

ภาคผนวกที่ 5
เอกสารสอบเทียบเครื่องมือตรวจวัด

ภาคผนวกที่ 5-1
เอกสารสอบเทียบคุณภาพอากาศในบรรยากาศ

CERTIFICATE OF CALIBRATION

Certificate No. : COF-016-68

Page 1 of 2 Pages

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

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

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

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

CALIBRATION CONDITION:

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

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

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibration procedure:

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

Traceability:

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

Uncertainty of Measurement:

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

Calibrated by:

- ☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol



Approved signatory: _____

Mr. Parinya Booncharoen
Calibration Department Manager

MEASUREMENT RESULTS:

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

Table 1: The results of Q Standard calibration data

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

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

Table 2: The results of Q actual calibration data

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

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

End of Certificate of Calibration



Analyzer Performance Test

Calibrated Date: 7 August 2024

Instruments Information

Analyzer Type: SO2 Analyzer Model: 43C	Manufacturer Thermo Environmental S/N: 43C-65967-350
-------------------------------------------	---------------------------------------------------------

Calibration System

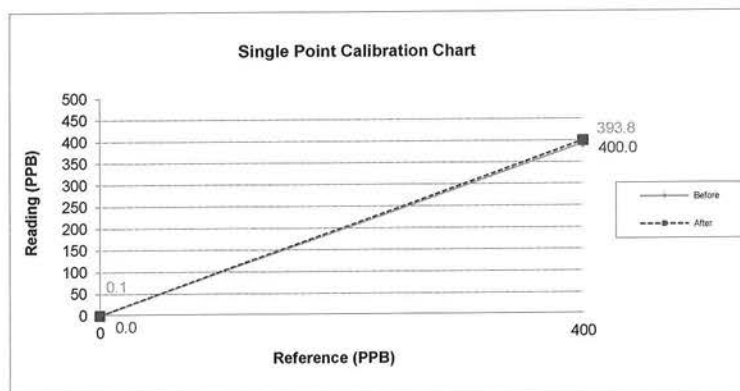
Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API MODEL 701 S/N: 1924	NO Conc 46.05 PPM SO2 Conc 46.01 PPM CO Conc 4,487 PPM Expire Date: 19 Sep. 2020

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	393.8	-1.6
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By :

Mr.PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 7 August 2024

Instruments Information

Analyzer Type: SO2 Analyzer Model: 43C	Manufacturer Thermo Environmental S/N: 0601114-787
-------------------------------------------	-------------------------------------------------------

Calibration System

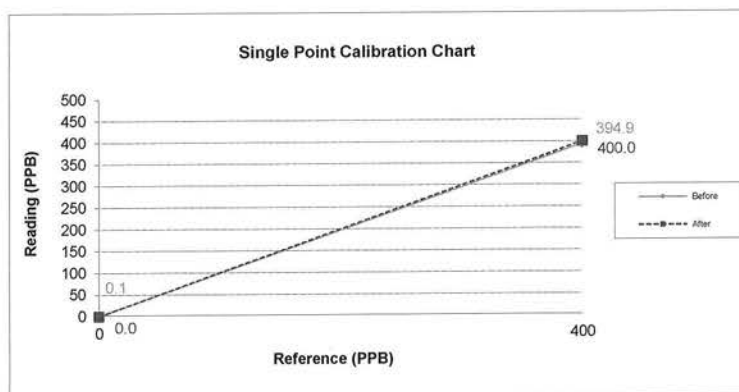
Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API MODEL 701 S/N: 1924	NO Conc 46.05 PPM SO2 Conc 46.01 PPM CO Conc 4,487 PPM Expire Date: 19 Sep. 2020

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	394.9	-1.3
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By :

Mr.PASAGORN SAMOL



บริษัท เอ็นไวร์ เซอร์วิส จำกัด

42 รามอินทรา 14 แยก 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
บริษัท เอ็นไวร์ เซอร์วิส จำกัด
ENVIR SERVICE CO., LTD. 42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Calibrated Date: 9 August 2024

Instruments Information

Analyzer Type: NO/NO ₂ /NO _x Analyzer Model: 42C	Manufacturer Thermo Environmental S/N: 42C-69273-362
---------------------------------------------------------------------------	---------------------------------------------------------

Calibration System

Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API Model 701 S/N: 1924	NO Conc 46.05 PPM SO ₂ Conc 46.01 PPM CO Conc 4.487 PPM Expire Date: 19 Sep. 2020

Environment: Temperature 25.5 °C

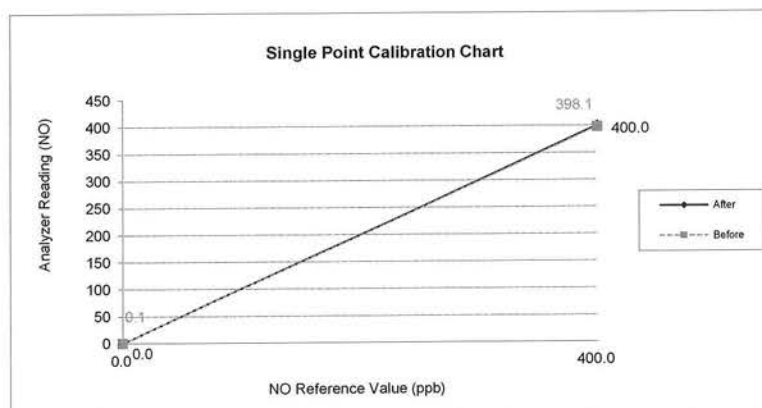
Humidity: 51 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.1	0.0	0.1	398.1	400.0	-0.5
NO _x	0.1	0.0	0.1	400.0	400.0	0.0

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.0	0.0	0.0	400.0	400.0	0.0
NO _x	0.0	0.0	0.0	400.0	400.0	0.0



Mr. Pasagorn Samol

Calibrate By : Mr. Pasagorn Samol



บริษัท เอ็นไวร์ เซอร์วิส จำกัด

42 รามอินทรา 14 แยก 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201
บริษัท เอ็นไวร์ เซอร์วิส จำกัด
ENVIR SERVICE CO., LTD. 42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Calibrated Date: 9 August 2024

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer Thermo Environmental S/N: 42C-63476-339
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Calibration System

Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API Model 701 S/N: 1924	NO Conc 46.05 PPM SO2 Conc 46.01 PPM CO Conc 4.487 PPM Expire Date: 19 Sep. 2020

Environment: Temperature 25.5 °C

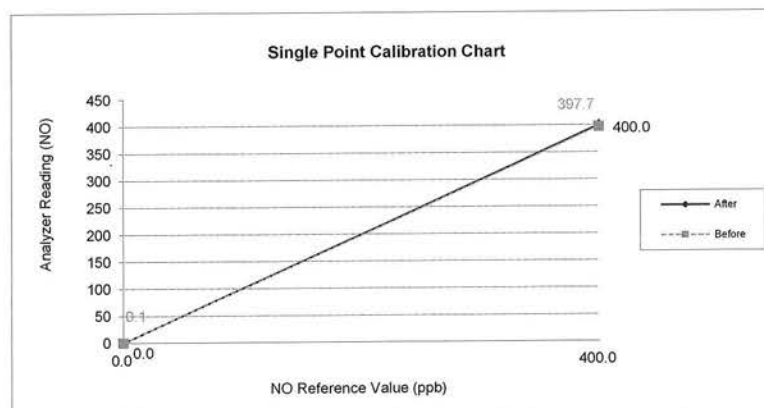
Humidity: 51 %RH

Calibration Check (Before adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.1	0.0	0.1	397.7	400.0	-0.6
NOx	0.1	0.0	0.1	400.0	400.0	0.0

Calibration Check (After adjust)

GAS	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift%
NO	0.0	0.0	0.0	400.0	400.0	0.0
NOx	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : Mr. Pasagorn Samol

ภาคผนวกที่ 5-2
เอกสารสอบเทียบ
ปริมาณสารเจือปนในอากาศที่ระบายออกจากปล่อง

Envi Equipment Service Co., Ltd.

110/254 Moo 3, Tambon Bang Rak Phathana, Amphur Bang Bua Thong, Nonthaburi 11110
Tel. 098 362 9132, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No.: E24-120087

Page.: 1 of 6

CERTIFICATE OF CALIBRATION

Customer : Pacific Laboratory Co., Ltd.
Address : 14/5358 Moo 14, Tambon Bang Bua Thong, Amphoe Bang Bua Thong, Nonthaburi 11110
Description of Equipment : Console meter
Manufacturer : Apex Instrument
Model Number : XC-572-OV
Serial Number : 1306033
ID./Control No. : -
Environment Conditions : Temperature (25 ± 2) °C
Humidity (50 ± 15) % RH
Cal. Date : 19/12/2024
Issue Date : 19/12/2024

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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

Result of Calibration

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

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

Calibrated by : Mr. Sunya Sangnil

Approved by :

(Mr. Mana Puchana)
Technical Manager



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

Meter Console Information				Calibration Conditions			Factors/Conversions		
Console Model Number	XC-572-OV	Date	19/12/2024	Time	10:45 AM	Std Temp	293	K	
Console Serial Number	1306033	Calibration Reference No.	SER24-120039			Std Press	760	mm Hg	
DGM Model Number	SK2SEX	Barometric Pressure	761.99			K _i	0.386		
DGM Serial Number	00009149	Calibration Meter Gamma	1.001			Console Leak Check		PASS	

Calibration Data											
Metering Console						Calibration Meter					
Run Time	DGM Orifice DH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final		
Elapsed (Q)	(P _a) mm H ₂ O	(V _{in}) m ³	(V _{out}) m ³	(t _{in}) °C	(t _{out}) °C	(V _{wf}) m ³	(V _{wf}) m ³	(t _{in}) °C	(t _{out}) °C		
min											
12.50	13.0	739.4010	739.5410	26	26	261.50434	261.64546	25	25		
12.47	13.0	739.5410	739.6810	26	26	261.64546	261.78708	24	24		
8.75	25.0	739.6920	739.8320	26	26	261.80304	261.94230	24	24		
8.70	25.0	739.8320	739.9720	26	26	261.94230	262.08004	24	24		
13.87	40.0	739.9780	740.2580	26	26	262.10624	262.38522	24	24		
13.93	40.0	740.2580	740.5380	26	26	262.38522	262.66570	24	24		
10.68	70.0	740.5460	740.8260	26	26	262.82274	263.10232	24	24		
10.83	70.0	740.8260	741.1060	26	26	263.10232	263.38116	24	24		
9.27	90.0	741.1150	741.3950	26	26	263.41114	263.68680	24	24		
9.23	90.0	741.3950	741.6750	26	26	263.68680	263.96244	24	24		

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

Meter Console Information				Calibration Conditions				Factors/Conversions			
Console Model Number	XC-572-OV	1306033	SK25EX	00009149	Date	19/12/2024	10:45 AM	Std Temp	293	K	
Console Serial Number					Calibration Reference No.	SER24-120039		Std Press	760	mm Hg	
DGM Model Number					Barometric Pressure	761.99	mmHg	K _i	0.386		
DGM Serial Number					Calibration Meter Gamma	1.001		Console Leak Check			
								PASS			

Calibration Data Results											
Standardized Data				Dry Gas Meter							
Dry Gas Meter (V _{std}) m ³	Dry Gas Meter (V _{std}) m ³ /min	Calibration Meter (V _{std}) m ³ /min	Calibration Factor Value (Y)	Calibration Factor Variation (ΔY)		Flowrate Std & Corr (Q _{std} cm)		Flowrate (ΔH _g)		Variation (ΔH _g)	
0.138	0.011	0.139	0.011	0.015	0.011	0.011	0.011	0.011	46.678	0.319	
0.139	0.011	0.140	0.011	0.019	0.011	0.011	0.011	0.011	45.947	-0.412	
0.139	0.016	0.138	0.016	0.001	0.016	0.016	0.016	0.016	45.120	-1.239	
0.139	0.016	0.136	0.016	0.002	0.016	0.016	0.016	0.016	45.596	-0.763	
0.278	0.020	0.276	0.020	0.002	0.020	0.020	0.020	0.020	45.309	-1.050	
0.278	0.020	0.278	0.020	0.000	0.020	0.020	0.020	0.020	45.257	-1.102	
0.279	0.026	0.277	0.026	0.002	0.026	0.026	0.026	0.026	47.133	0.774	
0.279	0.026	0.276	0.026	-0.002	0.025	0.025	0.025	0.025	48.723	2.364	
0.279	0.030	0.273	0.029	-0.015	0.029	0.029	0.029	0.029	47.079	0.720	
0.279	0.030	0.273	0.030	-0.015	0.030	0.030	0.030	0.030	46.748	0.389	
				0.992	Y Average						
								ΔH _g Average			
								46.359			

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

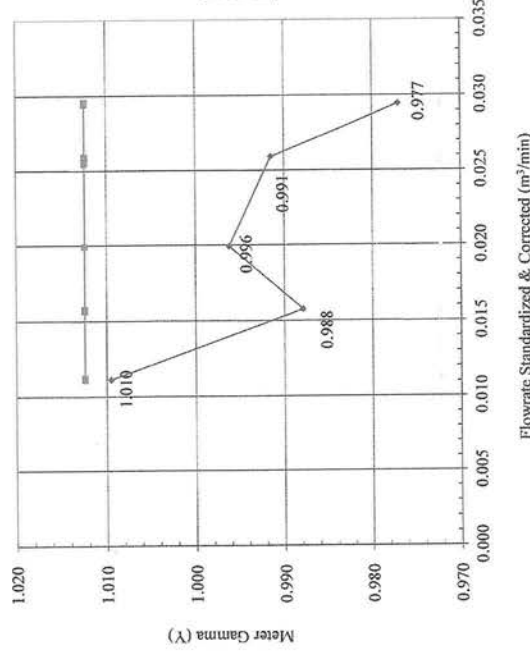
For ΔH_g, orifice pressure differential that equates to 0.75 cfm (0.0212 m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ±0.2 inches (5.1mm) H₂O



Meter Console Information				Calibration Conditions				Factors/Conversions			
Console Model Number	XC-572-OV	1306033	SK25EX	00009149	Date	19/12/2024	10:45 AM	Std Temp	293	K	
Console Serial Number					Calibration Reference No.	SER24-120039		Std Press	760	mm Hg	
DGM Model Number					Barometric Pressure	761.99	mmHg	K _i	0.386		
DGM Serial Number					Calibration Meter Gamma	1.001		Console Leak Check			
								PASS			

Calibration Date: 19-12-2024 Calibration Reference No: SER24-120039

Meter Gamma vs Flowrate



Console Serial: 1306033

Console Model: XC-572-OV

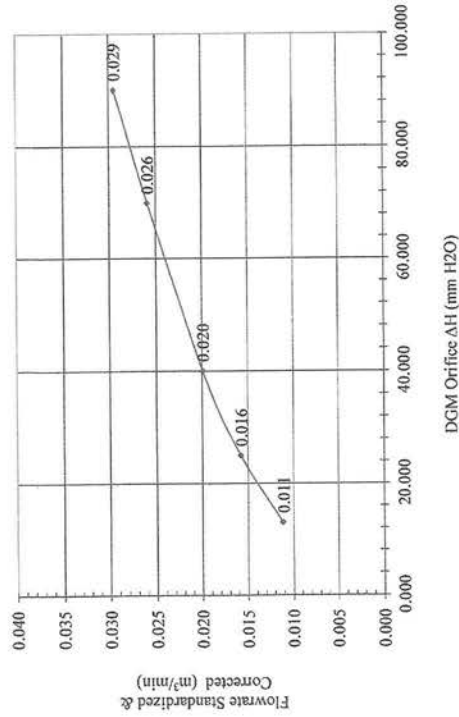


Meter Console Information		Calibration Conditions			Factors/Conversions	
Console Model Number	XC-572-OV	Date	Time	10:45 AM	Std Temp	293 K
Console Serial Number	1306033	Calibration Reference No.	SER24-120039		Std Press	760 mm Hg
DGM Model Number	SK25EX	Barometric Pressure	761.99	mmHg	K _i	0.386
DGM Serial Number	00009149	Calibration Meter Gamma	1.001		Console Leak Check	
					PASS	

Calibration Date: 19-12-2024

Calibration Reference No: SER24-120039

Meter Pressure vs Flowrate



Console Model: XC-572-OV



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information		Calibration Conditions	
Console Model Number	XC-572-OV	Date	19/12/2024 02:00 PM
Console Serial Number	1306033	Calibration Reference No.	SER24-120039
DGM Model Number	SK25EX	Reference Thermometer	DIGICON
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	260.0	371.0	482.0	593.0	816.0	1038.0
Stack	-18.0	26.0	39.0	92.0	150.0	258.0	372.0	484.0	595.0	818.0	1039.0
Aux	-	-	-	-	-	-	-	-	-	-	-
Probe	-18.0	26.0	39.0	92.0	150.0	-	-	-	-	-	-
Filter	-18.0	26.0	39.0	92.0	150.0	-	-	-	-	-	-
Oven	-	-	-	-	-	-	-	-	-	-	-
Exit	-18.0	26.0	39.0	-	-	-	-	-	-	-	-

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



Envi Equipment Service Co., Ltd.

1110/254 Moo 3, Tambon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110
Tel. 098 362 9152, 089 478 7885
E-mail: sales@envi-ees.com

Certificate No. : E24-120089
Page : 1 of 3

CERTIFICATE OF CALIBRATION

Customer : Pacific Laboratory Co., Ltd.
Address : 14/5358 Moo 14, Tambon Bang Bua Thong, Amphoe Bang Bua Thong, Nonthaburi 11110
Description of Equipment : Standard Probe Method 5
Manufacturer : Apex Instrument
Model Number : PS-4HV
Serial Number : -
ID/Control No. : -
Environment Conditions : Temperature (25 ± 2) °C
Humidity (50 ± 15) % RH
Cal. Date : 19/12/2024
Issue Date : 19/12/2024

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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

Result of Calibration

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

Calibrated by : Mr. Sanya Sangnil

Approved by :

(Mr. Mana Puckthong)
Technical Manager



Certificate No. : E24-120089
Page : 2 of 3

CALIBRATION RESULTS
S-Type Geometric Pitot Tube Calibration

Sampling System Equipment Information

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

Calibration Condition

Date : 19 December 2024
Barometric Pressure : 761.99 mm Hg
Digital Caliper : CD-6" ASX
Serial number : A18008059

Pitot tube/Probe: # PS-4HV			
Parameter	Value	Allowable Range	Check
Assembly level?	Yes	Yes	Pass
Ports Damage?	No	No	Pass
$\alpha 1$	0	$-10^\circ < \alpha 1 < +10^\circ$	Pass
$\alpha 2$	1	$-10^\circ < \alpha 2 < +10^\circ$	Pass
B1	0	$-5^\circ < B1 < +5^\circ$	Pass
B2	0	$-5^\circ < B2 < +5^\circ$	Pass
γ	0	N/A	-
θ	0	N/A	-
Dt	0.375	.188" to .375"	Pass
A	0.8920	$2.1Dt \leq A \leq 3Dt$	Pass
A/2Dt	1.1189	$1.05 \leq A/Dt \leq 1.5$	Pass
Z = A tan γ	0.048	$Z \leq .125"$	Pass
W = A tan θ	0.021	$W \leq .031"$	Pass

Remark:

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



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information			
Probe Model Number	PS-4HV		
Probe Serial Number	-		
Meter Box Model Number	JENCO 765 KF		
Meter Box Serial Number	JC 13335		

Calibration Conditions			
Date	19/12/2023	03:20 PM	
Calibration Reference No.	E24-120039		
Reference Thermometer	DIGICON		
Serial Number	183169105		

Thermocouple of Standard Probe method 5 = length 4 foot			
Set Point	Reference Thermocouple	Probe Thermocouple	Difference
100	100.0	98.0	0.54
250	250.0	247.0	0.57
300	300.0	297.0	0.52
350	350.0	347.0	0.48



CERTIFICATE OF CALIBRATION

Customer : Pacific Laboratory Co., Ltd.
Address : 14/5358 Moo 14, Tambon Bang Bua Thong, Amphoe Bang Bua Thong, Nonthaburi 11110
Description of Equipment : Stainless Steel Nozzle
Manufacturer : Apex Instrument
Model Number : NS-SET-ODD
Serial Number : -
ID/Control No. : -
Environment Conditions : Temperature (25 ± 2) °C
: Humidity (50 ± 15) % RH
Cal. Date : 19/12/2024
Issue Date : 19/12/2024

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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

Result of Calibration

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

Calibrated by : Mr. Sanya Sangnil

Approved by :

(Mr. Mana Fuchai)
Technical Manager

CALIBRATION RESULTS

Sampling System Equipment Information

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

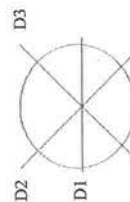
Calibration Condition

Date : 19 December 2024
Barometric Pressure : 761.99 mm Hg
Calibration Device : Vernier, 0-150 mm
Method Reference : US, EPA Method

Nozzle ID	Nozzle Diameter			Different ΔD	$(D1 + D2 + D3) / 3$ Davg
	Size	mm	mm		
NS-5	3.97	3.90	3.88	0.012	3.893
NS-7	5.55	5.37	5.36	0.010	5.370
NS-9	7.14	6.99	7.00	0.006	6.993
NS-13	10.31	10.22	10.20	0.012	10.207
NS-15	11.91	11.69	11.69	0.000	11.690
NS-17	13.49	13.48	13.46	0.012	13.473

Remark:

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



บริษัท คอล มี เอ็นจิเนีย จำกัด (สำนักงานใหญ่)
CALL ME ENGINEER COMPANY LIMITED. (Head Office)
89/553 หมู่ 5 ต.บางแม่นาง อ.บางใหญ่ จ.นนทบุรี 11140
89/553 Moo 5, T.Bangmaenang, A.Bangyai Nonthaburi,
11140 Thailand
เลขประจำตัวผู้เสียภาษีอากร (Tax ID.)
0125564024574



GASES AND FIRE DETECTION

Contact Us

E-Mail : service@callmeeng.com
Web Site : www.callmeeng.com

Tel : +66(0)61 960 6105
Line ID : @Callmeeng

Certificate of Calibration



CUSTOMER

Name
Pacific Laboratory Co., Ltd.

Address
**14/5358 Moo 14, Tambon Bang Bua Thong,
Amphoe Bang Bua Thong, Nonthaburi 11110**

Department/ Division/ Vessel
N/A

UNIT UNDER CALIBRATION (UUC)

Cert. No. SE-CM25SER018-1

Description

Flue gas analyzer

Manufacturers

Testo Model 310 II

S/N.64598297

Measuring Range

O2 : 0-21 %Vol, CO : 0-4000 PPM

Cal. Date : 08-Jan-25
Cal. Due : 07-Jan-26
Work Order No. : SE-CM25SER018
Cal. Temp. : 25.0 ± 1°C
Cal. Humidity : 55.0 ± 10 %RH

Reference Standard

Description	Cert. No.	Expired Date
- TSG Standard Nitrogen = 99.99 %Vo	DNHQ-44747-169649-10	18-Jul-28
- Linde Mixture Gas in Nitrogen	3278/22	17-Oct-25
Component : CO = 106 PPM, O2 = 18.1 %		

Function Setup

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

Test Result

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




Calibration Result

Parameter	Zero						Span						Respond time Sec.		Judgment	Note:
	Std.	Acc.	Before	Cal.	After	Err.	Std.	Acc.	Before	Cal.	After	Err.	Acc.	Read		
O2 (%Vol)	0.0	± 1.5	0.0	0.0	0.0	0.0	18.1	± 1.0	18.4	18.1	18.1	0.0	≤30	12.0	Pass	- Respond time must be within 30 sec. to reach to 90% of Std. concentration.
CO (PPM)	0.0	0.0	0.0	0.0	0.0	0.0	106.0	± 5.0	101.0	106.0	106.0	0.0	≤30	13.0	Pass	

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

Comment/ Suggestion :

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

Engineer Signatory	Approval Signatory	Company Stamp
 Mr. Rattanasak Yunbuapar (Technical Specialist) Date : 08-Jan-25	 Mr. Somsak Wangdeeklang (Engineer Specialist) Date : 08-Jan-25	 Call Me CALL ME ENGINEER CO., LTD.



SCIMET Co., Ltd.
1194 Soi Wachirathamsathit 57, Bangchak,
Phrakhanong, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
https://www.scimet.co.th



Certificate No. C07240096

Calibration Certificate

Equipment: SPECTROPHOTOMETER

Model: DR3900

Serial No.(or ID): 2076219 (LAB-ST-002)

Manufacturer: HACH

Condition: In Condition

Job No.: KSMT2401591

Received Date: 04 July 2024

Issued Date: 04 July 2024

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

04 July 2024

Environment Condition

Temperature: 28.8 °C \pm 0.5 °C

Humidity: 60.5 %RH \pm 2.3 %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 Starna Scientific Limited.

The standard for Wavelength Certificate No. 108691 and 108692

The standard for Photometric Certificate No. 109010 , 114655

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

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

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

(Mr. Dumrong Boonsopon)

Person in charge



(Mr. Thalerngkeat 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	360	1.02	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	513	0.75	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	641	0.95	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
	0.2373	0.236	0.0013	0.0045
	0.5617	0.561	0.0007	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
	0.2335	0.232	0.0015	0.0045
	0.5513	0.551	0.0003	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
	0.2126	0.213	-0.0004	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
	0.2201	0.219	0.0011	0.0045
	0.5176	0.518	-0.0004	0.0045
	0.6930	0.691	0.0020	0.0045
	0.9908	0.991	-0.0002	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.2443	0.243	0.0013	0.0045
	0.5530	0.553	0.0000	0.0045
	0.7196	0.717	0.0026	0.0045
	1.0301	1.028	0.0021	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.2646	0.263	0.0016	0.0045
	0.5370	0.537	0.0000	0.0045
	0.6862	0.684	0.0022	0.0045
	0.9822	0.981	0.0012	0.0045

The End of Certificate

บริษัท ชายนันเมท จำกัด (SCIMET CO., LTD.)

1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

FC07-03: 30 MAY 2023



Refer to Certificate No.: C07240096

Page: 1 of 3

Statements of conformity:

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

The error of temperature determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, ASTM E 275-08 and ASTM E 387-04. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

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

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



(Mr. Thalerngkeat Pongngam)

Authorized signatory

บริษัท ชายนันเมท จำกัด (SCIMET CO., LTD.)

1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

FC07-03: 30 MAY 2023



Refer to Certificate No.: C07240096

Page: 2 of 3

Without Adjustment**Wavelength Accuracy (nm), The spectral bandwidth of Std at 5 nm and UUC at 5 nm**

Unit Under Calibration	Correction	Guard Band (w)	Tolerance (\pm)	Conformity
360	1.02	0.59	2	Pass
417	0.80	0.59	2	Pass
441	0.29	0.59	2	Pass
471	0.51	0.59	2	Pass
480	-0.12	0.59	2	Pass
513	0.75	0.59	2	Pass
528	0.59	0.59	2	Pass
537	0.75	0.59	2	Pass
585	0.56	0.59	2	Pass
641	0.95	0.59	2	Pass
684	0.70	0.59	2	Pass
747	0.61	0.59	2	Pass
807	0.04	0.59	2	Pass
879	0.68	0.59	2	Pass

บริษัท ชายนันเมท จำกัด (SCIMET CO., LTD.)1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

FC07-03: 30 MAY 2023

Without Adjustment

Photometric Accuracy (Absorbance)

Wavelength	Unit Under Calibration	Correction	Guard Band (w)	Tolerance (\pm)	Conformity
420 nm	0.000	0.0000	0.0045	0.015	Pass
	0.236	0.0013	0.0045	0.015	Pass
	0.561	0.0007	0.0045	0.015	Pass
	0.737	0.0022	0.0045	0.015	Pass
	1.054	0.0010	0.0045	0.015	Pass
440 nm	0.000	0.0000	0.0045	0.015	Pass
	0.232	0.0015	0.0045	0.015	Pass
	0.551	0.0003	0.0045	0.015	Pass
	0.721	0.0020	0.0045	0.015	Pass
	1.031	0.0014	0.0045	0.015	Pass
465 nm	0.000	0.0000	0.0045	0.015	Pass
	0.213	-0.0004	0.0045	0.015	Pass
	0.505	-0.0014	0.0045	0.015	Pass
	0.673	0.0005	0.0045	0.015	Pass
	0.964	-0.0025	0.0045	0.015	Pass
546.1 nm	0.000	0.0000	0.0045	0.015	Pass
	0.219	0.0011	0.0045	0.015	Pass
	0.518	-0.0004	0.0045	0.015	Pass
	0.691	0.0020	0.0045	0.015	Pass
	0.991	-0.0002	0.0045	0.015	Pass
590 nm	0.000	0.0000	0.0045	0.015	Pass
	0.243	0.0013	0.0045	0.015	Pass
	0.553	0.0000	0.0045	0.015	Pass
	0.717	0.0026	0.0045	0.015	Pass
	1.028	0.0021	0.0045	0.015	Pass
635 nm	0.000	0.0000	0.0045	0.015	Pass
	0.263	0.0016	0.0045	0.015	Pass
	0.537	0.0000	0.0045	0.015	Pass
	0.684	0.0022	0.0045	0.015	Pass
	0.981	0.0012	0.0045	0.015	Pass

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

The End of Statements of Conformity

บริษัท ชายนันเมก จำกัด (SCIMET CO., LTD.)

1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

FC07-03: 30 MAY 2023

ภาคผนวกที่ 5-3
เอกสารสอบเทียบปริมาณความเข้มข้นละอองและสารเคมี
ในบรรยากาศการทำงาน

Personal Pump Calibration Report

Calibrate No. : CP256/2568

Calibrate Date : April 4, 2025

Equipment Type	: Personal Pump
Calibration Type	: DRYCAL DC-LITE FLOWMETER
Volume for Calibration	: 1.0 l/min
Environment Conditions	: 29.0 Deg C.
Environment Pressure	: 758.0 mmHg.
Customer Name	: บริษัท โรงพยาบาลเหล็กกรุงเทพ จำกัด

[illegible]

Calibration By

Sakuna S.
(Miss Sakuna Supparot)
Technician

Personal Pump Calibration Report

Calibrate No. : CP257/2568

Calibrate Date : June 3, 2025

Equipment Type	:	Personal Pump
Calibration Type	:	DRYCAL DC-LITE FLOWMETER
Volume for Calibration	:	1.0, 2.0 l/min
Environment Conditions	:	29.0 Deg C.
Environment Pressure	:	758.0 mmHg.
Customer Name	:	บริษัท โรงงานเหล็กกรุงเทพฯ จำกัด

[illegible]

Calibration By

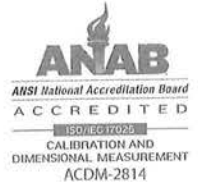
(Miss Sakuna Supparot)
Technician





CALIBRATION LABORATORY Co., LTD.

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



CERTIFICATE OF CALIBRATION FOR

NOMENCLATURE	:	AIR FLOW METER
MANUFACTURER	:	BIOS INTERNATIONAL
MODEL / TYPE	:	DCL-M
SERIAL NO.	:	104699
CLID. NO.	:	212402514
JOB CONTROL NO.	:	241226137823
CALIBRATION SERVICE	:	<input checked="" type="checkbox"/> IN-LABORATORY <input type="checkbox"/> ON-SITE

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

DATE OF RECEIVED : 26 December 2024

DATE OF ISSUED : 03 January 2025

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

Calibrated By :

Supphakit Sakuntaharn
Calibration Engineer

Approved By :

Mongkol Yotsoontorn
Authorized Signatory
03 January 2025



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

Certificate No. Q24137823

F3-011-05/12-23

page 1 of 3



@clccalibration



CALIBRATION LABORATORY Co., LTD.

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



REPORT OF CALIBRATION

FOR

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

ENVIRONMENT CONDITIONS :

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

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

PROCEDURE USED :

This instrument was calibrated under procedure No. **CLC-CPPF-03**. The calibration was performed by comparison with Gas Flow Meter which refers to the standard condition of 101.325 kPa and $0 ^\circ\text{C}$.

REFERENCE STANDARD USED :

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

TRACEABILITY :

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

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24137823

F3-011-05/12-23

page 2 of 3

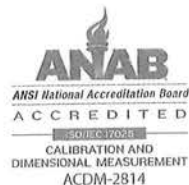


@clccalibration



CALIBRATION LABORATORY Co., LTD.

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



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring air flow meter.

CALIBRATION DATA

AIR FLOW METER RESULT

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

Technical Note. Media of Gas : Air

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

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

End of Certificate

Certificate No. Q24137823

F3-011-05/12-23

page 3 of 3



@clccalibration

CAL

Calibratech Co.,Ltd.

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

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



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-200273-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : Electronic Balance

Manufacturer : SHIMADZU

Model : AP225WD

Serial No. : D316301828

ID No. : LAB-BL-003

Capacity : 220000 mg

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

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

Ambient Temperature : (26.2 to 26.4) °C

Relative Humidity : (34.0 to 35.4) %

Air Pressure : 1007.0 mbar

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 31 July 2024

Calibrated by : Akaradath Thippichai

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

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

Standard Weights

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

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 67-200273-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

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

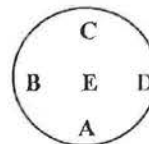
This result of calibration was found accurate as shown on date and place of calibration only.

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

Eccentric error

Load test : 50000 mg

A	B	C	D	E	
0.00	0.00	0.01	0.00	0.00	mg



Repeatability

Load test : 200000 mg

Stdev. : 0.053 mg

A handwritten signature in black ink, appearing to be 'AB' or similar, located to the right of the Repeatability section.

- o0o -





Metrohm Compliance Service

Certificate of Performance (CoP) for
881 Compact IC pro

Instrument details

Type:	1.881.0030
Serial No.:	PM240428/ME (1881000010137)
Manufacturer:	Metrohm AG Ionenstrasse CH-9100 Herisau Switzerland
Firmware:	5.850.0114
Customer Instrument ID:	N/A

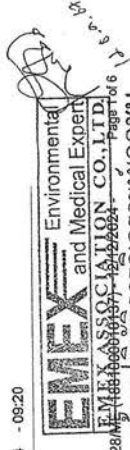
Customer details

Name of company:	EMEX Association Co., Ltd.
Address:	27, 29 Bang Mot, Chomthong, Bangkok 10150
Department:	Laboratory
Responsible person:	สุเมธ ฐาน
Calibration place:	Laboratory EMEX Association Co., Ltd.

Date and time of calibration: 12/12/2024 - 09:20



ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-244



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



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 executes the instrument's specific functions tested except where detailed overleaf.

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.	Due date / Expiry date
Multimeter	Fluke	884801190	E1U2402801	25/06/2025
Temperature meas. test.	DTM5000	3332	TML2403052	06/03/2025
High-pressure gauge	Metrohm	PG01	CAL252-24C0001	07/01/2025
Flow meter	ANALYT-ATC	434152	L302460075-0001	15/03/2025

Protocol

Instrument had to be repaired beforehand

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

Instrument had to be readjusted beforehand

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

Yes

No

Yes

No



Certificate of Performance (CoP) No.: PM240428ME (1881000010130/8 12/12/2024 - Page 2 of 6)

09:20

เลขทะเบียน ว-244



Conclusion of test results

Instrument satisfies the specified technical requirements

Recommended date for next maintenance:

Comments

Metrohm representative

Metrohm representative confirms correct execution of instrument calibration

Date

Name

Mr. Jaranasak Samana

Signature

Customer representative

Customer representative accepts results of instrument calibration

Date

Name

คุณสุภา ธีนา

Signature

ชัชวาลย์ ธีนา



ห้องปฏิบัติการวิเคราะห์เอกสาร

Certificate of Performance (CoP) No.: PM240428ME (1881000010130/8 12/12/2024 - Page 3 of 6)

09:20



Document Type
Description
Document ID

Certificate of Performance (CoP)
CoP for 881 Compact IC pro
CoP.881 Version 1.3 / 8.881.3008EN

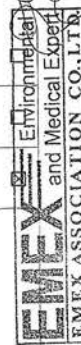


Document Type
Description
Document ID

Certificate of Performance (CoP)
CoP for 881 Compact IC pro
CoP.881 Version 1.3 / 8.881.3008EN

Test results

No.	Title	Comments	Pass		
			Yes	No	N/A
100	Visual test		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
101	Safety test		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
102	LED		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
103	Fan		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
104	Communication		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
105	Leak detector		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
106	MSB interface		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
107	USB interface		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
108	Column plug interface		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
109	Column heater		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
110	IC pump		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
111	Injector		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
112	Degasser		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
113	MSM (option)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



EMEX ASSOCIATION CO., LTD.
Page 4 of 6

หอนปฏิบัติการวิเคราะห์เอกชน

เลขทะเบียน ว-244

Certificate of Performance (CoP) No.: PM240428/ME (18810000101) 3/22/2023

09:20

No.	Title	Comments	Pass		
			Yes	No	N/A
114	Peristaltic pump (option)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
115	MCS (option)		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



EMEX ASSOCIATION CO., LTD.
Page 5 of 6

หอนปฏิบัติการวิเคราะห์เอกชน

เลขทะเบียน ว-244

Certificate of Performance (CoP) No.: PM240428/ME (18810000101) 3/22/2023

09:20



Document Type
Description
Document ID

Certificate of Performance (CoP)
CoP for 881 Compact IC pro
CoP 881 Version 1.3 / 8.881.3006EN



Document Type
Description
Document ID

Certificate of Performance (CoP)
CoP for 850.9010 Conductivity Detector
CoP 850 Version 1.3 / 8.850.3023EN

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-10456

End of CoP Document



ห้องปฏิบัติการวิเคราะห์เอกสาร
Certificate of Performance (CoP) No.: PM240428/ME (188100001) เลขที่เอกสาร ว-244 เลขที่ใบขึ้นทะเบียน ว-244
09:20

Metrohm Compliance Service

Certificate of Performance (CoP) for 850.9010 Conductivity Detector

Instrument details

Type:	18509010
Serial No.:	PM240428/ME (1850901012155)
Manufacturer:	Metrohm AG, Lenenstrasse, CH-9100 Herisau Switzerland
Customer instrument ID:	N/A

Control device details

Type:	1.881.0030
Serial No.:	1881000010137
Firmware:	5.850.0114

Customer details

Name of company:	EMEX Association Co., Ltd.
Address:	27, 29 Bang Mot, Chomthong, Bangkok 10150
Department:	Laboratory
Responsible person:	นางสาว อรุณ
Calibration place:	Laboratory EMEX Association Co., Ltd.



Date and time of calibration: 12/12/2024 - 09:40

ห้องปฏิบัติการวิเคราะห์เอกสาร
Certificate of Performance (CoP) No.: PM240428/ME (1850901012155) เลขที่เอกสาร ว-244 เลขที่ใบขึ้นทะเบียน ว-244
09:40



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 executes the instrument's specific functions tested except where detailed otherwise.

Declaration

Document

Test instructions used: C-1 Test instructions for 850.9010 Conductivity Detector, Version 1.3

Reference standards

Type / Model	Manufacturer	Serial No. / Batch No.	Certificate No.	Date date / Expiry date
Temperature meas. bath.	DTM000	3332	TMA2403052	08/03/2025
Conductivity standard (opt.)	N/A	N/A	N/A	N/A

Protocol

Instrument had to be repaired beforehand

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

Instrument had to be readjusted beforehand

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

Yes	No
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>

Conclusion of test results

Instrument satisfies the specified technical requirements

Recommended date for next maintenance:

Comments

Yes	No
<input checked="" type="checkbox"/>	<input type="checkbox"/>

Metrohm representative

Metrohm representative confirms correct execution of instrument calibration

Date	Name	Signature
12/12/2024	Mr. Jaransak Samana	

Customer representative

Customer representative accepts results of instrument calibration

Date	Name	Signature
12/12/2024	คุณสุภา คุ้มสาร	



Certificate of Performance (CoP) No.: PM240428/ME (1850901012155) - 12/12/2024 -
09:40

เลขทะเบียน ว-244



Certificate of Performance (CoP) No.: PM240428/ME (1850901012155) - 12/12/2024 -
09:40

เลขทะเบียน ว-244

No.	Title	Comments	Pass		
			Yes	No	N/A
100	Visual Inspection		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
101	Temperature absolute		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
102	Temperature stability		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
103	Signal noise		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
104	Conductivity dry test		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
105	Conductivity cell (optional)	N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Date	Article No.	Author	Description/Changes
26.04.2012	8,950.30/23EN	Philipp Rüegg	Layout adapted to Metrohm Compliance Service

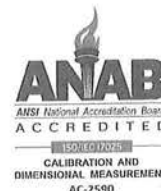
End of CoFP Document

ภาคผนวกที่ 5-4
เอกสารสอบเทียบระดับความดังเสียง
(Sound Level Meter)



Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsit-Nakornnayok Rd., Bungeeetho, Thunyaburi,
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 : EL41650/24
Control Number : PCAL153035
Customer Control : -
Description : Sound Calibrator
Manufacturer : SOUNDTEK
Model : ST-120
Serial Number : 211203764
Customer : Pacific Laboratory Co., Ltd.
14/5358 Moo 14, Tambol Bang Bua Thong, Amphoe Bang Bua Thong,
Nonthaburi 11110
Date of Receipt : 22-Aug-24
Date of Calibration : 23-Aug-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. Nonpawit Wiseschoo

Authorized Signature

(Mr. Manote Piwnimnual)

27-Aug-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL41650/24

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Meter	030606101	ANAB : AC-2590	EL12298/24	27-Mar-25
Sound Calibrator	125626778	NSC : Calibration 0037	EEL.BP. 161/0167	04-Feb-25

Condition as received : Normal

Definitions :-

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

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL41650/24

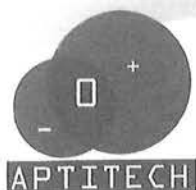
Page : 3 of 3

Calibration Results

Sound Pressure Level Accuracy

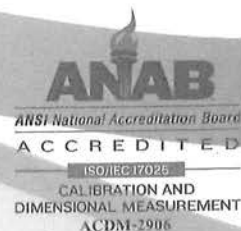
Nominal Value	Measured Value	UUC Error	Uncertainty (±)
94 dB	93.97 dB	0.03 dB	0.17 dB
114 dB	114.30 dB	-0.30 dB	0.17 dB

...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 : SC240209

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	: SC240209
Manufacturer	: Scarlet Tech	Calibration Location	: Laboratory
Model	: ST-11D	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 820968	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 20-Aug-2024

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

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

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

Standard Equipments

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



Authority of Calibration

Approved Signatory

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

Calibration Date : 21-Aug-2024

Issued Date : 24-Aug-2024

Calibrated By : Ms. Hathaichanok Kaewsrirai

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



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Email. sales@aptitech-cal.com



CALIBRATION REPORT

Certificate Number : SC240209

Calibration Method

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

Calibration Results

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

Sound Level Measurement (Slow Mode)

Parameter	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LFp	20-140 dB	93.86 dB	93.6 dB	-0.26 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB
LSp	20-140 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
Llp	20-140 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

Sound Level Measurement (Fast Mode)

Parameter	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LFp	20-140 dB	93.86 dB	93.6 dB	-0.26 dB	0.60 dB
		113.87 dB	113.5 dB	-0.37 dB	0.60 dB
LSp	20-140 dB	93.86 dB	93.6 dB	-0.26 dB	0.60 dB
		113.87 dB	113.5 dB	-0.37 dB	0.60 dB
Llp	20-140 dB	93.86 dB	93.6 dB	-0.26 dB	0.60 dB
		113.87 dB	113.5 dB	-0.37 dB	0.60 dB

--- End of Certificate ---



PACIFIC

LABORATORY CO., LTD.

Pacific Laboratory Co., Ltd.

14/5358 Moo 14 Tambol Bang Bua Thong

Amphoe Bang Bua Thong, Nonthaburi 11110

Tel. : 0-2045-2446-7 Fax. : 0-2045-3991

E-mail : pacificlab07@gmail.com

www.pacificlaboratory.com

Head office/Tax 0125550044098

Sound Level Meter Calibration Report

Calibrate No. : SLM 077/2568

Calibrate Date : April 4, 2025

Equipment : Sound Calibrator
Manufacturer : Soundtek
Model/Type : ST-120
Serial No. : 211203764
Customer Name : บริษัท โรงงานเหล็กกรุงเทพฯ จำกัด

Item	Instrument	Manufacturer	Model	Serial No.	Before Adjust	After Adjust	Inspection Result
1.	Sound Level Meter	ACO Co., Ltd.	6226	170091	94.3	94.0	Pass
					113.7	114.0	Pass

Approved By





Professional Calibration & Services Co., Ltd.

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



Certificate of Calibration

Page 1 of 3

Certificate Number : EL06579/25

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 : 04-Feb-25

Date of Calibration : 07-Feb-25

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. Manote Piwnimnual)

07-Feb-25

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL06579/25

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Meter	030606101	ANAB : AC-2590	EL12298/24	27-Mar-25
Sound Calibrator	125626778	NSC : Calibration 0037	EEL.BP. 99/0168	23-Jan-26

Condition as received : Normal

Definitions :-

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

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL06579/25

Page : 3 of 3

Calibration Results

Sound Pressure Level Accuracy

Nominal Value	Measured Value	UUC Error	Uncertainty (±)	Tolerance Limit Value
94 dB	94.07 dB	-0.07 dB	0.17 dB	93.50 ~ 94.50 dB
114 dB	114.10 dB	-0.10 dB	0.17 dB	113.50 ~ 114.50 dB

Notes:

- 1). Tolerances or specifications report in table above are based on TM-100 Sound Level Calibrator, User's manual, HB2TM1000001, Tenmars Electronics Co., Ltd.

...End...

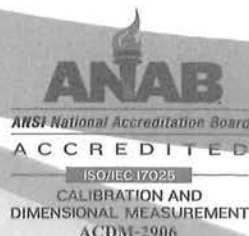


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CERTIFICATE OF CALIBRATION

Certificate Number : SC240292

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	: SC240292
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222015	Ambient Humidity	: 50 ± 15 %RH
ID. Number	: N/A	Received Date	: 16-Dec-24

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

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

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

Standard Equipments

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



Authority of Calibration

Approved Signatory

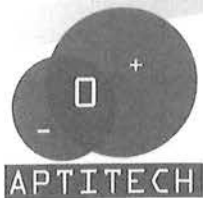
Calibration Date : 17-Dec-2024

Issued Date : 20-Dec-2024

Calibrated By : Mr.Worachot Thongthin

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

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



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CALIBRATION REPORT

Certificate Number : SC240292

Calibration Method

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

Calibration Results

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

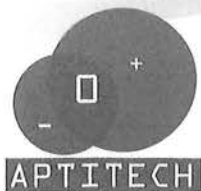
Sound Level Measurement (Slow Mode)

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

Sound Level Measurement (Fast Mode)

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

--- End of Certificate ---

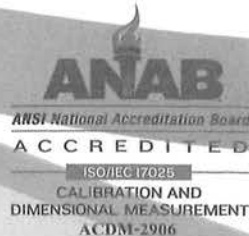


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CERTIFICATE OF CALIBRATION

Certificate Number : SC250017

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	: SC250017
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222046	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 06-Jan-25

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

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

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

Standard Equipments

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



Authority of Calibration

Approved Signatory

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

Calibration Date : 08-Jan-2025

Issued Date : 13-Jan-2025

Calibrated By : Ms. Hathaichanok Kaewsrirai

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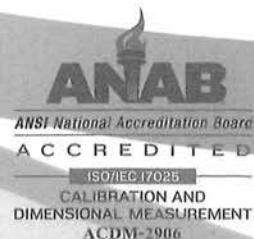


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CALIBRATION REPORT

Certificate Number : SC250017

Calibration Method

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

Calibration Results

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

Sound Level Measurement (Slow Mode)

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

Sound Level Measurement (Fast Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.0 dB	0.14 dB	0.60 dB
		113.87 dB	113.5 dB	-0.37 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.0 dB	0.14 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB

--- End of Certificate ---

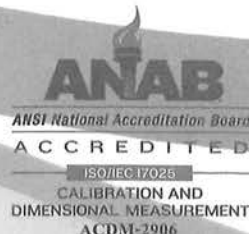


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CERTIFICATE OF CALIBRATION

Certificate Number : SC240294

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	: SC240294
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222017	Ambient Humidity	: 50 ± 15 %RH
ID. Number	: N/A	Received Date	: 16-Dec-24

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

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

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

Standard Equipments

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



Authority of Calibration

Approved Signatory

Calibration Date : 17-Dec-2024

Issued Date : 20-Dec-2024

Calibrated By : Mr.Worachot Thongthin

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

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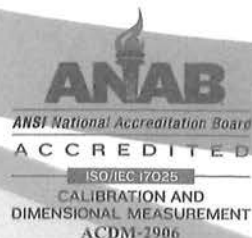


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CALIBRATION REPORT

Certificate Number : SC240294

Calibration Method

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

Calibration Results

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

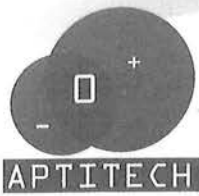
Sound Level Measurement (Slow Mode)

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

Sound Level Measurement (Fast Mode)

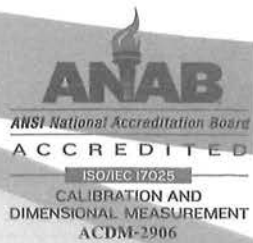
Function	UUC Range	Standard Value	UUC Reading	UUC Error	(\pm) Uncertainty
LA	40-130 dB	93.86 dB	94.0 dB	0.14 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.0 dB	0.14 dB	0.60 dB
		113.87 dB	113.7 dB	-0.17 dB	0.60 dB

--- End of Certificate ---



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CERTIFICATE OF CALIBRATION

Certificate Number : EI250216

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	: EI250216
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	: 21-Jan-25

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

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

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

Standard Equipments

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

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 27-Jan-2025

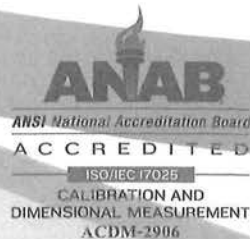
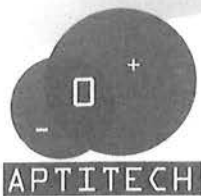
Issued Date : 30-Jan-2025

Calibrated By : Ms. Hathaichanok Kaewsrisai

☒ Mr. Anuwat Simsiriwat [Laboratory Manager]

☐ Mr. Kornupong Suksamran [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 : EI250216

Calibration Method

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

Calibration Results

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

Sound Level Measurement (Slow Mode)

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

Sound Level Measurement (Fast Mode)

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

--- End of Certificate ---

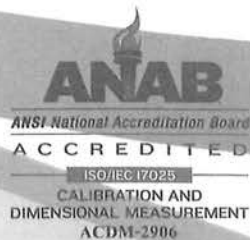


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CERTIFICATE OF CALIBRATION

Certificate Number : EI250212

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	: EI250212
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222133	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 21-Jan-25

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

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

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

Standard Equipments

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



Authority of Calibration

Approved Signatory

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

Calibration Date : 27-Jan-2025

Issued Date : 30-Jan-2025

Calibrated By : Ms. Hathaichanok Kaewsrisai

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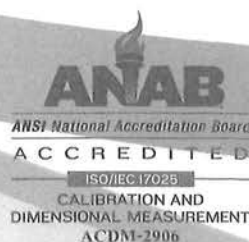


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CALIBRATION REPORT

Certificate Number : EI250212

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

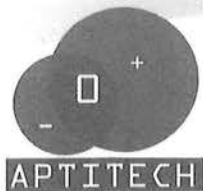
Sound Level Measurement (Slow Mode)

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	113.5 dB	-0.37 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.6 dB	-0.26 dB	0.60 dB
		113.87 dB	113.4 dB	-0.47 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	113.4 dB	-0.47 dB	0.60 dB
LC	40-130 dB	93.86 dB	93.7 dB	-0.16 dB	0.60 dB
		113.87 dB	113.4 dB	-0.47 dB	0.60 dB

--- End of Certificate ---

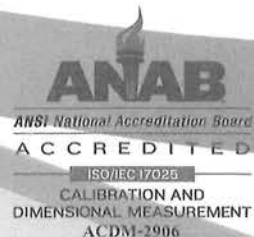


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CERTIFICATE OF CALIBRATION

Certificate Number : EI250282

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

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

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

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

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

Standard Equipments

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

APTITECH

Authority of Calibration

Approved Signatory

Calibration Date : 03-Feb-2025

Issued Date : 06-Feb-2025

Calibrated By : Ms. Hathaichanok Kaewsrirai

☒ Mr. Anuwat Simsiriwat [Laboratory Manager]

☐ Mr. Kornupong Suksamran [Technical Manager]

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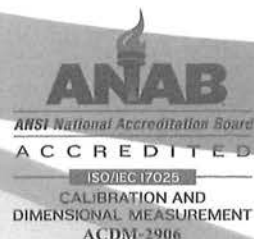


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CALIBRATION REPORT

Certificate Number : EI250282

Calibration Method

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

Calibration Results

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

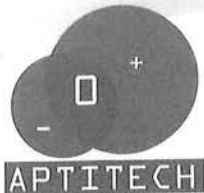
Sound Level Measurement (Slow Mode)

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

Sound Level Measurement (Fast Mode)

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

--- End of Certificate ---

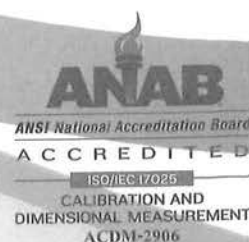


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CERTIFICATE OF CALIBRATION

Certificate Number : SC240228

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	: SC240228
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	: 24-Sep-24

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

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

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

Standard Equipments

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

APTITECH

Authority of Calibration

Approved Signatory

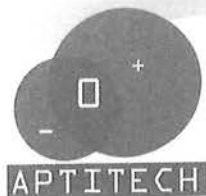
- ☒ Mr. Anuwat Simsiriwat [Laboratory Manager]
☐ Mr. Nattaphol Boonmee [Quality Manager]

Calibration Date : 25-Sep-2024

Issued Date : 28-Sep-2024

Calibrated By : Ms. Benjawan Bunlukit

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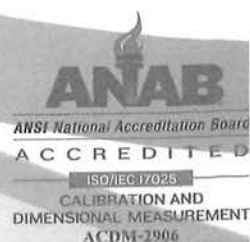


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CALIBRATION REPORT

Certificate Number : SC240228

Calibration Method

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

Calibration Results

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

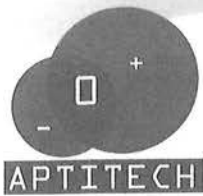
Sound Level Measurement (Slow Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(\pm) Uncertainty
LA	40-130 dB	93.86 dB	94.2 dB	0.34 dB	0.60 dB
		113.87 dB	114.1 dB	0.23 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.2 dB	0.34 dB	0.60 dB
		113.87 dB	114.1 dB	0.23 dB	0.60 dB

Sound Level Measurement (Fast Mode)

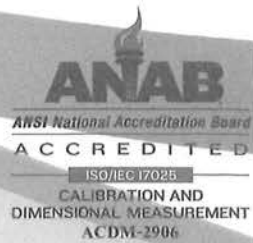
Function	UUC Range	Standard Value	UUC Reading	UUC Error	(\pm) Uncertainty
LA	40-130 dB	93.86 dB	94.2 dB	0.34 dB	0.60 dB
		113.87 dB	114.2 dB	0.33 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.2 dB	0.34 dB	0.60 dB
		113.87 dB	114.2 dB	0.33 dB	0.60 dB

--- End of Certificate ---



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CERTIFICATE OF CALIBRATION

Certificate Number : SC250021

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	: SC250021
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	: 06-Jan-25

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

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

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

Standard Equipments

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



Authority of Calibration

Approved Signatory

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

Calibration Date : 08-Jan-2025

Issued Date : 13-Jan-2025

Calibrated By : Ms. Hathaichanok Kaewsrisai

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.

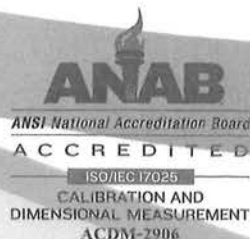


APTITECH CALIBRATION CO., LTD.

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

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

Email. sales@aptitech-cal.com



CALIBRATION REPORT

Certificate Number : SC250021

Calibration Method

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

Calibration Results

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

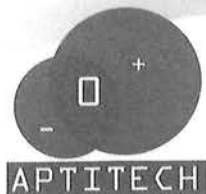
Sound Level Measurement (Slow Mode)

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

Sound Level Measurement (Fast Mode)

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

--- End of Certificate ---

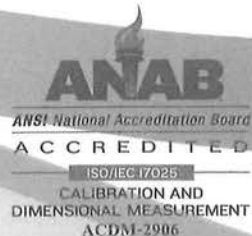


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CERTIFICATE OF CALIBRATION

Certificate Number : EI250281

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	: EI250281
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222173	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 31-Jan-25

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

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

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

Standard Equipments

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

APTITECH

Authority of Calibration

Approved Signatory

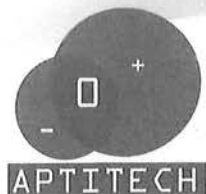
Calibration Date : 03-Feb-2025

Issued Date : 06-Feb-2025

Calibrated By : Ms. Hathaichanok Kaewsrisai

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

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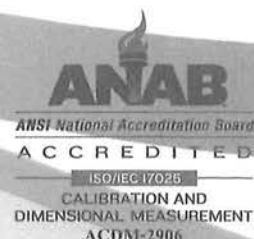


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Tel. +66 2103-6290 Fax. +66 2103-6291

Email. sales@aptitech-cal.com



CALIBRATION REPORT

Certificate Number : EI250281

Calibration Method

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

Calibration Results

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

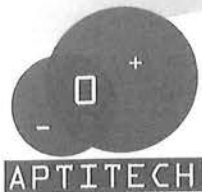
Sound Level Measurement (Slow Mode)

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

--- End of Certificate ---

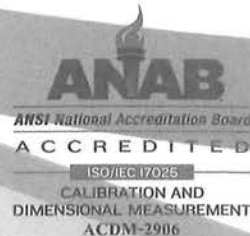


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CERTIFICATE OF CALIBRATION

Certificate Number : SC250018

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	: SC250018
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222047	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 06-Jan-25

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

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

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

Standard Equipments

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

APTITECH

Authority of Calibration

Approved Signatory

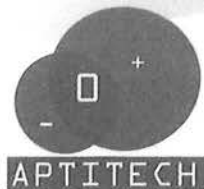
- ☒ Mr. Anuwat Simsiriwat [Laboratory Manager]
☐ Mr. Kornupong Suksamran [Technical Manager]

Calibration Date : 08-Jan-2025

Issued Date : 13-Jan-2025

Calibrated By : Ms. Hathaichanok Kaewsrirai

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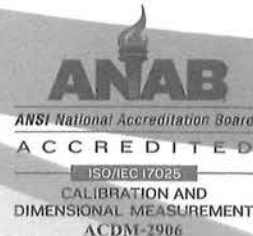


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Tel. +66 2103-6290 Fax. +66 2103-6291

Email. sales@aptitech-cal.com



CALIBRATION REPORT

Certificate Number : SC250018

Calibration Method

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

Calibration Results

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

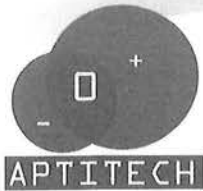
Sound Level Measurement (Slow Mode)

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

Sound Level Measurement (Fast Mode)

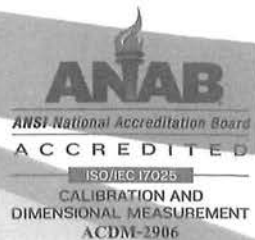
Function	UUC Range	Standard Value	UUC Reading	UUC Error	(\pm) Uncertainty
LA	40-130 dB	93.86 dB	94.1 dB	0.24 dB	0.60 dB
		113.87 dB	113.6 dB	-0.27 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.0 dB	0.14 dB	0.60 dB
		113.87 dB	113.5 dB	-0.37 dB	0.60 dB

--- End of Certificate ---



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CERTIFICATE OF CALIBRATION

Certificate Number : EI250219

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	: EI250219
Manufacturer	: ACO	Calibration Location	: Laboratory
Model	: 6236	Ambient Temperature	: 22 ± 2 °C
Serial Number	: 222171	Ambient Humidity	: 55 ± 15 %RH
ID. Number	: N/A	Received Date	: 21-Jan-25

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

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

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

Standard Equipments

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



Authority of Calibration

Approved Signatory

Calibration Date : 27-Jan-2025

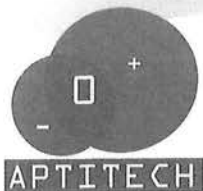
Issued Date : 30-Jan-2025

Calibrated By : Ms. Hathaichanok Kaewsrisai

☒ Mr. Anuwat Simsiriwat [Laboratory Manager]

☐ Mr. Kornupong Suksamran [Technical Manager]

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CALIBRATION REPORT

Certificate Number : EI250219

Calibration Method

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

Calibration Results

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

Sound Level Measurement (Slow Mode)

Function	UUC Range	Standard Value	UUC Reading	UUC Error	(±) Uncertainty
LA	40-130 dB	93.86 dB	94.4 dB	0.54 dB	0.60 dB
		113.87 dB	114.4 dB	0.53 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.4 dB	0.54 dB	0.60 dB
		113.87 dB	114.4 dB	0.53 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	94.4 dB	0.54 dB	0.60 dB
		113.87 dB	114.5 dB	0.63 dB	0.60 dB
LC	40-130 dB	93.86 dB	94.4 dB	0.54 dB	0.60 dB
		113.87 dB	114.5 dB	0.63 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 24 January, 2025

Certification No. 069/25

Page : 1 of 2

Object : Thermal Environment Monitor

Manufacturer : QUEST TECHNOLOGIES

Type : QUESTemp°32


Serial No. : TPC090036

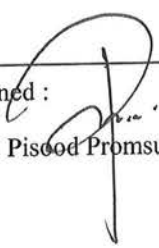
Customer : Pacific Laboratory Co.,Ltd.
14/5358 Moo 14, T. Bang Bua Thong,
A.Bang Bua Thong, Nonthaburi 11110.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1010.9 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. 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. 069/25

24 January, 2025

Page : 2 of 2

Standard Temp. °C	Temperature Sensor Reading					
	Dry Bulb °C	Correction °C	Globe °C	Correction °C	Wet Bulb °C	Correction °C
50.14	50.1	0.04	50.1	0.04	50.1	0.04
40.23	40.1	0.13	40.2	0.03	40.2	0.03
30.17	30.2	-0.03	30.2	-0.03	30.1	0.07

Calibrated by : 

Mr. Watcharapol 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 3 March, 2025

Certification No. 137/25

Page : 1 of 2

Object : AREA HEAT STRESS MONITOR

Manufacturer : METROSONICS

Type : hs-32

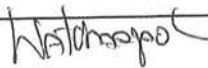
Serial No. : MCG050027 ID No. : N/A

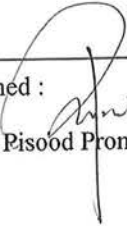
Customer : Pacific Laboratory Co.,Ltd.
14/5358 Moo 14, T. Bang Bua,
A.Bang Bua Thong, Nonthaburi 11110.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1008.2 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. 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. 137/25

3 March, 2025

Page : 2 of 2

Standard Temp. °C	Temperature Sensor Reading					
	Dry Bulb °C	Correction °C	Globe °C	Correction °C	Wet Bulb °C	Correction °C
50.06	50.1	-0.04	50.0	0.06	50.1	-0.04
42.21	42.2	0.01	42.2	0.01	42.2	0.01
30.62	30.6	0.02	30.6	0.02	30.6	0.02

Calibrated by :

Watchapol

Mr. Watchapol Subwat
Mechanical Engineer



ภาคผนวกที่ 5-6
เอกสารสอบเทียบคุณภาพน้ำทิ้ง

CAL

Calibratech Co.,Ltd.

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

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



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-420078-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A pH

Resolution : 0.01 pH

Serial No. : 2841305

ID No. : LAB-PH-002

Electrode

Model : N/A

Serial No. : 3172493

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

Ambient Temperature : (25.0 to 26.0)° C

Relative Humidity : (40 to 45) %

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 03 August 2024

Calibrated by : Permpon Chanpu

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

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

1. Multiproduct Calibrator

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

2. Standard Buffer Solution

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

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-420078-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

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

Function : pH meter with electrode

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

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

Remark

UUC : Unit Under Calibration

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

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

- o0o -

Handwritten signature



Certificate of Calibration

Certificate No. : 67-420078-2

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A pH

Resolution : 0.01 pH

Serial No. : 2841305

ID No. : LAB-PH-002

Electrode

Model : N/A

Serial No. : 3052953

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

Ambient Temperature : (25.0 to 26.0)° C

Relative Humidity : (40 to 45) %

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 03 August 2024

Calibrated by : Permpoon Chanpu

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

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

1. Multiproduct Calibrator

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

2. Standard Buffer Solution

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

Approved by :



(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-420078-2

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

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

Function : pH meter with electrode

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

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

Remark

UUC : Unit Under Calibration

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

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

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NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-400424-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd

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

Equipment : Digital Thermometer with Thermistor probe

Temperature Indicator

Manufacturer : Eutech

Model : pH 700

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 2841305

ID No. : LAB-PH-002

Thermistor probe

Model : N/A

Sheath Material : Stainless

Diameter : 3 mm.

Length : 115 mm.

Serial No. : PHSTEMB01P 304

ID No. : LAB-PH-002

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

Ambient Temperature : (25.0 to 25.6) °C

Relative Humidity : (45 to 47) %

Line Voltage : (220.0 to 222.0) VAC

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 03 August 2024

Calibrated by : Permpon Chanpu

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

The temperature scale used was based on ITS-90


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

1. Platinum Resistance Thermometer (PRT)

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

2. Standard Digital Thermometer

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

Approved by : 
(Bunjerd Masri)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-400424-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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

Remark

UUC : Unit Under Calibration

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

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

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NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-200273-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : Electronic Balance

Manufacturer : SHIMADZU

Model : AP225WD

Serial No. : D316301828

ID No. : LAB-BL-003

Capacity : 220000 mg

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

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

Ambient Temperature : (26.2 to 26.4) °C

Relative Humidity : (34.0 to 35.4) %

Air Pressure : 1007.0 mbar

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 31 July 2024

Calibrated by : Akaradath Thippichai

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

Edition 7 - November 2022

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

Standard Weights

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

Approved by :

(Surachai Promthong)

Laboratory Manager

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CAL-F0031-03



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Certificate of Calibration

Certificate No. : 67-200273-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

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

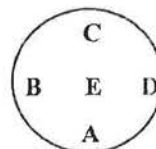
This result of calibration was found accurate as shown on date and place of calibration only.

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

Eccentric error

Load test : 50000 mg

A	B	C	D	E	
0.00	0.00	0.01	0.00	0.00	mg



Repeatability

Load test : 200000 mg

Stdev. : 0.053 mg

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

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NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-400454-3

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd

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

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : Aqua Lytic

Model : TC 135S

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 0614/000033

ID No. : LAB-IB-001

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

Ambient Temperature : (25.5 to 26.0) °C

Relative Humidity : (40 to 45) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 03 August 2024

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with RTD Probe

ID No.

Cert. No.

Due Date

Traceability

400029 & 400043

67-400245-1

27 Oct 2024

National Institute of Metrology Thailand (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

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Certificate of Calibration

Certificate No. : 67-400454-3

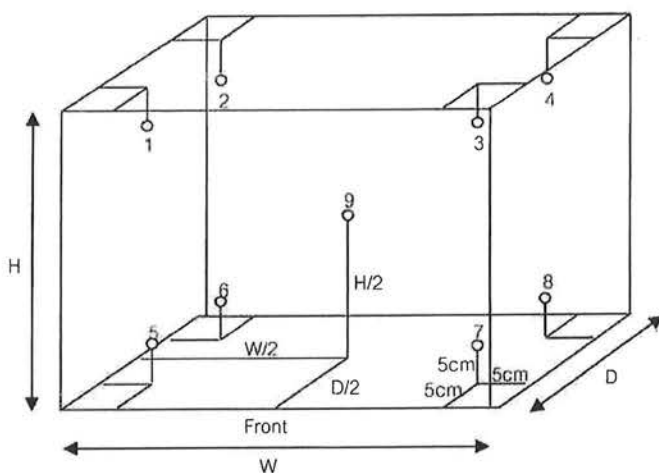
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.51 m

D = 0.04 m

H = 0.70 m

Capacity = 0.02 m³

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

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

Remark The uncertainty is not combine uniformity of the air chamber

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

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

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NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-400454-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd

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

Equipment : Temperature controlled enclosure (Oven)

Manufacturer : Memmert

Model : UN 55

Range : N/A °C

Resolution : 0.1 °C

Serial No. : B214.1879

ID No. : LAB-OV-001

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

Ambient Temperature : (30.0 to 31.3) °C

Relative Humidity : (60 to 65) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 03 August 2024

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No.

Cert. No.

Due Date

Traceability

400029 & 400030

67-400246-1

25 Oct 2024

National Institute of Metrology Thailand (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

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Certificate of Calibration

Certificate No. : 67-400454-1

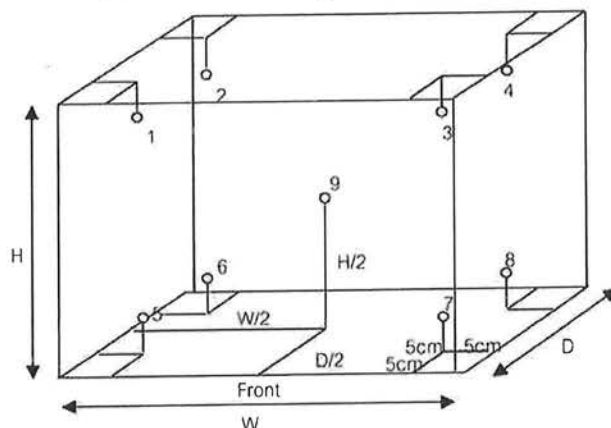
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.40 m

Capacity = 0.05 m³

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

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

Remark The uncertainty is not combine uniformity of the air chamber

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

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

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NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-400454-2

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd

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

Equipment : Water Bath

Manufacturer : Memmert

Model : WNB 22

Range : N/A °C

Resolution : 0.1 °C

Serial No. : L514.0184

ID No. : LAB-WB-001

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

Ambient Temperature : (30.0 to 31.3) °C

Relative Humidity : (60 to 65) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 30 July 2024

Date of Calibration : 30 July 2024

Date of Issue : 03 August 2024

Calibrated by : Permpon Chanpu

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

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

ID No.

Cert. No.

Due Date

Traceability

400029 & 400031

67-400244-1

24 Oct 2024

National Institute of Metrology Thailand (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

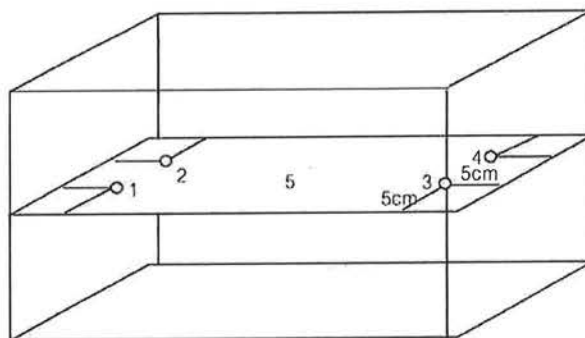
Certificate No. : 67-400454-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

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

Remark The uncertainty is not combine uniformity of the water bath

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

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

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