0.000020
0.01	0.00001	0.000021
0.05	0.00001	0.000019
0.1	0.00001	0.000024
1	-0.00001	0.000030
2	0.00000	0.000036
5	-0.00001	0.000046
20	-0.00002	0.000073
50	-0.00004	0.00011
100	-0.00005	0.00020
150	-0.0001	0.00038
200	-0.0001	0.00040

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 $k =$ 2.52 , providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

A B C D E

0.00002 0.00003 0.00001 0.00004 0.00000 g



Repeatability

Load test : 200 g

Stdev. : 0.000048 g

- oOo -





Document Type Certificate of Performance (CoP)
Description CoP for 881 Compact IC pro
Document ID CoP 881 Version 1.3 / 9.891.3098204

Metrohm Compliance Service

Certificate of Performance (CoP) for 881 Compact IC pro

Instrument details

Type 18810020
Serial No. PU230014ME (1981000010137)
Manufacturer Metrohm AG
Inventar-ID CH-9105 Herisau
Switzerland
Firmware 5.850.0114
Customer Instrument ID N/A

Customer details

Name of company: EMEX Association Co., Ltd.
Address: 27, 28 Bang Mot
Chomthong
Bangkok 10150

Department

Responsible person: Laboratory
Calibration place: EMEX Association Co., Ltd.

Date and time of calibration: 21/10/2025 10:00

Certificate of Performance (CoP) No.: PU230014ME (1981000010137) v-244 Page 1 of 5

ใบรับรองการสอบเทียบ “เครื่อง Ion chromatography”
(Calibration Certificate of Ion chromatography)



ห้องปฏิบัติการวิเคราะห์ไอออน
เลขทะเบียน ว-244



ห้องปฏิบัติการวิเคราะห์ไอออน
เลขทะเบียน ว-244 Page 1 of 5



Document Type Certificate of Performance (CoP)
Description CoP for 881 Compact IC pro
Document ID CoP 881 Version 1.3 / 18.01.2018CM



Document Type Certificate of Performance (CoP)
Description CoP for 881 Compact IC pro
Document ID CoP 881 Version 1.3 / 18.01.2018CM

Certificate of Performance (CoP)

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 Certificate of Performance (CoP) 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 meets the specific functions tested, except where detailed overload.

Conclusion of test results

Yes ☒ No ☐

Instrument satisfies the specified technical requirements

Recommendation date for next maintenance

Comments

Declaration

Document

Test instructions used: C.1 Test instructions for 881 Compact IC pro, Version 1.3

Reference standards

Type / Model	Manufacturer	Serial No. / Batch No.	Certificate No.	Expiry date / Validity date
Reference standard	Yes	Yes	Yes	Yes
Reference standard	Yes	Yes	Yes	Yes
Reference standard	Yes	Yes	Yes	Yes
Reference standard	Yes	Yes	Yes	Yes
Reference standard	Yes	Yes	Yes	Yes

Prepared

Instrument had to be repaired beforehand

If yes, see Certificate of Performance (CoP) No.:

Instrument had to be inspected beforehand

If yes, see Certificate of Performance (CoP) No.:

Yes ☐ No ☒



ห้ขอปฏิบัติกรวิเคราะห้ไอออน

เลขที่ใบขึ้น 3-244

Certificate of Performance (CoP) No.: P40203814M5 (16810000101307) - 21/12/2023
Page 3 of 8

Metrohm representative

Metrohm representative confirms correct execution of instrument calibration

Date 21/12/2023 Name Mr. Jitirak Sathira Signature

Customer representative

Customer representative accepts results of instrument calibration

Date 21/12/2023 Name (signature) Signature



ห้ขอปฏิบัติกรวิเคราะห้ไอออน

เลขที่ใบขึ้น 3-244

Certificate of Performance (CoP) No.: P40203814M5 (16810000101307) - 21/12/2023
Page 3 of 8



Document Type Certificate of Performance (CoP)
Description CoP for 881 Compact IC pro
Document ID CoP 881 Version 1.3 / 0.881.3004EN

CoP 881 Document History

Date	Article No.	Author	Description/Changes
16.04.2012	8.881.3004EN	Philipp Rüegg	Layout adapted to Metrohm Compliance Service
20.02.2013	8.881.3006EN	Philipp Rüegg	Test step 115 MCS tolerance increased according C.3 CRM-09/05

End of CoP Document



หอยปฏิบัติกรวิเคราะหหอย
เลขทะเบียน 7-244

Certificate of Performance (CoP) No.: PM23284-AME (169-03020101.07) - 21.12.2023 -
19/03 Page 6 of 6

ภาคผนวกที่ 5-4
เอกสารสอบเทียบระดับความดังเสียง
(Sound Level Meter)



Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsit-Nakornnayok Rd., Sungyeetho, Thanyaburi,
Pathumthani 12130 Thailand
Tel : (+66)2150-6641 (Autoline), (+66)2569-5158
Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Page 1 of 3

Certificate Number : EL14068/24
Control Number : PCAL163759
Customer Control : -
Description : Sound Calibrator
Manufacturer : Tenmars
Model : TM-100
Serial Number : 220501964
Customer : Pacific Laboratory Co., Ltd.
14/5358 Moo 14, Tambol Bang Bua Thong, Amphoe Bang Bua Thong,
Nonthaburi 11110
Date of Receipt : 16-Mar-24
Date of Calibration : 18-Mar-24
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

Mr. Watcharapol Horasit

Authorized Signature

(Mr. Jumphong Jumphong)

28-Mar-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL14068/24

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Meter	030806101	ANAB : AC-2590	EL09782/23	29-Mar-24
Sound Level Calibrator	141208123	ANAB : AC-2590	EL12312/24	04-Mar-25

Condition as received : Normal

Definitions :-

* ANAB - The ANSI National Accreditation Board

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL14068/24

Page: 3 of 3

Calibration Results

Sound Calibration

Nominal	Measured Value	Uncertainty (+)	Tolerance Limit Values
94 dB	93.9 dB	0.2 dB	93.5 ~ 94.5 dB
114 dB	113.9 dB	0.2 dB	113.0 ~ 115.0 dB

Notes:

- 1). Tolerances or specifications report in table above are base on the product data sheet Sound Level Calibrator TM-100.

...End...



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 : SC240028

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	: SC240028
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222136	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 19-Feb-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	CP20230261EA	TISI: 22-LB0119	05-Jul-24

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 20-Feb-2024

Issued Date : 23-Feb-2024

Calibrated By : Ms. Hathaichanok Kaewsrirai

- ☒ Ms. Siranalan Lertmaneesetsiri [Quality Manager]
☐ Mr. Sompoch Srisunart [Technical 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 : SC240028

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	93.7 dB	-0.16 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.7 dB	-0.16 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	93.7 dB	-0.16 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.7 dB	-0.16 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB

--- End of Certificate ---



APTITECH CALIBRATION CO., LTD.

50/40 Moo 5 T. Lat Sawai, A. Lamlukka, Pathumthani 12150

Tel. +66 2103-6290 Fax. +66 2103-6293

Email: sales@aptitech-cal.com



CERTIFICATE OF CALIBRATION

Certificate Number : SC240024

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	: SC240024
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: $22 \pm 2^\circ\text{C}$
Serial Number	: 222132	Ambient Humidity	: $55 \pm 15\% \text{RH}$
ID. Number	: N/A	Received Date	: 12-Jan-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	CP20230261EA	TISI: 22-LB0119	05-Jul-24

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 15-Jan-2024

Issued Date : 18-Jan-2024

Calibrated By : Ms. Hathaichanok Kaewsrirai

- ☒ Ms. Siranalan Lertmaneesetsiri | Quality Manager |
☐ Mr. Sompoch Srisunart | Technical 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 : SC240024

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	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB

Sound Level Measurement (Fast Mode)

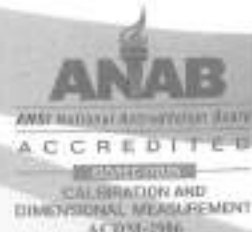
Function	UUC Range	Standard Value	UUC Reading	UUC Error	(\pm) Uncertainty
LA	40-130 dB	93.86 dB	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB

--- End of Certificate ---



APTITECH CALIBRATION CO., LTD.

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



CERTIFICATE OF CALIBRATION

Certificate Number : SC230404

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	: SC230404
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222043	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 17-Oct-23

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	CP20220161EA	TISI: 22-LB0125	13-May-24

Authority of Calibration

Approved Signatory

Calibration Date : 19-Oct-2023

Issued Date : 23-Oct-2023

Calibrated By : Mr. Rattapong Janpanya

- ☒ Ms. Siranalan Lertmaneesetsiri [Quality Manager]
☐ Mr. Sompoch Srisunart [Technical 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 : SC230404

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	93.7 dB	-0.16 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.7 dB	-0.16 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	93.6 dB	-0.26 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.6 dB	-0.26 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB

--- End of Certificate ---



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Tel. +66 2103-6290 Fax. +66 2103-6291

Email: sales@aptitech-cal.com



CERTIFICATE OF CALIBRATION

Certificate Number : SC240004

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	: SC240004
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222017	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 04-Jan-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	CP20230261EA	TISI: 22-LB0119	05-Jul-24

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 05-Jan-2024

Issued Date : 12-Jan-2024

Calibrated By : Ms. Hathaichanok Kaewsrisai

☒ Ms. Siranalan Lertmaneesetsiri [Quality Manager]

☐ Mr. Sompoch Srisunart [Technical Manager]

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CALIBRATION REPORT

Certificate Number : SC240004

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	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB
LC	40-130 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

Sound Level Measurement (Fast Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	93.7 dB	-0.16 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.7 dB	-0.16 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB

--- End of Certificate ---



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Tel. +66 2103-6290 Fax. +66 2103-6291
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CERTIFICATE OF CALIBRATION

Certificate Number : SC240031

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	: SC240031
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222166	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 19-Feb-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	CP20230261EA	TISI: 22-LB0119	05-Jul-24

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 20-Feb-2024

Issued Date : 23-Feb-2024

Calibrated By : Ms. Hathaichanok Kaewsisai

- ☒ Ms. Siranalan Lertmaneesetsiri [Quality Manager]
☐ Mr. Sompoch Srisunart [Technical Manager]

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CALIBRATION REPORT

Certificate Number : SC240031

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	113.8 dB	-0.07 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 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	113.8 dB	-0.07 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB

--- End of Certificate ---



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Tel. +66 2103-6290 Fax. +66 2103-6291

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CERTIFICATE OF CALIBRATION

Certificate Number : SC240039

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	: SC240039
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222177	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 19-Feb-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	CP20230261EA	TISI: 22-LB0119	05-Jul-24

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 20-Feb-2024

Issued Date : 23-Feb-2024

Calibrated By : Ms. Hathaichanok Kaewsrisai

- ☒ Ms. Siranalan Lertmaneesetsiri [Quality Manager]
☐ Mr. Sompoch Srisunart [Technical Manager]

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CALIBRATION REPORT

Certificate Number : SC240039

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	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 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	93.7 dB	-0.16 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.7 dB	-0.16 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 : SC240010

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	: SC240010
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222041	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 04-Jan-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	CP20230261EA	TISI: 22-LB0119	05-Jul-24



Authority of Calibration

Approved Signatory

Calibration Date : 05-Jan-2024

Issued Date : 12-Jan-2024

Calibrated By : Ms. Hathaichanok Kaewrisai

- ☒ Ms. Siranalan Lertmaneesetsiri [Quality Manager]
☐ Mr. Sompoch Srisunart [Technical Manager]

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CALIBRATION REPORT

Certificate Number : SC240010

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	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 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	113.7 dB	-0.17 dB	0.60 dB
LC	40-130 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

--- End of Certificate ---



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Tel. +66 2103-6290 Fax. +66 2103-6291

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CERTIFICATE OF CALIBRATION

Certificate Number : SC240030

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	: SC240030
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	: 19-Feb-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	CP20230261EA	TISI: 22-LB0119	05-Jul-24

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 20-Feb-2024

Issued Date : 23-Feb-2024

Calibrated By : Ms. Hathachanok Kaewsrirai

- ☒ Ms. Siranalan Lertmaneesetsiri | Quality Manager |
☐ Mr. Sompoch Srisunart | Technical Manager |

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CALIBRATION REPORT

Certificate Number : SC240030

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	113.9 dB	0.03 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.9 dB	0.03 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	113.9 dB	0.03 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.0 dB	0.14 dB	0.60 dB
		113.87 dB	113.9 dB	0.03 dB	0.60 dB

--- End of Certificate ---



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Tel. +66 2103-6290 Fax. +66 2103-6291

Email: sales@aptitech-cal.com



CERTIFICATE OF CALIBRATION

Certificate Number : SC240032

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	: SC240032
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222167	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 19-Feb-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	CP20230261EA	TISI: 22-LB0119	05-Jul-24

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 20-Feb-2024

Issued Date : 23-Feb-2024

Calibrated By : Ms. Hathaichanok Kaewsrirai

- ☒ Ms. Siranalan Lertmaneesetsiri [Quality Manager]
☐ Mr. Sompoch Srisunart [Technical Manager]

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CALIBRATION REPORT

Certificate Number : SC240032

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	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB
LC	40-130 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

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	113.8 dB	-0.07 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB

--- End of Certificate ---

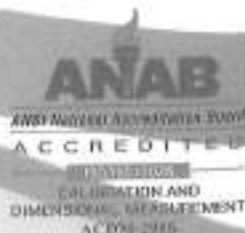


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50/40 Moo 5 T. Lat Sawai, A. Lamlukka, Pathumthani 12150

Tel. +66 2103-6290 Fax. +66 2103-6291

Email. sales@aptitech-cal.com



CERTIFICATE OF CALIBRATION

Certificate Number : SC240023

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	: SC240023
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222050	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 12-Jan-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	CP20230261EA	TISI: 22-LB0119	05-Jul-24

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 15-Jan-2024

Issued Date : 18-Jan-2024

Calibrated By : Ms. Hathaichanok Kaewsrisai

- ☒ Ms. Siranalan Lertmaneeesetsiri [Quality Manager]
☐ Mr. Sompoch Srisunart [Technical Manager]

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CALIBRATION REPORT

Certificate Number : SC240023

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	113.9 dB	0.03 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.9 dB	0.03 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	113.9 dB	0.03 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.0 dB	0.14 dB	0.60 dB
		113.87 dB	113.9 dB	0.03 dB	0.60 dB

--- End of Certificate ---



APTITECH CALIBRATION CO., LTD.

50/40 Moo 5 T. Lat Sawai, A. Lamlukka, Pathumthani 12150

Tel. +66 2103-6290 Fax. +66 2103-6293

Email: sales@aptitech-cal.com



CERTIFICATE OF CALIBRATION

Certificate Number : SC240003

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	: SC240003
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222016	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 04-Jan-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	CP20230261EA	TISI: 22-LB0119	05-Jul-24

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 05-Jan-2024

Issued Date : 12-Jan-2024

Calibrated By : Ms. Hathachanok Kaewsrirai

- ☒ Ms. Siranalan Lertmaneesetsiri [Quality Manager]
☐ Mr. Sompoch Srisunart [Technical 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 : SC240003

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	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 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	93.8 dB	-0.06 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.9 dB	0.04 dB	0.60 dB
		113.87 dB	113.8 dB	-0.07 dB	0.60 dB

--- End of Certificate ---

ภาคผนวกที่ 5-5
เอกสารสอบเทียบสภาพความร้อน (Heat Stress)



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 28 September, 2023

Certification No. 333/23

Page : 1 of 2

Object : THERMAL ENVIRONMENT MONITOR

Manufacturer : 3M

Type : QUESTemp[®]32

Serial No. : TPJ110033

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


Calibration Condition : Temperature 25.1 °C Barometric Pressure 1007.1 hPa


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

: testo, testo 645 Serial No. 02848057 : Thermoschneider No.6169 , No.6178

: TT-3 Serial 43BE04

Japan Meteorological Agency

Calibrated by : 
Mr. Watchapol Subwat
Mechanical Engineer

Signed : 
Mr. Pisood Pichsut





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 333/23

28 September, 2023

Page : 2 of 2

Standard Temp. °C	Temperature Sensor Reading					
	Dry Bulb °C	Correction °C	Globe °C	Correction °C	Wet Bulb °C	Correction °C
50.12	50.1	0.02	50.1	0.02	50.2	-0.08
40.55	40.5	0.05	40.6	-0.05	40.6	-0.05
30.04	30.0	0.04	30.0	0.04	30.0	0.04

Calibrated by :

Watchapol

Mr. Watchapol Subwat

Mechanical Engineer





THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 11 January, 2024

Certification No. 015/24

Page : 1 of 2

Object : Thermal Environment Monitor

Manufacturer : QUEST TECHNOLOGIES

Type : QUESTEMP[®]36

Serial No. : TKJ090016 ID No. : N/A

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


Calibration Condition : Temperature 25.1 °C Barometric Pressure 1010.2 hPa

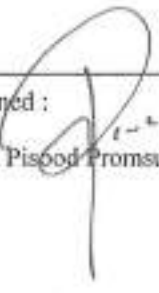
STANDARD THERMOMETER : Theodor Friedrich : Dry No. 8390/94 Wet No. 8389/94

: testo, testo 645 Serial No. 02849057 : Thermoschneider No. 6169 , No. 6178

: TT-3 Serial 43BE04

Japan Meteorological Agency

Calibrated by : 
Mr. Watcharapol Subwat
Mechanical Engineer

Signed : 
Mr. Pisood Promsut





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 015/24

11 January, 2024

Page : 2 of 2

Standard Temp. °C	Temperature Sensor Reading					
	Dry Bulb °C	Correction °C	Globe °C	Correction °C	Wet Bulb °C	Correction °C
50.24	50.2	0.04	50.3	-0.06	50.3	-0.06
40.08	40.1	-0.02	40.1	-0.02	40.0	0.08
30.15	30.1	0.05	30.1	0.05	30.0	0.15

Calibrated by :

Watchapol

Mr. Watchapol Subwat
Mechanical Engineer



ภาคผนวกที่ 5-6
เอกสารสอบเทียบคุณภาพน้ำทิ้ง

Certificate of Calibration

Certificate No. : 66-420070-2

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

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) %

Date of Received : 31 July 2023

Date of Calibration : 31 July 2023

Date of Issue : 05 August 2023

Calibrated by : Bunjerd Masri

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

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

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00473/64	27 Aug 2023	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.008	61270213	915161	19 Jul 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.985	61275614	898428	28 May 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
9.997	61281073	915163	19 Jul 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :



(Bunjerd Masri)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-420070-2

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	-177.5	0.0	0.12

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.008	4.01	0.00	0.0097
	6.985	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. : 66-400424-1

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 049

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 : 31 July 2023

Date of Calibration : 31 July 2023

Date of Issue : 05 August 2023

Calibrated by : Bunjerd Masri

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	20 Jun 2024	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400033	22E569	22 Feb 2024	National Institute of Metrology Thailand (NIMT)

Approved by :



(Bunjerd Masri)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-400424-1

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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Certificate of Calibration

Certificate No. : 66-420070-1

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. : 3093341

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) %

Date of Received : 31 July 2023

Date of Calibration : 31 July 2023

Date of Issue : 05 August 2023

Calibrated by : Bunjerd Masri

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

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

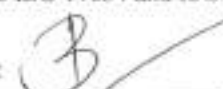
1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00473/64	27 Aug 2023	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.008	61270213	915161	19 Jul 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.985	61275614	898428	28 May 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
9.997	61281073	915163	19 Jul 2024	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :



(Bunjerd Masri)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-420070-1

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	-177.5	0.0	0.12

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (\pm pH)
4, 7, 10	4.008	4.01	0.00	0.0097
	6.985	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. : 66-200247-2 **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 : Electronic Balance
 Manufacturer : SHIMADZU Model : AP225WD
 Serial No. : D316301828 ID No. : LAB-BL-003
 Capacity : 220 g Resolution : 0.00001g/102g, 0.0001g/220g

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd.
 Ambient Temperature : (25.1 to 25.4) °C
 Relative Humidity : (62.3 to 64.8) %
 Air Pressure : 1007.0 mbar

Date of Received : 31 July 2023
Date of Calibration : 31 July 2023
Date of Issue : 02 August 2023
Calibrated by : Akaradath Thippichai
Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref.: LAB 14
 Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02222345	10 Nov 2023	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. : 66-200247-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.001	0.00001	0.000020
0.01	0.00001	0.000021
0.05	0.00001	0.000019
0.1	0.00001	0.000024
1	-0.00001	0.000030
2	0.00000	0.000036
5	-0.00001	0.000046
20	-0.00002	0.000073
50	-0.00004	0.00011
100	-0.00005	0.00020
150	-0.0001	0.00038
200	-0.0001	0.00040

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 $k = 2.52$, providing a level of confidence of approximately 95%.

Eccentric error

Load test : 50 g

A B C D E

0.00002 0.00003 0.00001 0.00004 0.00000 g



Repeatability

Load test : 200 g

Sidev. : 0.000048 g

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CAL

Calibratech Co.,Ltd.

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

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



Certificate of Calibration

Certificate No. : 66-400422-5

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 : Air Chamber (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 : (23.5 to 24.2) °C

Relative Humidity : (40 to 45) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 31 July 2023

Date of Calibration : 31 July 2023

Date of Issue : 05 August 2023

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with RTD Probe

ID No.

Cert. No.

Due Date

Traceability

400029 & 400048

66-400067-1

04 Aug 2023

National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-400422-5

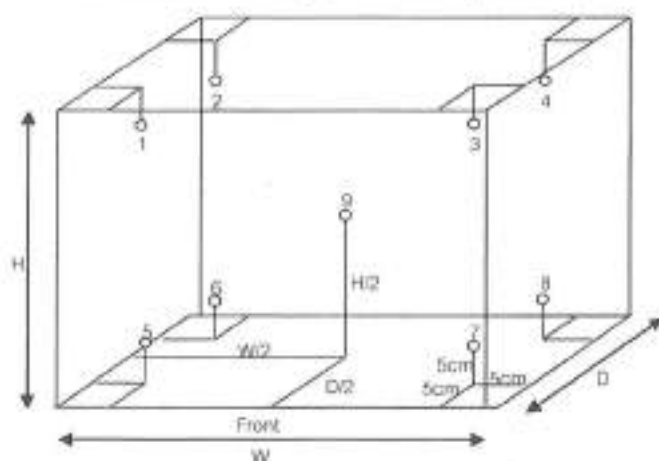
Page : 2 of 2

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	20.05	19.87	19.94	19.93	19.93	19.91	20.00	20.01	19.90	0.77

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.5	20.5	0.33	0.39	0.8

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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CAL

Calibratech Co.,Ltd.

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

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



NSC-TISI-TIS11025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 66-400422-3

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 : Air Chamber (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 : (30.0 to 32.0) °C
Relative Humidity : (50 to 55) %
Line Voltage : (220.0 to 222.0) V

Date of Received : 31 July 2023

Date of Calibration : 31 July 2023

Date of Issue : 05 August 2023

Calibrated by : Permpon Changu

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	66-400227-1	24 Oct 2023	National Institute of Metrology Thailand (NIMT)

Approved by :

(Bunjerd Masri)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 66-400422-3

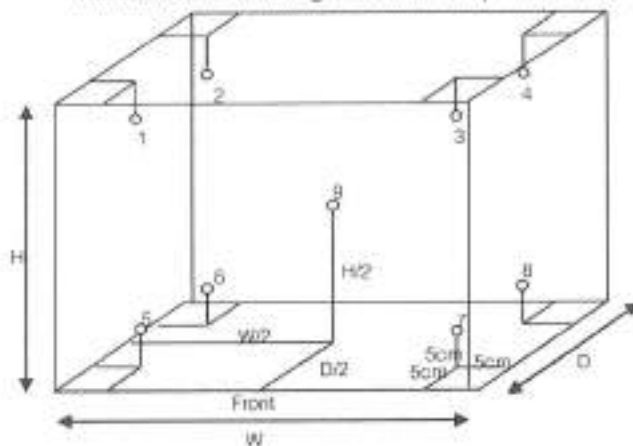
Page : 2 of 2

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 = 0.40 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	104.9	104.7	104.2	104.7	103.1	103.2	102.9	104.2	103.5	0.83
180.0	184.0	184.0	180.5	180.3	179.7	180.3	176.9	176.8	177.0	180.3	179.4	1.1

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	107.0	107.0	1.5	0.3	2.3
180.0	184.0	184.0	2.8	0.4	4.3

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. : 66-400422-4

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 32.0) °C

Relative Humidity : (50 to 55) %

Line Voltage : (220.0 to 222.0)V

Date of Received : 31 July 2023

Date of Calibration : 31 July 2023

Date of Issue : 05 August 2023

Calibrated by : Permpon Charipa

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	66-400225-1	28 Oct 2023	National Institute of Metrology Thailand (NIMT)

Approved by :



(Bunjerd Masri)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

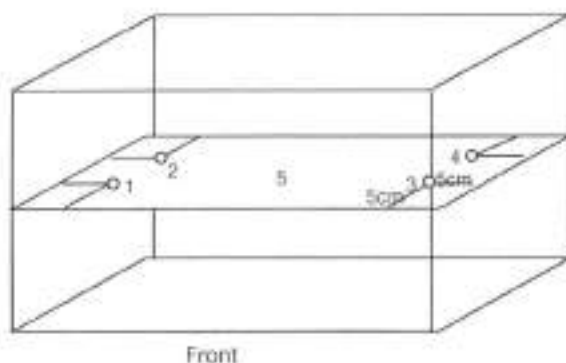
Certificate No. : 66-400422-4

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Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Temperature (° C) @ Sensor					Uncertainty (± ° C)	Measured Uniformity (° C)	Measured Stability (° C)
			No.							
			1	2	3	4	5			
95.0	95.0	95.0	94.46	94.37	94.38	94.38	94.41	0.18	0.08	0.04

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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