

ภาคผนวก จ

เอกสารการสอบเทียบ
เครื่องมือตรวจวัดและวิเคราะห์

Envi Equipment Service Co., Ltd.

110/254 Moo 3, Tumbon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No. : E23-10082

Page : 1 of 6

CERTIFICATE OF CALIBRATION

Customer : Safety Plan Co., Ltd.

Address : 1034 Moo 3, Rang sit-Pathum Thani Rd., T. Bangpoon, A. Muang, Pathum Thani 12000

Description of Equipment : Console meter

Manufacturer : Apex Instrument

Model Number : MC-572VS

Serial Number : 0506007

ID./Control No. : -

Environment Conditions : **Temperature** (25 ± 2) °C
: **Humidity** (50 ± 15) % RH

Cal. Date : 26/10/2023

Issue Date : 26/10/2023

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 (IS).

Result of Calibration

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

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

Calibrated by : Mr. Sanya Sangnil

Approved by : 
(Mr. Mana Fuekhud)
Technical Manger



**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	MC-572VS	Date	Time	26/10/2023	00:00 PM	Std Temp	293	K
Console Serial Number	0506007	Calibration Reference No.		SER23-10035		Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure		756.74	mmHg	K ₁	0.386	
DGM Serial Number	00003585	Calibration Meter Gamma		0.999		Console Leak Check		PASS

Calibration Data									
Run Time	Metering Console					Calibration Meter			
Elapsed	DGM Orifice DH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final
(Q)	(P _m)	(V _{mi})	(V _{mf})	(t _{mi})	(t _{mf})	(V _{wi})	(V _{wf})	(t _{wi})	(t _{wf})
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
12.70	13.0	201.0670	201.2070	31	31	172.49564	172.63638	27	27
12.70	13.0	201.2070	201.3470	31	31	172.63638	172.77658	26	26
8.68	26.0	201.3550	201.4950	31	31	172.79958	172.93882	26	26
8.72	26.0	201.4950	201.6350	31	31	172.93882	173.07786	26	26
14.20	40.0	201.6420	201.9220	31	31	173.07786	173.36050	26	26
14.17	40.0	201.9220	202.2020	31	31	173.36050	173.64182	26	26
10.72	70.0	202.2130	202.4930	32	32	173.67182	173.95388	26	26
10.67	70.0	202.4930	202.7730	32	32	173.95388	174.23570	26	26
9.38	90.0	202.7860	203.0660	33	33	174.24770	174.52972	26	26
9.33	90.0	203.0660	203.3460	33	33	174.52972	174.81118	26	26



**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	MC-572VS	Date	Time	26/10/2023	00:00 PM	Std Temp	293	K
Console Serial Number	0506007	Calibration Reference No.		SER23-08030		Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure		756.74	mmHg	K ₁	0.386	
DGM Serial Number	00003585	Calibration Meter Gamma		0.999		Console Leak Check		PASS

Calibration Data								
Results								
Standardized Data				Dry Gas Meter				
Dry Gas Meter		Calibration Meter		Calibration Factor		Flowrate	.0212 m ³ _{std} /min	Variation
				Value	Variation	Std & Corr		
(V _{m(std)})	(Q _{m(std)})	(V _{w(std)})	(Q _{w(std)})	(Y)	(ΔY)	(Q _{m(std)(corr)})	(ΔH _@)	(ΔH _@)
m ³	m ³ /min	m ³	m ³ /min			m ³ /min	mm H ₂ O	
0.136	0.011	0.137	0.011	1.003	0.005	0.011	49.305	1.708
0.137	0.011	0.137	0.011	0.999	0.001	0.011	49.520	1.923
0.137	0.016	0.136	0.016	0.991	-0.007	0.016	47.059	-0.538
0.137	0.016	0.136	0.016	0.990	-0.008	0.016	47.557	-0.040
0.274	0.019	0.276	0.019	1.005	0.007	0.019	47.116	-0.481
0.274	0.019	0.274	0.019	1.000	0.002	0.019	47.336	-0.261
0.275	0.026	0.275	0.026	1.000	0.002	0.026	47.430	-0.167
0.275	0.026	0.275	0.026	0.999	0.001	0.026	47.069	-0.528
0.276	0.029	0.275	0.029	0.997	0.000	0.029	46.945	-0.652
0.276	0.030	0.274	0.029	0.996	-0.002	0.029	46.631	-0.966
				0.998	Y Average		47.597	ΔH@ Average

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

For ΔH_@, 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	
Console Model Number	MC-572VS
Console Serial Number	0506007
DGM Model Number	SK25EX
DGM Serial Number	00003585

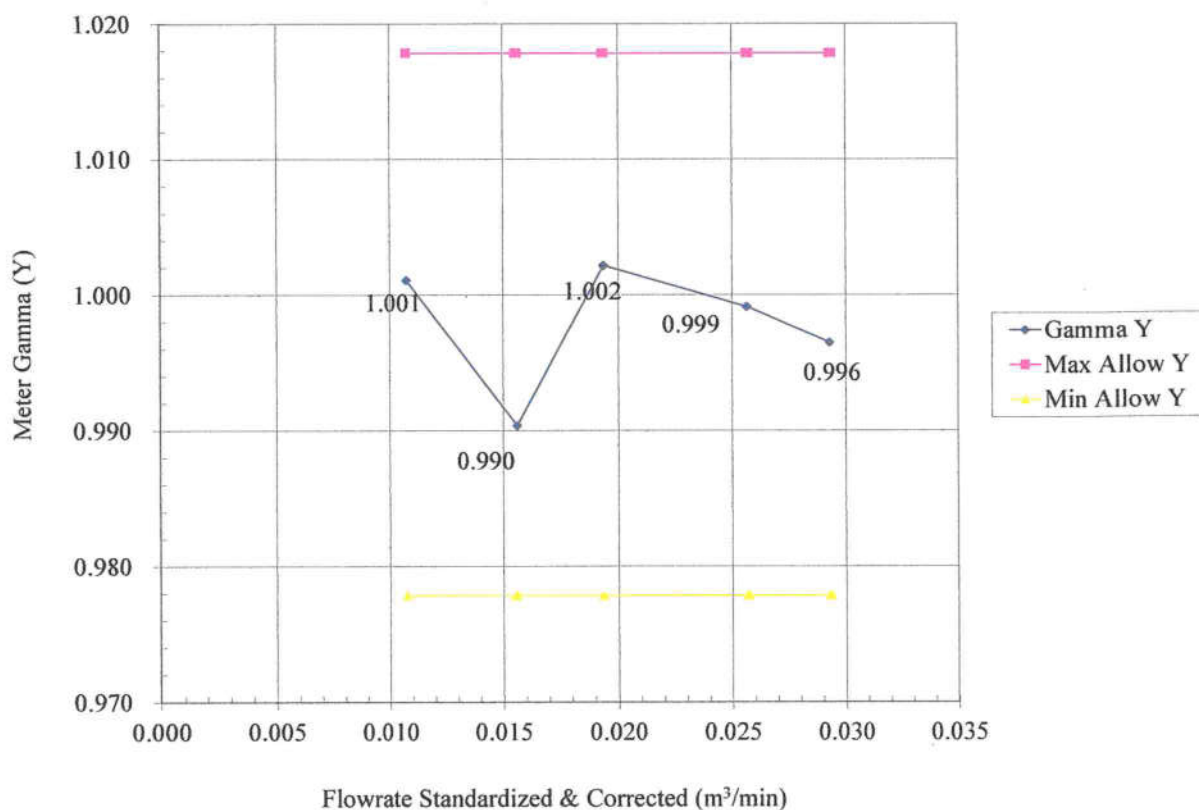
Calibration Conditions			
Date	Time	26/10/2023	00:00 PM
Calibration Reference No.		SER23-10035	
Barometric Pressure		756.74	mmHg
Calibration Meter Gamma		0.999	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	
Console Leak Check		PASS

Calibration Date: 26-10-2023

Calibration Reference No: SER23-10035

Meter Gamma vs Flowrate



Console Serial: 0506007

Console Model: MC-572VS



Meter Console Information	
Console Model Number	MC-572VS
Console Serial Number	0506007
DGM Model Number	SK25EX
DGM Serial Number	00003585

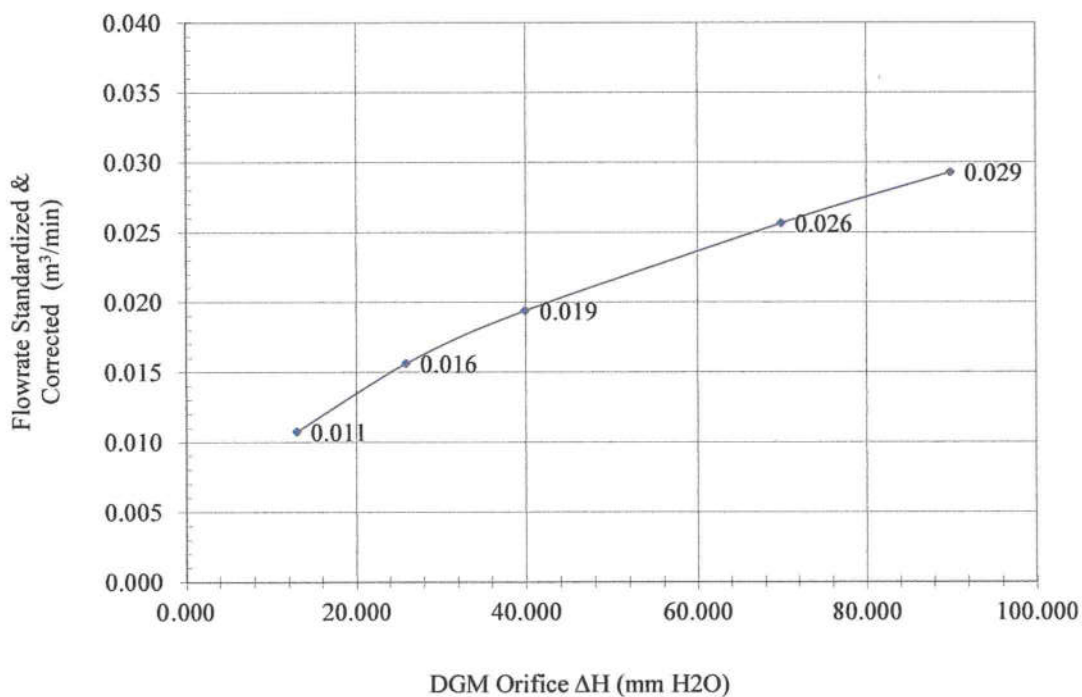
Calibration Conditions			
Date	Time	26/10/2023	00:00 AM
Calibration Reference No.		SER23-10035	
Barometric Pressure		756.74	mmHg
Calibration Meter Gamma		0.999	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	
Console Leak Check		PASS

Calibration Date: 26-10-2023

Calibration Reference No: SER23-10035

Meter Pressure vs Flowrate



Console Serial: 0506007

Console Model: MC-572VS



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Console Model Number	MC-572VS
Console Serial Number	0506007
DGM Model Number	SK25EX
DGM Serial Number	00003585
Meter Box Model Number	JENCO 765 KF
Meter Box Serial Number	JC 16047

Calibration Conditions			
Date	Time	26/08/2023	02:00 PM
Calibration Reference No.		SER23-10035	
Reference Thermometer		DIGICON	
Serial Number		183169105	

Results											
Console Thermocouple Simulator											
Channel and test point	Meter Box Channel Temperature Reading (°C)										
	-18.0	25.0	38.0	93.0	149.0	260.0	371.0	482.0	593.0	816.0	1038.0
Stack	-17.0	24.0	37.0	92.0	148.0	257.0	370.0	480.0	591.0	814.0	1036.0
Aux	-17.0	24.0	37.0	92.0	148.0						
Probe	-17.0	24.0	37.0	92.0	148.0						
Filter	-17.0	24.0	37.0	92.0	148.0						
Exit	-17.0	24.0	37.0								

Tolerance Range

Stack ± 1.50% Absolute
 Probe ± 3.0 °C
 Filter ± 3.0 °C

Meter ± 3.0 °C
 Exit ± 2.0 °C



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Certificate No. : E23-10083

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CERTIFICATE OF CALIBRATION

Customer : Safety Plan Co., Ltd.

Address : 1034 Moo 3, Rang sit-Pathum Thani Rd., T. Bangpoon, A. Muang, Pathum Thani 12000

Description of Equipment : Nozzle

Manufacturer : Apex Instrument

Model Number : NS SET

Serial Number : -

ID./Control No. : -

Environment Conditions : **Temperature** (25 ± 2) °C
: **Humidity** (50 ± 15) % RH

Cal. Date : 26/10/2023

Issue Date : 26/10/2023

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)


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Result of Calibration

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Calibrated by : Mr. Sanya Sangnil

Approved by : 
(Mr. Mana Fuekhud)
Technical Manger



CALIBRATION RESULTS

Sampling System Equipment Information

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

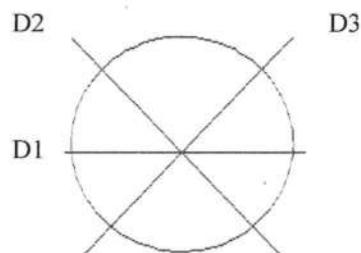
Calibration Condition

Date : 26 October 2023
Barometric Pressure : 756.74 mm Hg
Calibration Device : Vernier, 0-150 mm
Method Reference : US. EPA Method

Nozzle ID	Nozzle Diameter				Different	(D1 + D2 + D3) / 3
Size	mm	D1	D2	D3	ΔD	Davg
		mm	mm	mm	mm	mm
NS-4	3.18	3.06	3.07	3.05	0.010	3.060
NS-6	4.76	4.76	4.78	4.77	0.010	4.770
NS-8	6.35	6.45	6.46	6.48	0.015	6.463
NS-16	12.70	11.91	11.94	11.92	0.015	11.923

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
 Davg = $(D_1 + D_2 + D_3) / 3$



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Certificate No. : E23-10084

Page : 1 of 3

CERTIFICATE OF CALIBRATION

Customer : Safety Plan Co., Ltd.

Address : 1034 Moo 3, Rang sit-Pathum Thani Rd., T. Bangpoon, A. Muang, Pathum Thani 12000

Description of Equipment : Standard Probe Method 5

Manufacturer : Apex Instrument

Model Number : PS-6HV

Serial Number : W1911338

ID./Control No. : -

Environment Conditions : **Temperature** (25 ± 2) °C
: **Humidity** (50 ± 15) % RH

Cal. Date : 26/10/2023

Issue Date : 26/10/2023

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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Result of Calibration

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Calibrated by : Mr. Sanya Sangnil

Approved by : 

(Mr. Mana Fuekhud)

Technical Manger



CALIBRATION RESULTS

S-Type Geometric Pitot Tube Calibration

Sampling System Equipment Information

Probe Model	:	PS-6HV
Probe Number	:	W1911338
Pitot Number	:	A8987
Pitot Tube Type	:	S-type

Calibration Condition

Date	:	26 October 2023
Barometric Pressure	:	756.74 mm Hg
Digital Caliper	:	CD-6" ASX
Serial number	:	A18008059

<p>TOP VIEW</p> <p>SIDE VIEW</p> <p>THE APPROPRIATE PORTS OF THE PITOT TUBE SHALL BE USED WITH OR ABOVE THE NOZZLE ENTRY PLANE.</p> <p>FIGURE 1: PORTS INDICATING DEFLECTION FOR DETERMINING α</p> <p>FIGURE 2: PORTS INDICATING DEFLECTION FOR DETERMINING β</p> <p>FIGURE 3: PORTS INDICATING DEFLECTION FOR DETERMINING θ</p> <p>FIGURE 4: PORTS INDICATING DEFLECTION FOR DETERMINING Z</p>	Pitot tube/Probe: # PS-6HV			
	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
	$\beta 1$	0	$-5^\circ < \beta 1 < +5^\circ$	Pass
	$\beta 2$	0	$-5^\circ < \beta 2 < +5^\circ$	Pass
	γ	0	N/A	-
	θ	0	N/A	-
	Dt	0.374	.188" to .375"	Pass
	A	0.8810	$2.1Dt \leq A \leq 3Dt$	Pass
	A/2Dt	1.177	$1.05 \leq A/Dt \leq 1.5$	Pass
	$Z = A \tan \gamma$	0.072	$Z \leq .125"$	Pass
	$W = A \tan \theta$	0.019	$W \leq .031"$	Pass

Remark:

I certified that probe model: **PS-6HV**, serial number **W1911338**, Pitot tube no. **A8987** 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.



Certificate No. : E23-10084

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THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Probe Model Number	PS-6HV
Probe Serial Number	W1911338
Meter Box Model Number	JENCO 765 KF
Meter Box Serial Number	JC 16047

Calibration Conditions			
Date	Time	26/10/2023	04:00 PM
Calibration Reference No.		SER23-10035	
Reference Thermometer		DIGICON	
Serial Number		183169105	

Thermocouple of Standard Dual Probe = length 5 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	298.0	0.35
350	350.0	348.0	0.32



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Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No.: E24-070055

Page.: 1 of 6

CERTIFICATE OF CALIBRATION

Customer : TT Environment Co., Ltd.

Address : 67/107 Moo 10, Soi Banglan 23/4, Banglan, Bangyai, Nonthaburi 11140

Description of Equipment : Console meter

Manufacturer : Apex Instrument

Model Number : TMC-572-V

Serial Number : A2202066

ID./Control No. : -

Environment Conditions : Temperature (25 ± 2) °C
: Humidity (50 ± 15) % RH

Cal. Date : 18/07/2024

Issue Date : 18/07/2024

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

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Result of Calibration

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Calibrated by : Mr. Sanya Sangnil

Approved by : (Mr. Mana Fuekhud)

Technical Manger



**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	TMC-572-V	Date	Time	18/07/2024	09:45 AM	Std Temp	293	K
Console Serial Number	A2202066	Calibration Reference No.		SER24-070024		Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure		755.16	mmHg	K ₁	0.386	
DGM Serial Number	00005159	Calibration Meter Gamma		1.001		Console Leak Check		PASS

Calibration Data									
Run Time	Metering Console					Calibration Meter			
Elapsed	DGM Orifice DH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final
(Q)	(P _m)	(V _{mi})	(V _{mf})	(t _{mi})	(t _{mf})	(V _{wi})	(V _{wf})	(t _{wi})	(t _{wf})
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
12.00	13.0	195.5250	195.6650	28	28	233.44894	233.58982	29	29
12.05	13.0	195.6650	195.8050	28	28	233.58982	233.73054	28	28
8.50	26.0	195.8130	195.9530	28	28	233.73856	233.87950	28	28
8.48	26.0	195.9530	196.0930	28	28	233.87950	234.02002	27	27
13.78	40.0	196.1010	196.3810	28	28	234.02704	234.30884	27	27
13.77	40.0	196.3810	196.6610	28	28	234.30884	234.58846	27	27
10.38	70.0	196.6740	196.9540	29	29	234.60146	234.88028	26	26
10.35	70.0	196.9540	197.2340	30	30	234.88028	235.15828	26	26
9.23	90.0	197.2460	197.5260	30	30	235.17006	235.44644	26	26
9.22	90.0	197.5260	197.8060	30	30	235.44644	235.72256	26	26



**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	TMC-572-V	Date	Time	18/07/2024	09:45 AM	Std Temp	293	K
Console Serial Number	A2202066	Calibration Reference No.		SER24-070024		Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure		755.16	mmHg	K ₁	0.386	
DGM Serial Number	00005159	Calibration Meter Gamma		1.001		Console Leak Check		PASS

Calibration Data								
Results								
Standardized Data				Dry Gas Meter				
Dry Gas Meter		Calibration Meter		Calibration Factor		Flowrate		
(V _{m(std)})	(Q _{m(std)})	(V _{w(std)})	(Q _{w(std)})	Value	Variation	Std & Corr	.0212 m ³ _{std} /min	Variation
m ³	m ³ /min	m ³	m ³ /min	(Y)	(ΔY)	(Q _{m(std)(corr)})	(ΔH _@)	(ΔH _@)
						m ³ /min	mm H ₂ O	
0.135	0.011	0.136	0.011	1.006	0.011	0.011	44.141	-1.095
0.136	0.011	0.136	0.011	1.005	0.010	0.011	44.463	-0.773
0.136	0.016	0.136	0.016	1.005	0.010	0.016	44.222	-1.015
0.136	0.016	0.137	0.016	1.002	0.007	0.016	44.165	-1.071
0.273	0.020	0.274	0.020	1.004	0.008	0.020	44.721	-0.515
0.273	0.020	0.272	0.020	0.996	0.000	0.020	45.312	0.075
0.274	0.026	0.272	0.026	0.990	-0.005	0.026	45.481	0.244
0.274	0.027	0.271	0.026	0.987	-0.008	0.026	45.456	0.220
0.275	0.030	0.269	0.029	0.979	-0.016	0.029	47.242	2.006
0.275	0.030	0.269	0.029	0.979	-0.017	0.029	47.160	1.924
				0.995	Y Average		45.236	ΔH _@ Average

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

For ΔH_@, 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.



Certificate No. : E24-070055

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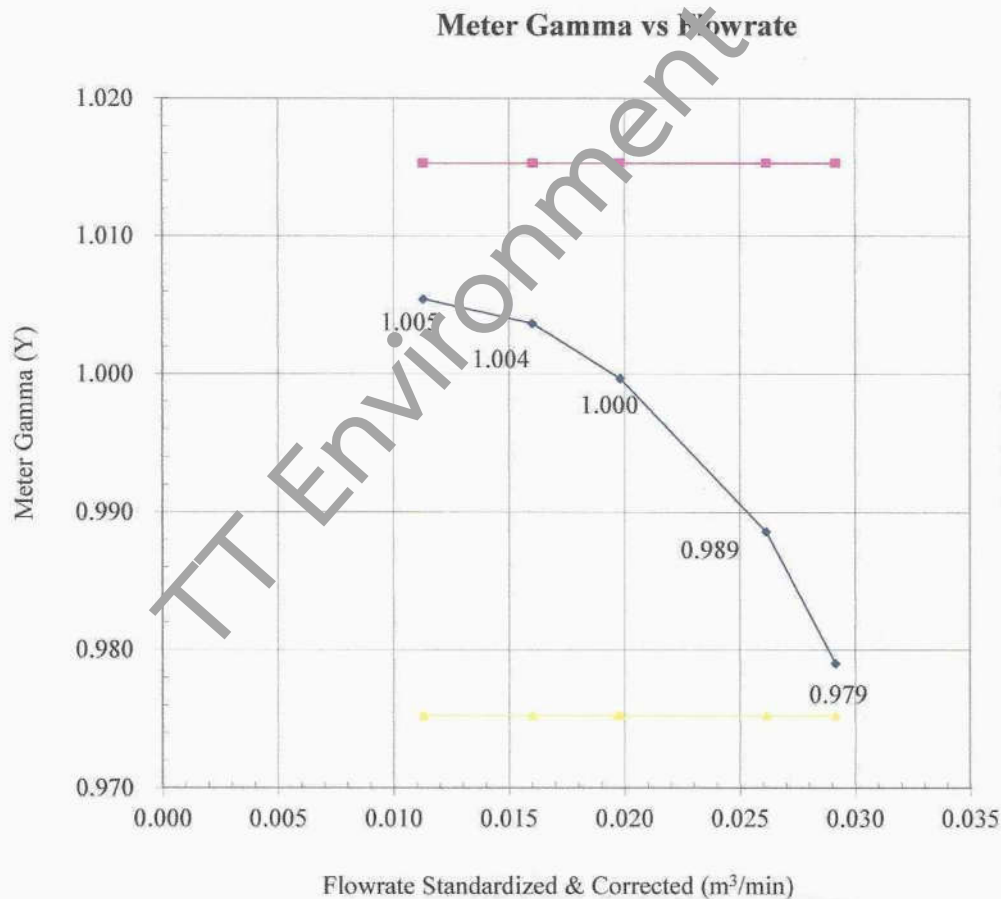
Meter Console Information	
Console Model Number	TMC-572-V
Console Serial Number	A2202066
DGM Model Number	SK25EX
DGM Serial Number	00005159

Calibration Conditions			
Date	Time	18/07/2024	09:45 AM
Calibration Reference No.		SER24-070024	
Barometric Pressure		755.16	mmHg
Calibration Meter Gamma		1.001	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	
Console Leak Check		PASS

Calibration Date: 18-7-2024

Calibration Reference No: SER24-070024



Console Serial: A2202066

Console Model: TMC-572-V



Meter Console Information	
Console Model Number	TMC-572-V
Console Serial Number	A2202066
DGM Model Number	SK25EX
DGM Serial Number	00005159

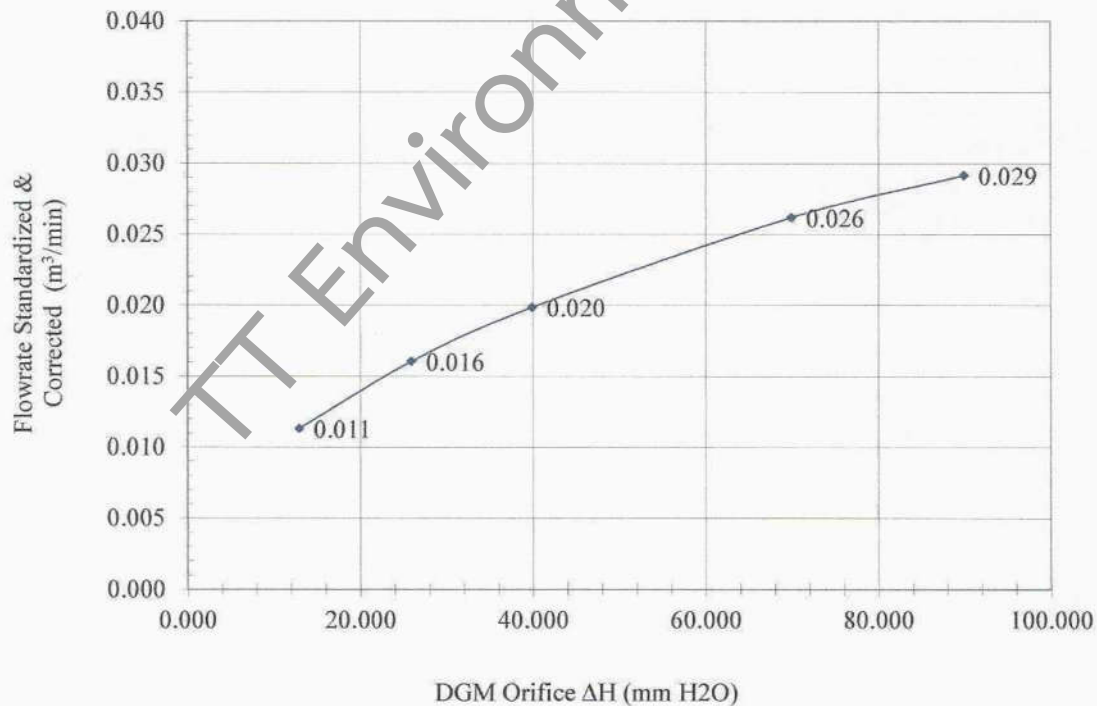
Calibration Conditions			
Date	Time	18/07/2024	09:45 AM
Calibration Reference No.		SER24-070024	
Barometric Pressure		755.16	mmHg
Calibration Meter Gamma		1.001	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	
Console Leak Check		PASS

Calibration Date: 18-7-2024

Calibration Reference No: SER24-070024

Meter Pressure vs Flowrate



Console Serial: A2202066

Console Model: TMC-572-V



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Console Model Number	TMC-572-V
Console Serial Number	A2202066
DGM Model Number	SK25EX
DGM Serial Number	00005159
Meter Box Model Number	-
Meter Box Serial Number	-

Calibration Conditions			
Date	Time	18/07/2024	12:00 PM
Calibration Reference No.	SER24-070024		
Reference Thermometer	DIGICON		
Serial Number	183169105		

Results											
Console Thermocouple Simulator											
Channel and test point	Meter Box Channel Temperature Reading (°C)										
	-18.0	25.0	38.0	93.0	147.0	260.0	371.0	482.0	593.0	816.0	1038.0
Stack	-18.0	24.0	37.0	92.0	147.0	257.0	269.0	479.0	591.0	812.0	1035.0
Aux	-18.0	24.0	37.0	92.0	147.0						
Probe	-18.0	24.0	37.0	92.0	147.0						
Filter	-18.0	24.0	37.0	92.0	147.0						
Oven	-18.0	24.0	37.0	92.0	147.0						
Exit	-18.0	24.0	37.0								

Tolerance Range

Stack ± 1.50% Absolute
 Probe ± 3.0 °C
 Filter ± 3.0 °C

Meter ± 3.0 °C
 Exit ± 2.0 °C





บริษัท เอ็นไวร์ เซอร์วิส จำกัด
ENVIR SERVICE CO., LTD.

บริษัท เอ็นไวร์ เซอร์วิส จำกัด

42 รามอินทรา 14 แยก 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201

42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201

High Volume Sampler Calibration

CONDITIONS

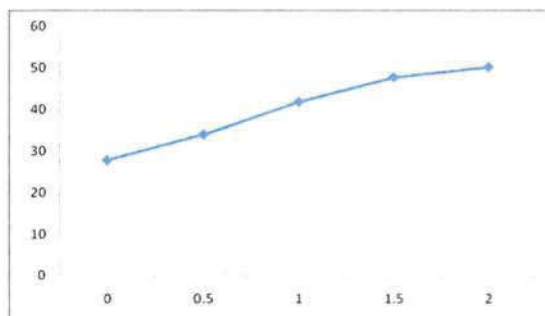
Barometric Pressure (mm Hg)	:	752.80	Corrected Pressure (mm Hg)	:	753
Temperature rapture (deg C)	:	32	Temperature	:	305
Average Press. (mm Hg)	:	752.80	Corrected Average (mm Hg)	:	753
Average Temp. (deg C)	:	31	Average Temp. (deg K)	:	304

CALIBRATION ORIFICE

Make	:	General Metal Works	Qstd Slope	:	1.89677
Model	:	GMW	Qstd Intercept	:	-0.02329
Serial #	:	F36	Date Certified	:	January 18, 2024

CALIBRATIONS

Plate or	H2O	Qstd	I	IC	LINEAR	
Test #	(in)	(m3/min)	(Chart)	(Corrected)	REGRESSION	
15	9.20	1.587	52.5	51.69	Slope	= 30.0359
13	7.60	1.443	48.5	47.75	Intercept	= 4.4591
10	5.22	1.198	42.5	41.84	Corr. Coeff.	= 0.9976
7	3.42	0.972	34.0	33.48		
5	2.20	0.782	28.5	28.06 #	of Observations	: 5
Range of Chart						37
at 1.1-1.7 m3/min						56



Calibrated By :

Mr. PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 18 January 2024

Instruments Information

Analyzer Type: SO2 Analyzer Model: 43C	Manufacturer Thermo Environmental S/N: 43C-53168-294
---	---

Calibration System

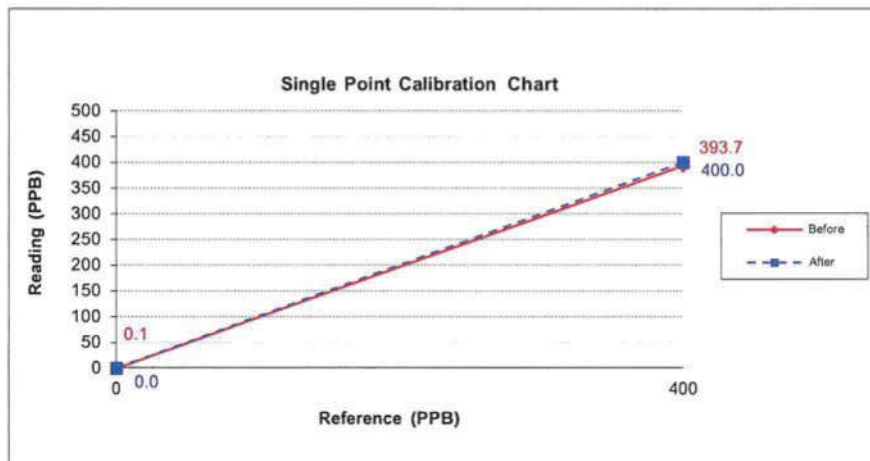
Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API MODEL 701 S/N: 1924	NO Conc 45.2 PPM SO2 Conc 44.9 PPM CO Conc 4,490 PPM Expire Date: 6 July 2024

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	393.7	-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: 18 January 2024

Instruments Information

Analyzer Type: SO ₂ Analyzer Model: 43C	Manufacturer Thermo Environmental S/N: 43C-62237-334
---	---

Calibration System

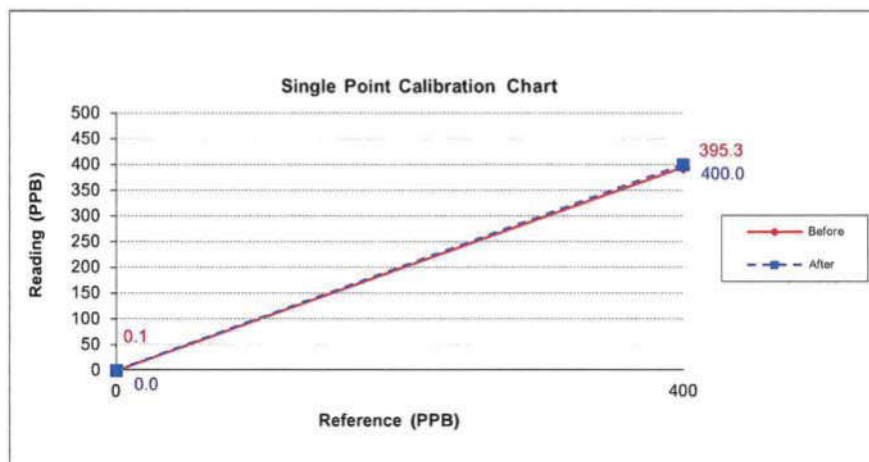
Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API MODEL 701 S/N: 1924	NO Conc 45.2 PPM SO ₂ Conc 44.9 PPM CO Conc 4,490 PPM Expire Date: 6 July 2024

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	395.3	-1.2
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By :

Mr.PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 18 January 2024

Instruments Information

Analyzer Type: SO2 Analyzer Model: 43C	Manufacturer Thermo Environmental S/N: 43C-73377-373
---	---

Calibration System

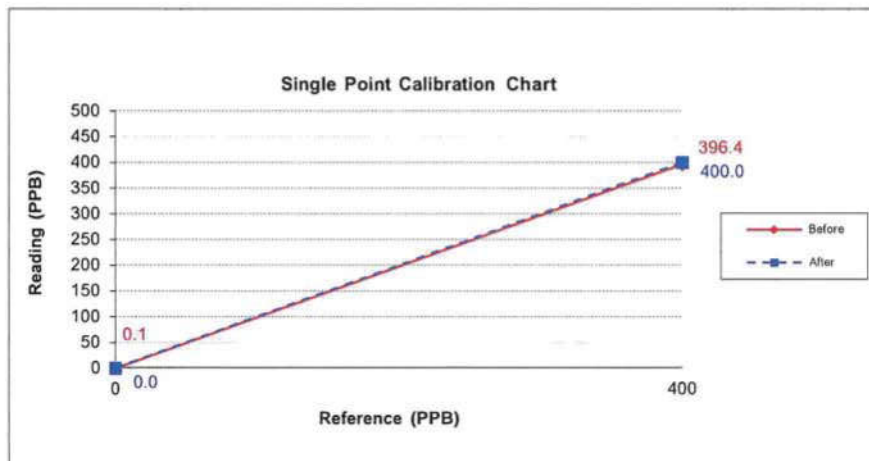
Calibrator Unit	Standard Gas
Dilutor Model Dasibi Model 5008 S/N: 705 ZERO AIR Generator API MODEL 701 S/N: 1924	NO Conc 45.2 PPM SO2 Conc 44.9 PPM CO Conc 4,490 PPM Expire Date: 6 July 2024

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	396.4	-0.9
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By :

Mr.PASAGORN SAMOL



บริษัท เอ็นไวร์ เซอร์วิส จำกัด
ENVIR SERVICE CO., LTD.

บริษัท เอ็นไวร์ เซอร์วิส จำกัด

42 รามอินทรา 14 แขวง 9 แขวงท่าแร้ง เขตบางเขน กรุงเทพฯ 10230 โทรศัพท์ 02-9435814-5 โทรสาร 02-9438201

42 Raminthra 14 yeak 9, Tha Rang, Bangkhen, Bangkok 10230 Tel : 02-9435814-5 Fax : 02-9438201

Analyzer Performance Test

Calibrated Date: 18 January 2024

Instruments Information

Analyzer Type: NO/NO ₂ /NO _x Analyzer Model: 42C	Manufacturer Thermo Environmental S/N: 42CLS-76495-383
---	---

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 45.2 PPM SO ₂ Conc 44.9 PPM CO Conc 4,490 PPM Expire Date: 6 July 2024

Environment: Temperature 25.5 °C

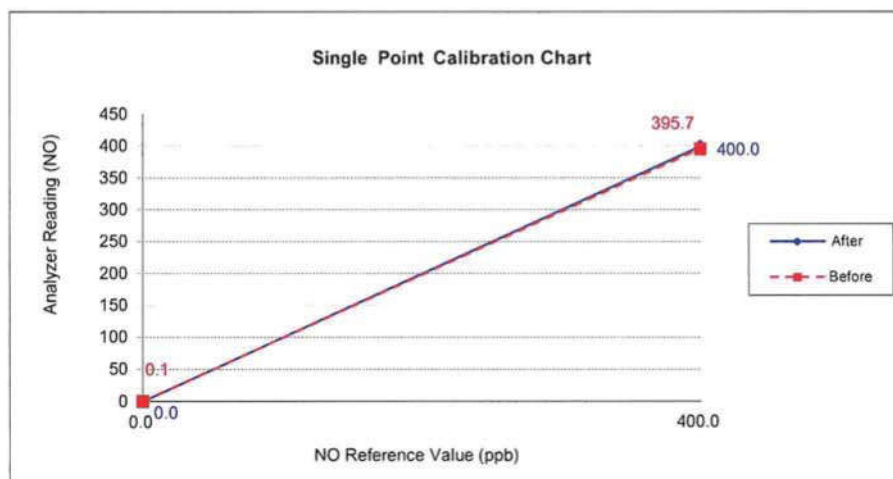
Humidity: 51 %RH

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	395.7	400.0	-1.1
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



Calibrate By: Mr. Pasagorn Samol

Analyzer Performance Test

Calibrated Date: 18 January 2024

Instruments Information

Analyzer Type: NO/NO ₂ /NO _x Analyzer Model: 42C	Manufacturer Thermo Environmental S/N: 70968-367
---	---

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 45.2 PPM SO ₂ Conc 44.9 PPM CO Conc 4,490 PPM Expire Date: 6 July 2024

Environment: Temperature 25.5 °C

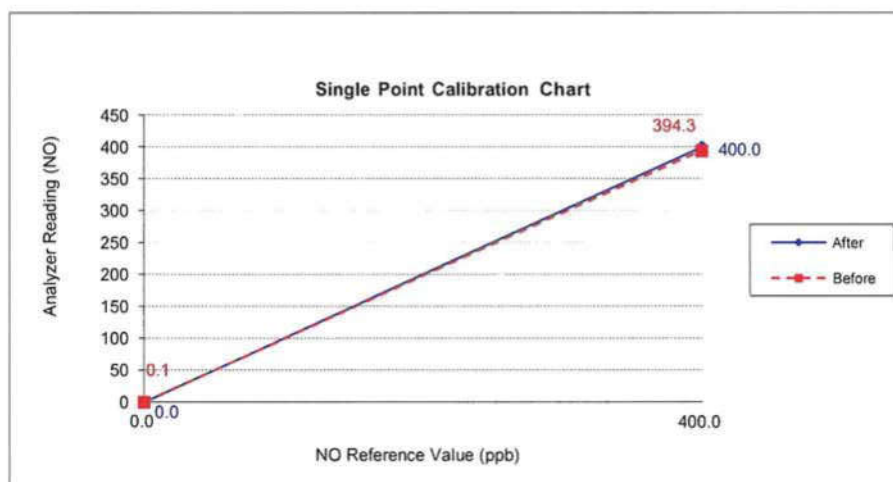
Humidity: 51 %RH

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	394.3	400.0	-1.4
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



Calibrate By: Mr. Pasagorn Samol

Analyzer Performance Test

Calibrated Date: 18 January 2024

Instruments Information

Analyzer Type: NO/NO2/NOx Analyzer Model: 42C	Manufacturer Thermo Environmental S/N: 0508011077
--	--

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 45.2 PPM SO2 Conc 44.9 PPM CO Conc 4,490 PPM Expire Date: 6 July 2024

Environment: Temperature 25.5 °C

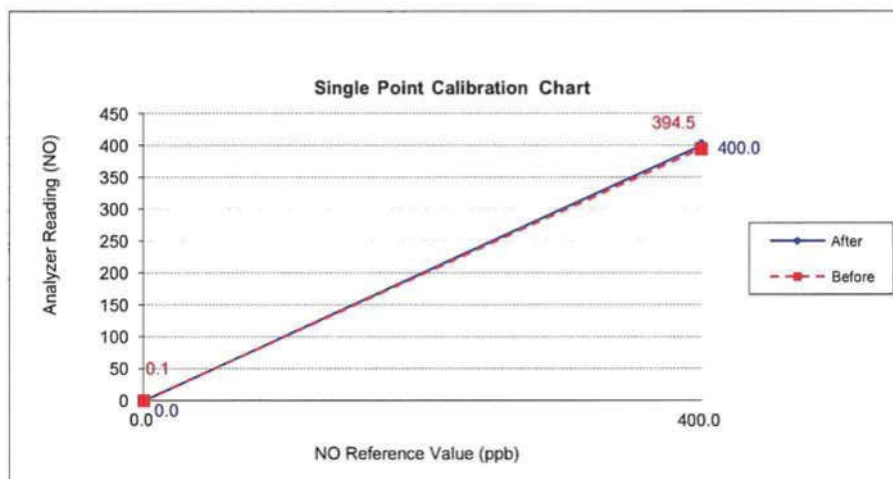
Humidity: 51 %RH

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	394.5	400.0	-1.4
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



Mr. Pasagorn Samol

Calibrate By : Mr. Pasagorn Samol



Professional Calibration & Services Co., Ltd.

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



Certificate of Calibration

Certificate Number : EL08194/24
Control Number : PCAL143091
Customer Control : -
Description : Acoustic Calibrator
Manufacturer : Casella
Model : CEL-110/2
Serial Number : 114866
Customer : SAFETY PLAN CO., LTD.
1034 Moo 3, Rangsit-Pathumthani Rd., T.Bangpoon,
A.Maung, Pathumthani 12000

Page 1 of 3



Date of Receipt : 20-Feb-24
Date of Calibration : 22-Feb-24
Environment : Temperature $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$
: Relative Humidity $50\text{ } \% \pm 20\text{ } \%$
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. Songpol Nakanurak)

27-Feb-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL08194/24

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Meter	030606101	ANAB : AC-2590	EL09782/23	29-Mar-24
Sound Level Calibrator	141208123	NSC : Calibration 0037	EEL.BP. 16/0366	06-Mar-24

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.: EL08194/24

Page : 3 of 3

Calibration Results

Sound Calibration

Nominal	Measured Value	Uncertainty (\pm)	Tolerance Limit Values
114.0 dB	113.9 dB	0.2 dB	113.4 ~ 114.6 dB

Notes:

- 1). Tolerances or specifications report in table above are base on data sheet Casella CEL-110/2.

...End...



Safety Plan Co., Ltd.

บริษัท เซฟตี้ แพลน จำกัด

1034 หมู่ 3 ถนนรังสิต-ปทุมธานี ตำบลบางพูน อำเภอเมือง จังหวัดปทุมธานี 12000 โทรศัพท์ 0-2567-3549 โทรสาร 0-2567-3485
1034 Moo 3 Rangsit-Pathum Thani Rd., Tambol Bangpooon, Amphur Muang, Pathum Thani 12000 Tel 0-2567-3549 Fax 0-2567-3485

Calibration Sound Level Meter Certificate

Date of Calibration : March 4, 2024

Condition of Calibration

Temperature : (° c) 23 ± 2 Humidity : (%RH) 50 ± 20
Ambient Pressure : (kPa) 101.325 ± 1.500

Signal Level Adjustment

Level Range : 113.4 - 114.6 dB Time Weighting : Slow
Frequency Weighting : C Acoustic Calibrator : 114.0 dB

Reference Equipment

Sound Level Calibrator Quest Technologies

Model : Casella (Acoustic Calibrator) Serial No. : 114866
Reference No. : PCAL143091
Calibration Date : February 22, 2024
Integrating Sound Level Meter : PICCOLO

Intergrating Sound Level Meter				Reading (dB)	Error (dB)	Adjustment
SLM (A1) PICCOLO	S/N	150217021		113.9	-0.2	Adjusted +0.1 to 114.0
SLM (A2) PICCOLO	S/N	150217004		113.9	-0.1	Adjusted +0.1 to 114.0
SLM (A3) PICCOLO	S/N	150217022		113.9	0.1	Adjusted +0.1 to 114.0
SLM (A4) PICCOLO	S/N	150217008		113.9	0.1	Adjusted +0.1 to 114.0
SLM (A5) PICCOLO	S/N	150217014		113.9	0.1	Adjusted +0.1 to 114.0
SLM (A6) PICCOLO	S/N	160721003		113.9	-0.1	Adjusted +0.1 to 114.0
SLM (A7) PICCOLO	S/N	160721002		113.9	-0.1	Adjusted +0.1 to 114.0
SLM (A8) PICCOLO	S/N	160721011		113.9	-0.1	Adjusted +0.1 to 114.0
SLM (A9) PICCOLO	S/N	160721001		113.9	-0.1	Adjusted +0.1 to 114.0
SLM (P1) PICCOLO	S/N	150324051		113.9	0.1	Adjusted +0.1 to 114.0
SLM (P2) PICCOLO	S/N	150324062		113.9	-0.1	Adjusted +0.1 to 114.0
SLM (P3) PICCOLO	S/N	121018012		113.9	0.1	Adjusted +0.1 to 114.0
SLM (P4) PICCOLO	S/N	150324047		113.9	-0.1	Adjusted +0.1 to 114.0
SLM (P5) PICCOLO	S/N	170808016		113.9	-0.1	Adjusted +0.1 to 114.0
SLM (P6) PICCOLO	S/N	130927047		113.9	-0.2	Adjusted +0.1 to 114.0

Calibrated By : ชาวลิต อ่อนไส
(Mr. Chawwalit Onswai)

Approve By : นารองศักดิ์ เสรียนิตกาน
(Mr. Narongsak Seripanitkarn)





Safety Plan Co., Ltd.

บริษัท เซฟตี้ แพลน จำกัด

1034 หมู่ 3 ถนนรังสิต-ปทุมธานี ตำบลบางพูน อำเภอเมือง จังหวัดปทุมธานี 12000 โทรศัพท์ 0-2567-3549 โทรสาร 0-2567-3485
1034 Moo 3 Rangsit-Patthum Thani Rd., Tambol Bangpooon, Amphur Muang, Pathum Thani 12000 Tel: 0-2567-3549 Fax 0-2567-3485

Calibration Sound Level Meter Certificate

Date of Calibration : March 4, 2024

Condition of Calibration

Temperature : ($^{\circ}\text{C}$) 23 ± 2 Humidity : ($\%\text{RH}$) 50 ± 20
Ambient Pressure : (kPa) 101.325 ± 1.500

Signal Level Adjustment

Level Range : 113.4 - 114.6 dB Time Weighting : Slow
Frequency Weighting : C Acoustic Calibrator : 114.0 dB

Reference Equipment

Sound Level Calibrator Quest Technologies

Model : Casella (Acoustic Calibrator) Serial No. : 114866
Reference No. : PCAL143091
Calibration Date : February 22, 2024
Integrating Sound Level Meter : PICCOLO

Intergrating Sound Level Meter	Reading (dB)	Error (dB)	Adjustment
SLM (No.1) PICCOLO S/N P0220012705	113.9	0.1	Adjusted +0.1 to 114.0
SLM (No.2) PICCOLO S/N P0220012801	113.9	-0.1	Adjusted +0.1 to 114.0
SLM (No.3) PICCOLO S/N P0220031802	113.9	0.1	Adjusted +0.1 to 114.0
SLM (No.4) PICCOLO S/N P0220031804	113.9	-0.2	Adjusted +0.1 to 114.0
SLM (No.5) PICCOLO S/N P0220031803	113.9	0.1	Adjusted +0.1 to 114.0
SLM (No.6) PICCOLO S/N P0220012704	113.9	-0.2	Adjusted +0.1 to 114.0
SLM (No.7) PICCOLO S/N P0220012703	113.9	-0.1	Adjusted +0.1 to 114.0
SLM (No.8) PICCOLO S/N P0220031801	113.9	0.1	Adjusted +0.1 to 114.0
SLM (No.9) PICCOLO S/N P0220012802	113.9	-0.1	Adjusted +0.1 to 114.0
SLM (No.10) PICCOLO S/N P0220031901	113.9	-0.1	Adjusted +0.1 to 114.0

Calibrated By : ชาวลิม อ่อนไส
(Mr. Chawwalit Onswai)

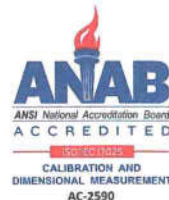
Approve By : ชามะ
(Mr. Narongsak Seripanitkarn)





Professional Calibration & Services Co., Ltd.

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



Certificate of Calibration

Certificate Number : EL08187/24
Control Number : PCAL147016
Customer Control : -
Description : Sound Level Meter
Manufacturer : Rion
Model : NL-21
Serial Number : 00977102
Customer : SAFETY PLAN CO., LTD.
1034 Moo 3, Rangsit-Pathumthani Rd., T.Bangpoon,
A.Maung, Pathumthani 12000

Page 1 of 3



Date of Receipt : 20-Feb-24
Date of Calibration : 22-Feb-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

Ms. Janjira Intapat

Authorized Signature

(Mr. Songpol Naknura)

22-Feb-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL08187/24

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Calibrator	141208123	NSC : Calibration 0037	EEL.BP. 16/0366	06-Mar-24

Condition as received : Normal

Definitions :-

* NSC - National Standardization Council of Thailand

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL08187/24

Page : 3 of 3

Calibration Results

Sound Level Calibration

UUC Range	Standard Value	UUC Reading	Uncertainty (\pm)	Tolerance Limit Values
<u>A-Weighting</u>				
20-100 dB	93.90 dB	94.1 dB	0.2 dB	92.5 ~ 95.3 dB
20-110 dB	93.90 dB	94.1 dB	0.2 dB	92.5 ~ 95.3 dB
30-120 dB	93.90 dB	94.1 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.1 dB	0.2 dB	112.5 ~ 115.3 dB
40-130 dB	93.90 dB	94.1 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.1 dB	0.2 dB	112.5 ~ 115.3 dB
<u>C-Weighting</u>				
20-100 dB	93.90 dB	94.2 dB	0.2 dB	92.5 ~ 95.3 dB
20-110 dB	93.90 dB	94.2 dB	0.2 dB	92.5 ~ 95.3 dB
30-120 dB	93.90 dB	94.2 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.1 dB	0.2 dB	112.5 ~ 115.3 dB
40-130 dB	93.90 dB	94.2 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.1 dB	0.2 dB	112.5 ~ 115.3 dB
<u>P-Weighting</u>				
20-100 dB	93.90 dB	94.2 dB	0.2 dB	92.5 ~ 95.3 dB
20-110 dB	93.90 dB	94.2 dB	0.2 dB	92.5 ~ 95.3 dB
30-120 dB	93.90 dB	94.2 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.1 dB	0.2 dB	112.5 ~ 115.3 dB
40-130 dB	93.90 dB	94.2 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.2 dB	0.2 dB	112.5 ~ 115.3 dB

Notes:

- 1). Tolerances or specifications report in table above are base on the IEC61672-1:2013.

...End...



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert. No.: 23TM1699

Page : 1 of 3

Certificate of Calibration

Equipment : Incubator

Manufacturer : Biobase

Model : BJPX-B150II

Serial No. : 06091902

ID No. : -

Submitted by : Safety Plan Co.,Ltd.
1034 Moo 3 Rangsit-Pathumthani Road,
T. Bangpoon, A. Muang,
Pathumthani 12000

Location : Laboratory Room (Safety Plan Co.,Ltd.)

Received Order : 20 November 2023

Calibration Date : 20 - 21 November 2023

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Khit Ruttanaprapachai

Approved by :

Approved Signatory

- () Pornthippa Tameyakul
() Ponpan Paipim
(✓) Suwit Imjai

Issue Date : 28 November 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0061236



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2311-04940N-4

Cert. No.: 23TM1699

Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY49001451	23LM27	TPA	25 Feb 2024

2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

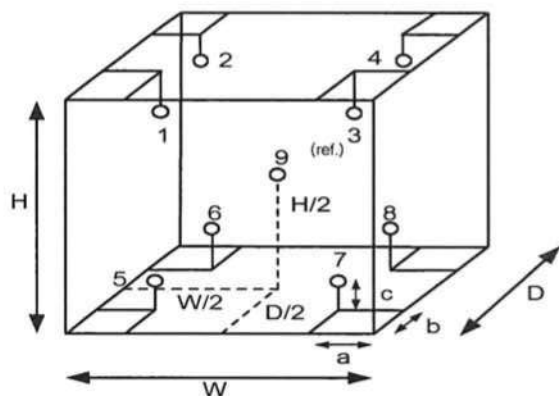
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	23	22
REL.Humid. (%)	57	55
AC Supply (Volt)	221	221



Position :	Ref. Std. ID No.:
1	19RTD-2/1
2	19RTD-2/2
3	19RTD-2/3
4	19RTD-2/4
5	19RTD-2/5
6	19RTD-2/6
7	19RTD-2/7
8	19RTD-2/8
9 (ref.)	19RTD-2/9

Probe Installation Details :

a = 10 cm
b = 10 cm
c = 10 cm

Dimension of Chamber :

D = 0.40 m
W = 0.45 m
H = 0.85 m
Capacity = 0.15 m³

Signature

a 1191482



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2311-0494ON-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 23TM1699

Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor <i>k</i>
20.0	20.0	20.0	0.37	0.40	0.80	2.03

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	19.964	20.080	19.902	20.017	20.060	20.025	20.130	20.154	20.095	0.79

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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Seunt

a 1191481



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert. No.: 23TM1341

Page : 1 of 3

Certificate of Calibration

Equipment : Refrigerator

Manufacturer : Accuplus

Model : SMART i250

Serial No. : 2054-0317.0006

ID No. : SAF.LAB.001-2560

Submitted by : Safety Plan Co.,Ltd.
1034 Moo 3, Rangsit-Pathumthani Road,
T.Bangpoon, A.Muang,
Pathumthani 12000

Location : Laboratory Room (Safety Plan Co.,Ltd.)

Received Order : 20 November 2023

Calibration Date : 20 November 2023

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Krisda Malee

Approved by :

Approved Signatory

- () Pornthippa Tameyakul
() Ponpan Paipim
(✓) Suwit Imjai

Issue Date : 28 November 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0061237



Equipment : Refrigerator
Condition As-Received : Used Item
Reference : 2311-0494ON-5

Cert. No.: 23TM1341

Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

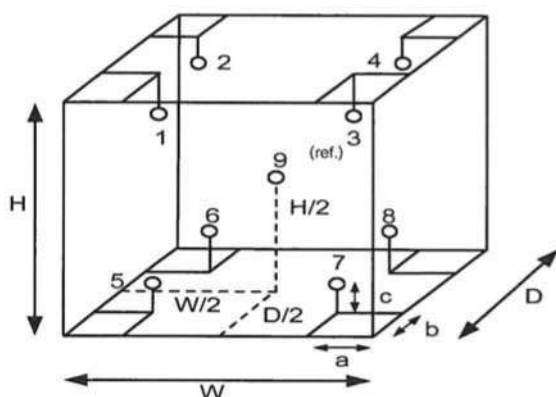
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	25	26
REL.Humid. (%)	55	52
AC Supply (Volt)	221	220



Position :	Ref. Std. ID No.:
1	18-18RTD-01
2	18-18RTD-02
3	18-18RTD-03
4	18-18RTD-04
5	18-18RTD-05
6	23-18RTD-06
7	18-18RTD-07
8	22-18RTD-08
9 (ref.)	18-18RTD-09

Probe Installation Details :

a = 10 cm
b = 10 cm
c = 10 cm

Dimension of Chamber :

D = 0.50 m
W = 0.48 m
H = 1.1 m
Capacity = 0.26 m³

Signature



Equipment : Refrigerator
Condition As-Received : Used Item
Reference : 2311-0494ON-5
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 23TM1341

Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor <i>k</i>
4.0	4.6	4.7	0.14	1.0	1.5	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (±°C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
4.0	4.345	3.921	4.644	4.325	3.839	3.455	3.907	3.787	3.710	0.62

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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Yusuf

a 1179634



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Cert. No.: 23TM1700

Page : 1 of 3

Certificate of Calibration

Equipment : Water Bath

Manufacturer : M-LAB

Model : WBN30-SC

Serial No. : 0333

ID No. : SAF.LAB.014-2548

Submitted by : Safety Plan Co.,Ltd.
1034 Moo 3 Rangsit-Pathumthani Road,
T. Bangpoon, A. Muang,
Pathumthani 12000

Location : Laboratory Room (Safety Plan Co.,Ltd.)

Received Order : 20 November 2023

Calibration Date : 21 November 2023

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Khit Ruttanaprapachai

Approved by :

Approved Signatory

- () Pornthippa Tameyakul
() Ponpan Paipim
(✓) Suwit Imjai

Issue Date : 28 November 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0061235



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2311-0494ON-3

Cert. No.: 23TM1700

Page : 2 of 3

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT04 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

<u>Instrument</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due Date</u>
1) Data Acquisition	MY49001451	23LM27	TPA	25 Feb 2024

2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

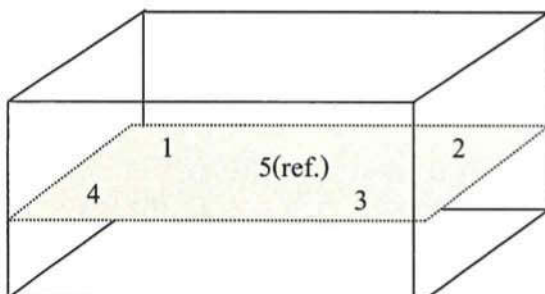
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	
Beginning of Calibration	22	55	221
Finished of Calibration	22	57	222



Front

Position :	Ref. Std. ID No.:
1	N37P301419
2	N37P300732
3	N37P301420
4	N37P301421
5(ref.)	N37P301425

Signature



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2311-0494ON-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 23TM1700

Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)					Uncertainty (± °C)
			Position					
			1	2	3	4	5 (ref.)	
85.0	85.0	85.0	84.957	84.980	85.155	85.098	85.137	0.19

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor <i>k</i>
85.0	0.32	0.12	2

Average* : The average of 30 values in each position.

Uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

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

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Signature

a 1191483



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Cert. No.: 23TM1698

Page : 1 of 3

Certificate of Calibration

Equipment : Hot Air Oven

Manufacturer : Memmert

Model : UFB 400

Serial No. : G405.0773

ID No. : SAF.LAB.017-2548

Submitted by : Safety Plan Co.,Ltd.
1034 Moo 3 Rangsit-Pathumthani Road,
T. Bangpoon, A. Muang,
Pathumthani 12000

Location : Laboratory Room (Safety Plan Co.,Ltd.)

Received Order : 20 November 2023

Calibration Date : 20 November 2023

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Khit Ruttanaprapachai

Approved by :

Approved Signatory

- () Pornthippa Tameyakul
() Ponpan Paipim
(☒) Suwit Imjai

Issue Date : 28 November 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0061234



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2311-0494ON-2

Cert. No.: 23TM1698

Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

<u>Instrument</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due Date</u>
1) Data Acquisition	MY49001451	23LM27	TPA	25 Feb 2024

2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

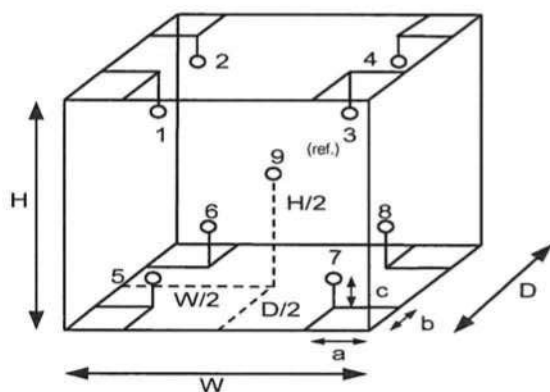
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	22	23
REL.Humid. (%)	55	57
AC Supply (Volt)	222	221



Ref. Std. ID No.: @ Calibration Point

Position :	(104) °C	(180) °C
1	19RTD-2/1	20-19TC-01
2	19RTD-2/2	20-19TC-02
3	19RTD-2/3	20-19TC-03
4	19RTD-2/4	20-19TC-04
5	19RTD-2/5	20-19TC-05
6	19RTD-2/6	20-19TC-06
7	19RTD-2/7	20-19TC-07
8	19RTD-2/8	20-19TC-08
9 (ref.)	19RTD-2/9	20-19TC-09

Probe Installation Details :

Dimension of Chamber :

a =	5.0	cm	D =	0.33	m
b =	5.0	cm	W =	0.40	m
c =	5.0	cm	H =	0.40	m
			Capacity =	0.053	m ³

Yant



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2311-0494ON-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 23TM1698

Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor <i>k</i>
104.0	104.0	104.0	0.058	0.63	1.0	2
180.0	180.5	180.5	0.16	1.4	2.0	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (±°C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	104.030	104.088	103.458	103.953	104.411	104.367	103.516	103.494	103.820	0.42
180.0	180.176	180.532	179.210	180.193	180.549	180.411	180.880	179.593	180.483	1.1

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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Signature




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Cert.No.: 23MM357

Page.: 1 of 3

Certificate of Calibration

Equipment :	Electronic Balance
Manufacturer :	Mettler Toledo
Model :	AB204-S /FACT
Serial No. :	1126481317
ID No. :	SAF.LAB.018-2548
Submitted by :	Safety Plan Co.,Ltd. 1034 Moo 3, Rangsit-Pathumthani Road, T.Bangpoon, A.Muang, Pathumthani 12000
Location :	Laboratory Room (Safety Plan Co.,Ltd.)
Received order :	20 November 2023
Calibration Date :	20 November 2023
Ambient Temperature :	15 °C to 40 °C
Relative Humidity :	30 % to 90 %
Calibrated by :	Krisda Malee
Approved by :	 Approved Signatory
() Pornthippa Tameyakul	
() Ponpan Paipim	
(✓) Suwit Imjai	
Issue Date :	28 November 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0061238



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2311-0494ON-1
Procedure used :-

Cert.No.: 23MM357

Page: 2 of 3

Calibration were conducted using in-house calibration procedure CP-OB01 according to direct measurement method against standard weight.

Condition of this result of calibration

1. Reference standard instruments:-

<u>Instruments</u>	<u>Model</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Test report No.</u>	<u>Due date</u>
1) Standard Weight Set (E2)	15884	24053	70RC007	MM-0010-22	20 Jan 2024

2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This result of calibration was made on requested at the point specified by customer.

4. This certificate is not certified for any commercial transaction.

5. This certification is traceable to the International System of Unit.

Result of calibration () Without Adjustment (*) After Adjustment by External Calibration

Range capacity : 0 g to 220 g Resolution 0.0001 g

Before Adjustment :

<u>Applied Weight</u>	<u>Balance Reading</u>	<u>Correction</u>	<u>Measurement Uncertainty</u>	<u>Coverage Factor</u>
(g)	(g)	(g)	(\pm mg)	(k)
100	99.9999	+0.0001	0.17	2
200	199.9996	+0.0004	0.29	2

After Adjustment :

1. **Determination of the standard deviation of weighing machine**

(n = 10)

<u>Applied Weight</u>	<u>Standard Deviation of Reading (g)</u>
(g)	
100	0.00005
200	0.00005

Handwritten signature



Equipment : Electronic Balance
 Condition As-Received : Used Item
 Reference : 2311-0494ON-1

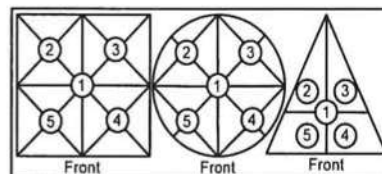
Cert.No.: 23MM357

Page: 3 of 3

Result of calibration

2. Effect of off center loading

A mass of 100 g was placed to various position on the pan.
 The weighing machine reading error obtained is given in the table



Maximum difference between
 off-center and central loading

Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)	(g)
0.0000	-0.0002	+0.0003	+0.0003	-0.0004	0.0004

3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (\pm mg)	Coverage Factor (k)
Unload	0.0000	0.0000	0.12	2.06
1	1.0000	0.0000	0.12	2.06
2	2.0000	0.0000	0.12	2.06
5	5.0000	0.0000	0.12	2.06
10	10.0000	0.0000	0.12	2.05
25	25.0000	0.0000	0.13	2.04
50	50.0000	0.0000	0.14	2
75	75.0000	0.0000	0.17	2
100	100.0001	-0.0001	0.17	2
150	150.0000	0.0000	0.29	2
200	200.0000	0.0000	0.29	2

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

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Yant

a 1191477



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Certificate of Calibration

Certificate No. : 23H2217

Page : 1 of 2

Equipment : Digital Thermo-Hygrometer

Manufacturer: Digicon

Model : TH-02

Serial No.: AF-87311

ID No.: -

Condition As-Received: Used Item

Received Date: 18 October 2023

Calibration Date: 20 October 2023

Reference: 2310-0593DN

Submitted by: Safety Plan Co.,Ltd.

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

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Corporate Services 3: Equipment Calibration and Testing Services.

1034 Moo 3, Rangsit-Pathumthani Road,
T.Bangpoon, A.Muang, Pathumthani 12000

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with standard chilled mirror sensor for humidity measurement function and comparison with standard temperature probe for temperature measurement function into humidity / temperature chamber.

Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Chilled Mirror Hygrometer	Dew Master	44730	21656	02 Aug 2024
2) Handheld Thermometer With Sensor	1523	3240076	231305	15 Mar 2024

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

3.This Certification is traceable to the International System of Unit maintained through:-

- Thunder Scientific Corporation, NVLAB Accreditation No. Calibration 200582-0
- Technology Promotion Association (Thailand-Japan), NSC-ONSC Accredited No. Calibration 0008

Calibrated by : Viporn Tantiyawutti
Issue Date : 31 October 2023

Approved Signatory :

- [✓] Chakrit Waewwanjua
[] Pornthippa Tameyakul
[] Viporn Tantiyawutti

B 0327584



Cert. No.: 23H2217

Page.: 2 of 2

Result of Calibration:- Without Adjustment

Function: Humidity Measurement

<u>Reference Temperature</u>	<u>Standard Humidity</u>	<u>UUC* Reading</u>	<u>Error</u>	<u>Uncertainty of Measurement</u>
(°C)	(%R.H.)	(%R.H.)	(%R.H.)	(±%R.H.)
25.0	50.1	47	-3.1	1.6

Result of Calibration:- Without Adjustment

Function: Temperature Measurement

<u>Standard Temperature</u>	<u>UUC* Reading</u>	<u>Error</u>	<u>Uncertainty of Measurement</u>
(°C)	(°C)	(°C)	(±°C)
25.026	24.8	-0.226	0.42

UUC* : Unit Under Calibration

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

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a 1187316



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Certificate of Calibration

Certificate No. : 23T1968

Page : 1 of 2

Equipment : Digital Thermometer With Sensor

Manufacturer: Union

Model : -

Serial No.: I0009864

ID No.: -

Condition As-Received: Used Item

Received Date: 18 October 2023

Calibration Date: 26 October 2023
to 02 November 2023

Reference: 2310-0593DN

Submitted by: Safety Plan Co.,Ltd.

Ambient Temperature: (25 \pm 3) °C

Relative Humidity: (50 \pm 20) %

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Corporate Services 3: Equipment Calibration and Testing Services.

1034 Moo 3, Rangsit-Pathumthani Road,
T.Bangpoon, A.Muang, Pathumthani 12000

Procedure used: Calibration were conducted using in-house calibration procedure CP-T01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into liquid bath temperature controller.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Digital Thermometer	1529	A66176	22I1358	16 Nov 2023
2) Industrial Platinum Resistance Thermometer	5627	739437	22I1358	16 Nov 2023
3) Industrial Platinum Resistance Thermometer	5627	739435	22I1358	16 Nov 2023

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

3.This Certification is traceable to the International System of Unit maintained through:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Sitthinon Poomai
Issue Date : 06 November 2023

Approved Signatory :

[] Phalinee Prabpaipal
[✓] Chatchawan Khunpiluek
[] Wanlop Larpkern

B 0327765



Cert. No.: 23T1968

Page.: 2 of 2

Result of Calibration:-

Without Adjustment

Function:

Temperature measurement

This equipment was connected with Thermocouple Type K ID No. I0009864/T

Dimension of probe : Diameter 3.5 mm., Length 23 mm. Sheath material : Stainless Steel

Immersion Depth (mm.)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
150	4.0034	4.0	-0.0034	0.41
150	20.0024	19.8	-0.2024	0.41
150	104.0057	103.8	-0.2057	0.52
150	180.0025	178.3	-1.7025	0.74

UUC* : Unit Under Calibration

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

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No. : 23M2008

Page : 1 of 2

Equipment : Standard Weights
Manufacturer: -
Model : -
Serial No.: -
ID No.: SAF.LAB.012-2548

Condition As-Received: Used Item

Received Date: 18 October 2023

Calibration Date: 24 October 2023

Reference: 2310-0593DN

Submitted by: Safety Plan Co.,Ltd.

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 15) %

Atmospheric Pressure: 1009.1 hPa

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except with the prior written approval of the head of
Corporate Services 3: Equipment Calibration and Testing Services.

1034 Moo 3, Rangsit-Pathumthani Road,
T.Bangpoon, A.Muang, Pathumthani 12000

Procedure used: Calibration were conducted using in-house calibration procedure CP-M02 according to comparison method against standard weights on the basis of weighings at an average air density of 1.2 kg/m³ and a temperature of 23.2 °C material density of weight is 8000 kg/m³.

Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Standard Weight Set (F1)	-	-	22M2409	19 Dec 2023

2.This certificate is not certified for any commercial transaction.

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

4.This Certification is traceable to the International System of Unit maintained through:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Suwat Wutthicharoenmongkol
Issue Date : 26 October 2023

Approved Signatory :

[] Phalinee Prabpaipal

[✓] Sura Suwannasri

[] Sorapong Koomkainam

B 0323854



Cert No.: 23M2008

Page: 2 of 2

Result of calibration

Without adjustment

Nominal Value	Conventional mass		Uncertainty of Measurement (\pm)	Maximum Permissible error (\pm)
50 g	50.00003	g	0.30 mg	1.0 mg
20 g	19.99979	g	0.25 mg	0.80 mg
20 g•	19.99960	g	0.25 mg	0.80 mg
10 g	10.00005	g	0.20 mg	0.60 mg
5 g	5.00014	g	0.16 mg	0.50 mg
2 g	2.00006	g	0.12 mg	0.40 mg
2 g•	1.99999	g	0.12 mg	0.40 mg
1 g	0.99999	g	0.10 mg	0.30 mg
500 mg	500.00	mg	0.080 mg	0.25 mg
* 200 mg	199.82	mg	0.060 mg	0.20 mg
200 mg•	200.02	mg	0.060 mg	0.20 mg
100 mg	99.98	mg	0.050 mg	0.16 mg
50 mg	49.949	mg	0.040 mg	0.12 mg

Note : *Can not adjustment

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

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No. : 23T1967

Page : 1 of 2

Equipment : Liquid-in Glass Thermometer

Manufacturer: SK

Model : -

Serial No.: -

ID No.: SAF.LAB.003

Condition As-Received: Used Item

Received Date: 18 October 2023

Calibration Date: 26 October 2023
to 02 November 2023

Reference: 2310-0593DN

Submitted by: Safety Plan Co.,Ltd.

Ambient Temperature: (25 \pm 3) °C

Relative Humidity: (50 \pm 20) %

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Corporate Services 3: Equipment Calibration and Testing Services.

1034 Moo 3, Rangsit-Pathumthani Road,
T.Bangpoon, A.Muang, Pathumthani 12000

Procedure used: Calibration were conducted using in-house calibration procedure CP-T02 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into liquid bath temperature controller.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Digital Thermometer	1529	A66176	22I1358	16 Nov 2023
2) Industrial Platinum Resistance Thermometer	5627	739437	22I1358	16 Nov 2023
3) Industrial Platinum Resistance Thermometer	5627	739435	22I1358	16 Nov 2023

2.The UUC* was immersed into liquid bath temperature controller and the top about 12 mm of the liquid column above the bath medium in every calibration points.

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

4.This Certification is traceable to the International System of Unit maintained through:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Sitthinon Poomai
Issue Date : 06 November 2023

Approved Signatory :

[] Phalinee Prabpaipal
[✓] Chatchawan Khunpiluek
[] Wanlop Larpkern

B 0327764



Cert. No.: 23T1967

Page.: 2 of 2

Result of Calibration:-

Without Adjustment

Function: Temperature measurement.

Type: Total Immersion

Scale Division: 1 °C **Readability :** 0.1 °C

Reference point (0 °C) Error = -0.5854 °C, with Uncertainty of Measurement of ± 0.15 °C

<u>Standard Temperature</u> (°C)	<u>UUC*</u> <u>Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty of Measurement</u> (\pm °C)
1.0027	0.0	-1.0027	0.15
20.0036	18.9	-1.1036	0.15
50.0063	49.7	-0.3063	0.15
100.0056	99.5	-0.5056	0.15

Note: UUC* : Unit Under Calibration

The UUC* readings were made under magnification and resolved to one tenth of one scale division.

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

-o0o-

Certificate of Calibration

Certificate No. : 67-400217-3

Page : 1 of 2

Submitted by : Special Lab Envi and Consultant Co., Ltd.
47/91 Moo 3 Thambol Tha-it, Pakkret, Nonthaburi 11120

Equipment : Water Bath
Manufacturer : Memmert Model : WNB22
Range : N/A °C Resolution : 0.1 °C
Serial No. : L520.0201 ID No. : LB-Eq-041

Environment : On site calibration was carried out at the Laboratory, Special Lab Envi and Consultant Co., Ltd.
Ambient Temperature : (34.0 to 35.0) °C
Relative Humidity : (35 to 40) %
Line Voltage : (226.0 to 226.5) V

Date of Received : 20 April 2024

Date of Calibration : 20 April 2024

Date of Issue : 26 April 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	66-400592-1	24 Apr 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

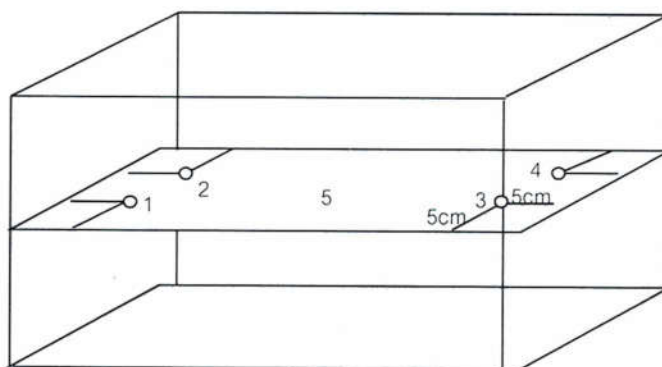
Certificate No. : 67-400217-3

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			
62.0	62.0	62.0	62.04	62.05	62.03	62.05	62.02	0.18	0.09	0.04
85.0	85.0	85.0	85.05	85.05	85.04	85.06	85.02	0.18	0.09	0.05
95.0	95.0	95.0	94.92	94.82	94.81	94.78	94.80	0.21	0.21	0.10
100.0	CCC	100.6	100.44	100.47	100.55	100.50	100.36	0.21	0.28	0.09

Remark The uncertainty is not combine uniformity of the water bath

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

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

- o0o -

Handwritten signature



Certificate of Calibration

Certificate No. : 67-400217-4

Page : 1 of 2

Submitted by : Special Lab Envi and Consultant Co., Ltd.
47/91-93 Moo 3, Tambol Tha-It, Pakkret, Nonthaburi 11120

Equipment : Temperature controlled enclosure (Refrigerator)
Manufacturer : Frozen Model : CC-2288F
Range : N/A °C Resolution : 1 °C
Serial No. : CC-2288F-1163-003 ID No. : LB-Eq-046

Environment : On site calibration was carried out at the Laboratory, Special Lab Envi and Consultant Co., Ltd.
Ambient Temperature : (32.0 to 33.0) °C
Relative Humidity : (40 to 45) %
Line Voltage : (226.0 to 226.5) V

Date of Received : 20 April 2024

Date of Calibration : 20 April 2024

Date of Issue : 26 April 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	66-400595-1	26 Apr 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. : 67-400217-4

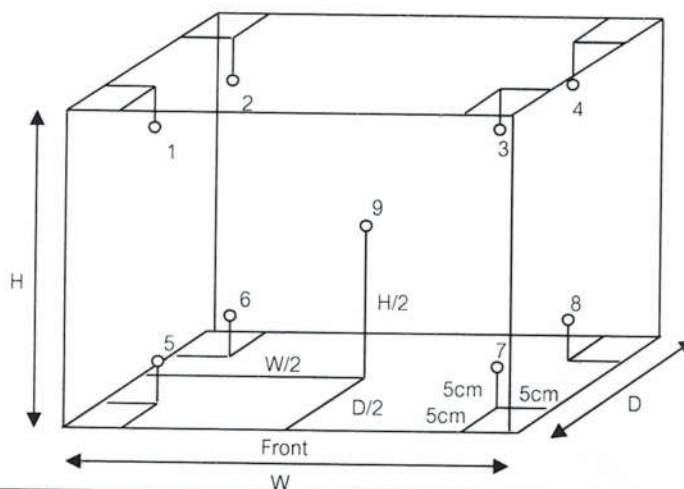
Page : 2 of 2

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 = 1.02 m

D = 0.47 m

H = 1.48 m

Capacity = 0.71 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	
3	3	3	4.0	3.0	2.6	2.5	4.0	4.1	2.1	2.1	3.1	0.85

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
3	3	3	1.2	0.2	2.3

Remark The uncertainty is not combine uniformity of the air chamber

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

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

- oOo -

Handwritten signature



Certificate of Calibration

Certificate No. : 67-400217-1

Page : 1 of 2

Submitted by : Special Lab Envi and Consultant Co., Ltd.
47/91 Moo 3 Thambol Tha-it, Pakkret, Nonthaburi 11120

Equipment : Temperature controlled enclosure(Incubator)
 Manufacturer : Lovibond Model : FKU 1800
 Range : N/A °C Resolution : 0.1 °C
 Serial No. : 0925481-19 ID No. : LB-Eq-005

Environment : On site calibration was carried out at the Laboratory, Special Lab Envi and Consultant Co., Ltd.
 Ambient Temperature : (24.0 to 25.0) °C
 Relative Humidity : (50 to 55) %
 Line Voltage : (226.0 to 226.5) V

Date of Received : 20 April 2024

Date of Calibration : 20 April 2024

Date of Issue : 26 April 2024

Calibrated by : Kittisak Kokaeo

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
400046 & 400047	67-400047-2	26 Jul 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. : 67-400217-1

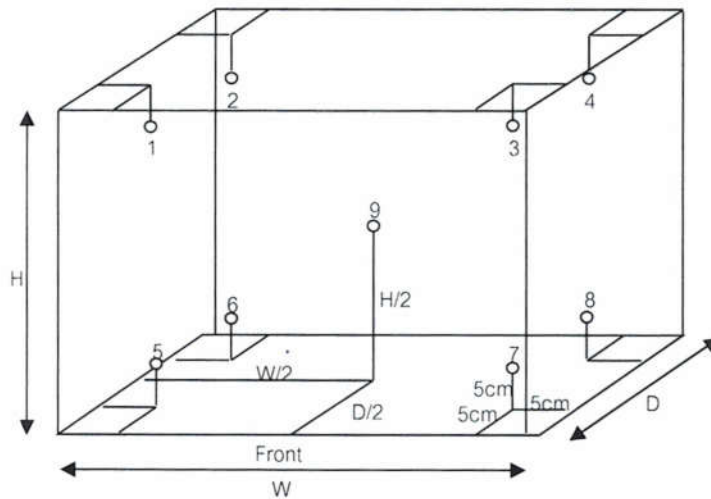
Page : 2 of 2

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 = 0.55 m

D = 0.73 m

H = 0.50 m

Capacity = 0.20 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	
30.0	30.0	30.0	30.09	30.21	30.18	30.17	30.52	30.49	30.13	30.32	30.13	0.31
35.0	35.0	35.0	34.95	35.17	35.13	35.14	35.62	35.67	35.04	35.40	35.19	0.32
37.0	37.0	37.0	36.94	37.16	37.13	37.11	37.60	37.64	37.02	37.37	37.16	0.33

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Uniformity (° C)	Measured Stability (° C)	Overall Variation (° C)
30.0	30.0	30.0	0.42	0.03	0.46
35.0	35.0	35.0	0.50	0.04	0.77
37.0	37.0	37.0	0.51	0.06	0.79

Remark The uncertainty is not combine uniformity of the air chamber

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

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

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Certificate of Calibration

Certificate No. : 67-400217-2

Page : 1 of 2

Submitted by : Special Lab Envi and Consultant Co., Ltd.
47/91 Moo 3 Thambol Tha-it, Pakkret, Nonthaburi 11120

Equipment : Temperature controlled enclosure(Incubator)
Manufacturer : Lovibond Model : FKU 1800
Range : N/A °C Resolution : 0.1 °C
Serial No. : 0914643-01 ID No. : LB-Eq-004

Environment : On site calibration was carried out at the Laboratory, Special Lab Envi and Consultant Co., Ltd.
Ambient Temperature : (26.0 to 27.0) °C
Relative Humidity : (45 to 50) %
Line Voltage : (226.0 to 226.5) V

Date of Received : 20 April 2024

Date of Calibration : 20 April 2024

Date of Issue : 26 April 2024

Calibrated by : Kittisak Kokaco

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
400046 & 400042	67-400047-1	25 Jul 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. : 67-400217-2

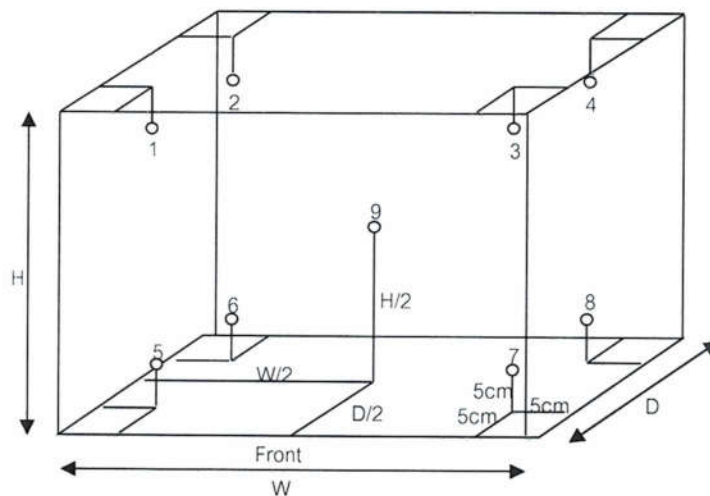
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.55 m

D = 0.73 m

H = 0.50 m

Capacity = 0.20 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	19.9	19.9	20.27	20.24	20.07	20.06	20.15	20.14	20.21	20.03	20.12	0.44

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	19.9	19.9	0.24	0.20	0.54

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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ABJ



www.calibratech.co.th

Certificate of Calibration

Certificate No. : 67-200136-1

Page : 1 of 2

Submitted by : Special Lab Envi and Consultant Co., Ltd.
47/91-93 Moo 3, Tambol Tha-It, Pakkret, Nonthaburi 11120

Equipment : Electronic Balance
Manufacturer : AND Model : GR-200
Serial No. : 14245322 ID No. : LB-Eq-016
Capacity : 210 g Resolution : 0.0001 g

Environment : On site calibration was carried out at the Laboratory,
Special Lab Envi and Consultant Co., Ltd.
Ambient Temperature : (27.3 to 27.7) °C
Relative Humidity : (42.5 to 44.0) %
Air Pressure : 1006.0 mbar

Date of Received : 20 April 2024

Date of Calibration : 20 April 2024

Date of Issue : 24 April 2024

Calibrated by : Akaradath Thippichai

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

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

Standard Weights

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

Approved by :



(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-200136-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.001	0.0000	0.00012
0.01	0.0000	0.00012
0.1	0.0000	0.00012
0.5	0.0000	0.00013
2	0.0000	0.00013
5	-0.0001	0.00013
10	0.0000	0.00013
50	0.0000	0.00015
100	0.0000	0.00020
200	0.0001	0.00038

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

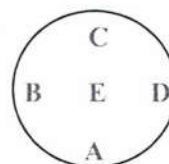
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.06$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

A B C D E

-0.0003 0.0000 0.0006 -0.0001 0.0000 g



Repeatability

Load test : 200 g

Stdev. : 0.00005 g

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

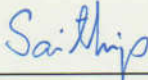
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250

TEL. 0-2717-3000 FAX. 0-2719-9484

Cert.No.: 24TW29

Page.: 1 of 2

Certificate of Testing

Equipment :	DO Meter
Manufacturer :	Hanna
Model :	HI98193
Serial No. :	03030056991
ID No. :	LB-Eq-014
Received Date :	05 February 2024
Test Date :	06 February 2024
Reference :	2402-0129WN-1
Submitted by :	Special Lab Envi And Consultant Co.,Ltd 47/91-93, 96 Moo 3 Thambon Tha-it, Pakkret, Nonthaburi 11120
Laboratory Condition :	Temperature (25 ± 5) °C Humidity (50 ± 20) %
Test Procedure :	In - house method : CP-CH9 by Comparison Technique with Azide Modification Method
Tested by :	Walalak Sirithean
Approved by :	 Approved Signatory
(<input checked="" type="checkbox"/>) Saithip Meangmai (<input type="checkbox"/>) Warakorn Lerngagtrakul (<input type="checkbox"/>) Ponpan Paipim	
Issue Date :	7 February 2024



Cert.No.: 24TW29

Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

<u>Instruments</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	1124013382	140RC006	23MM18	20 Feb 2024

2. Standard Material :-

<u>Material</u>	<u>Manufacturer</u>	<u>Lot.No.</u>	<u>Assay</u>
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

Result : **Dissolved Oxygen Meter Adjustment With Air 100 %**

Dissolved Oxygen Probe No.: KC1N20CDJ

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.18	8.18	0.0084

This report was certified only for the instrument we tested. It is allowable to use for study
Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced
other in full, without written approval of the laboratory

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Saithip

a 1201024



BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY

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



Certificate No. : CAL-24-099

Page : 1 of 3

CERTIFICATE OF CALIBRATION

Equipment	:	Spectrophotometer
Manufacturer	:	Thermo Scientific
Model	:	Genesys 20
Serial No.	:	3SGT041007
ID No.	:	LB-Eq-029
Customer	:	Special Lab Envi And Consultant Co.,Ltd.
	:	47/91-93 Moo 3, Tambol Tait, Amphur Pakrad,
	:	Nonthaburi, 11120
Location	:	Becthai Laboratory
Date of Receipt	:	30 April 2024
Date of Calibration	:	2 May 2024
Date of Issue	:	2 May 2024
Ambient Temperature	:	(25±10) °C
Relative Humidity	:	(60±20) %
Condition As-Received	:	Used Item

Calibrated by

Ms. Bussayamas Noppakhun

Calibration Engineer

Approved by

(Ms. Jintana Sangthaijaroenlap)

Calibration Manager

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

This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

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



BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY

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



Certificate No. : CAL-24-099

Page : 2 of 3

CALIBRATION REPORT

Conditions of this result of calibration

1. Reference Standard Material :

<u>Material</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert.No.</u>	<u>Due date</u>
Holmium Glass Filter	RM-HG	12705	117342	13 December 2025
Neutral Density Filter	RM-1N2N3N	8323	117341	13 December 2025

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

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

3. Method of calibration :

The calibration procedure was carried out according to ASTM E275-08 (2022) and ASTM E925-09 (2014).

4. Result of calibration :

(☒) without adjustment

(☐) after adjustment

5. Equipment Specifications:

Spectral Bandwidth :	8	nm
Data Interval :	1	nm
Scan Speed :	N/A	nm/min



BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY

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



Certificate No. : CAL-24-099

Page : 3 of 3

CALIBRATION REPORT

Wavelength Calibration

Certified Values of Reference Material	Nominal Value (nm)	UUC*Reading (nm)	Error (nm)	Uncertainty of Measurement (\pm nm)	k Factor
418.40	418	418	-0.40	0.59	2.00
537.00	537	537	0.00	0.59	2.00
638.00	638	639	1.00	0.59	2.00

Photometric Calibration for Visible

Wavelength (nm)	Certified Values of Reference Material (A)	UUC* Reading (A)	Error (A)	Uncertainty of Measurement (\pm A)	k Factor
420.0	Zero	0.000	0.0000	0.0028	2.00
	0.5703	0.573	0.0027	0.0045	2.00
	0.7336	0.734	0.0004	0.0045	2.00
	1.0709	1.075	0.0041	0.0045	2.00
440.0	Zero	0.000	0.0000	0.0028	2.00
	0.5592	0.557	-0.0022	0.0045	2.00
	0.716	0.717	0.0010	0.0045	2.00
	1.0454	1.044	-0.0014	0.0045	2.00
465.0	Zero	0.000	0.0000	0.0028	2.00
	0.5094	0.511	0.0016	0.0045	2.00
	0.6601	0.664	0.0039	0.0045	2.00
	0.963	0.966	0.0030	0.0045	2.00
546.1 (546.0)	Zero	0.000	0.0000	0.0028	2.00
	0.5206	0.523	0.0024	0.0045	2.00
	0.6677	0.665	-0.0027	0.0045	2.00
	0.9763	0.979	0.0027	0.0045	2.00
590.0	Zero	0.000	0.0000	0.0028	2.00
	0.5522	0.555	0.0028	0.0045	2.00
	0.6966	0.699	0.0024	0.0045	2.00
	1.0201	1.022	0.0019	0.0045	2.00
635.0	Zero	0.000	0.0000	0.0028	2.00
	0.5377	0.538	0.0003	0.0045	2.00
	0.6649	0.667	0.0021	0.0045	2.00
	0.9736	0.977	0.0034	0.0045	2.00

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

Note:

UUC* : Unit Under Calibration

- End of Report -

Certificate of Calibration

Certificate No. : 67-300222-6

Page : 1 of 2

Submitted by : Special Lab Envi and Consultant Co., Ltd.

47/91-93 Moo 3, Tambol Tha-It, Pakkret, Nonthaburi 11120

Equipment : Burette

Manufacturer : Witeg

Class : A

Capacity : 25 ml

Graduation : 0.05 ml

ID No. : LB-Gw-001

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

Relative Humidity : (50 ± 10) %

Air Pressure : 1002.7 mbar.

Date of Received : 20 April 2024

Date of Calibration : 27 April 2024

Date of Issue : 27 April 2024

Calibrated by : Wipa Tovadee

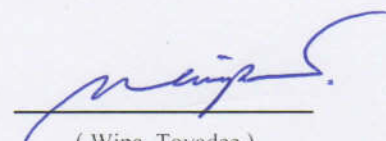
Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID No.	Cert. No.	Due Date	Traceability
241003	66-200388-2	02 Jun 2024	National Institute of Metrology (Thailand) (NIMT)

Approved by :



(Wipa Tovadee)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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



Certificate of Calibration

Certificate No. : 67-300222-6

Page : 2 of 2

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

UUC Condition As-Received : Good

Delivery Time : 40.01 sec.

Nominal Volume (ml)	Measuring Volume (ml)
10	10.0029
20	20.0018
25	25.0167

Uncertainty of measurement with in \pm 0.0066 ml

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

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

- o0o -






CALIBRATION CERTIFICATE

Date of Issue Jun 21, 2024

Cert No. 24/2294

Site Calibration

Order No. 24060309

Customer SPECIAL LAB ENVI AND CONSULTANT CO., LTD.
47/91 Moo 3, Tha-It, Pakkert, Nonthaburi 11120

Place of Calibration Laboratory Room

Description Oven

Model UF30

Serial No. B123.0544

ID.No. LB-Eq-047

Date of Receipt Jun 19, 2024

Date of Calibration Jun 19, 2024

Environment

Temperature (Min) 29.2 °C (Max) 33.1 °C

Relative Humidity (Min) 40.6 %RH (Max) 49.7 %RH

Calibration Method

WI-17 : The reference thermometer was placed into the chamber and measurement was performed based on AS-2853.

The temperature scale in use at this laboratory is the International Temperature Scale of 1990.

Standard

1) Data Acquisition with Sensor Model 34972A S/N. MY59002130, Certificate No. QR24-0873, Calibrated by Quality Reborn Co., Ltd., ONAC Calibration No. 0292. Due Date Apr 18, 2025.

This certificate is traceable to SI unit.

Q.N.

CALIBRATION CERTIFICATE

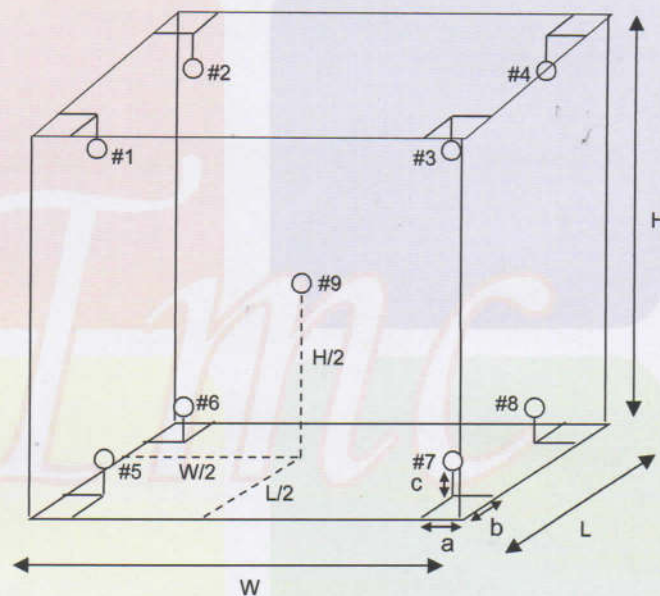
Date of Issue Jun 21, 2024

Cert No. 24/2294

Site Calibration

Order No. 24060309

Results (without adjustment)



Position of reference thermometers were placed

Note.

- 1). Dimension (W x L x H) is 40 x 25 x 32 cm.
- 2). Stability - greatest one half of difference between max peak and min peak of each reference probe measured temperature obtained during the calibration interval.
- 3). Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions. The reference sensor should preferably be located at the geometric center of the chamber.



CALIBRATION CERTIFICATE

Date of Issue Jun 21, 2024

Cert No. 24/2294

Site Calibration

Order No. 24060309

Results (without adjustment)

Cal Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability \pm (°C)	Uniformity (°C)	Uncertainty \pm (°C)
104.0	104.0	104.0	Position 1	104.402	0.079	0.697	0.35
			Position 2	103.716			
			Position 3	103.784			
			Position 4	103.652			
			Position 5	104.005			
			Position 6	103.668			
			Position 7	103.555			
			Position 8	103.750			
			Position 9	103.743			

Cal Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability \pm (°C)	Uniformity (°C)	Uncertainty \pm (°C)
150.0	150.0	150.0	Position 1	151.015	0.115	1.214	0.44
			Position 2	149.798			
			Position 3	149.866			
			Position 4	149.624			
			Position 5	150.425			
			Position 6	149.715			
			Position 7	149.490			
			Position 8	150.027			
			Position 9	149.857			

02h



CALIBRATION CERTIFICATE

Date of Issue Jun 21, 2024

Cert No. 24/2294

Site Calibration

Order No. 24060309

Results (without adjustment)

Cal Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability ±(°C)	Uniformity (°C)	Uncertainty ±(°C)
180.0	180.0	180.0	Position 1	181.152	0.102	1.491	0.49
			Position 2	179.669			
			Position 3	179.665			
			Position 4	179.354			
			Position 5	180.529			
			Position 6	179.540			
			Position 7	179.221			
			Position 8	180.082			
			Position 9	179.702			

The stability and uniformity was taken into account in the measurement uncertainty stated.

The above results are valid exclusively for calibration samples as mentioned in the report.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with ONAC requirements.

APPROVED SIGNATORY :

☐ MR. PRAJUCKPETCH THONGSOOKCHOTE

☒ MR. DAMRONG MULSING

☐ MR. JATURAPAT THONGSOOKCHOTE

Oven

Model. UF30	S/N. B123.0544	ID.No. LB-Eq-047
-------------	----------------	------------------



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No.23-66/0552

MTC.No.23-66/0552

Number of page(s) 2

CALIBRATION CERTIFICATE

Nomenclature : DRYCAL DC-LITE PRIMARY FLOWMETER

Manufacturer : BIOS International Corporation, USA.

Serial No.: 1210

Model : DCL-L

Scale range : 10 ml/min to 500 ml/min

Subdivision : (0.1, 0.01) ml/min

Submitted by : SAFETY PLAN CO.,LTD.

1034 Moo3, Rangsit-Pathum Thani Rd., T.Bangpoo,

A.Muang, Pathum Thani 12000, Thailand.

Received date : 7 July 2023

Condition of measured item : Normal

Calibration date : 16 August 2023

Standard :	Standard	Certificate No.	Date due	Traceability
	RTD Thermometer	PSL-T 643/65	1-Jun-24	TISTR
	Molbox/Pressure Transducer/UpStream	MP-0076-23	2-Apr-25	NIMT
	Primary Flow Calibrator S/N 117982	MW-0034-23	11-Jun-25	NIMT

Calibrated by : Terasak Panna
(Mr.Terasak Panna)

Approved by : Kirana Luanghirun
(Ms.Kirana Luanghirun)

Director
TISTR

Mechanical Engineering Standards Laboratory

Ref. 2013266070702663001

Issued Date 17 August 2023

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

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

FM.BL.MTC.002 Rev.4

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No.23-66/0552

2/2

MTC.No.23-66/0552

Calibration point : (100, 200, 300, 400, 500) ml/min

Ambient condition : Temperature (23 ± 3) °C , Relative humidity (55 ± 15) %

Atmospheric pressure (1010 ± 13) hPa

Calibration method : The flowmeter (UUC) was calibrated by comparison method with standard flowmeter according to CP-370.01.

The reported value is the value that converted to value at reference condition within pressure and temperature of the actual gas entering the UUC

Measurement data :

UUC Value (ml/min)	Standard Value (ml/min)	Temperature (°C)	Pressure (hPa)	Deviation (%)	Uncertainty (%)
101.1	100.04	23.255	1004.88	+1.06	1.01
200.2	199.80	23.274	1004.93	+0.20	1.04
300.6	297.26	23.277	1004.95	+1.13	0.99
401.5	399.06	23.286	1005.01	+0.60	0.98
505.3	498.72	23.286	1005.07	+1.33	0.99

The reported expanded uncertainties are based on standard uncertainties multiplied by a coverage factor $k=2$, which provides a level of confidence of approximately 95%.

The end of calibration certificate.

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

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FM.BL.MTC.002 Rev.4

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E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

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Fax. (66) 0 2323 9165

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No.23-67/0661

MTC.No.23-67/0661-01

Number of page(s) 2

CALIBRATION CERTIFICATE

Nomenclature : DRYCAL DC-LITE PRIMARY FLOWMETER

Manufacturer : BIOS International Corporation, USA.

Serial No.: 1210

Model : DCL-L

Scale range : 10 ml/min to 500 ml/min

Subdivision : (0.1, 0.01) ml/min

Submitted by : SAFETY PLAN CO.,LTD.

1034 Moo3, Rangsit-Pathum Thani Rd., T.Bangpoo,

A.Muang, Pathum Thani 12000, Thailand.

Received date : 21 August 2024

Condition of measured item : Normal

Calibration date : 29 August 2024

Standard :	Standard	Certificate No.	Date due	Traceability
	RTD Thermometer	PSL-T 0811/67	3-Jul-26	TISTR
	Molbox/PressureTransducer/UpStream	MP-0076-23	2-Apr-25	NIMT
	Primary Flow Calibrator S/N 117982	MW-0034-23	11-Jun-25	NIMT

Calibrated by : Terasak Panna
(Mr.Terasak Panna)

Approved by : Kirana Luanghirun
(Ms.Kirana Luanghirun)

Director
Mechanical Engineering Standards Laboratory

Ref. 2013267082103113001

Issued Date 3 September 2024

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FM.BL.MTC.002 Rev.4

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Mechanical Engineering Standards Laboratory Soi 1, Bangpoo Industrial Estate, Muang, Samutprakan 10280, Thailand.

Request No.23-67/0661

2/2

MTC.No.23-67/0661-01

Calibration point : (100, 200, 300, 400, 500) ml/min

Ambient condition : Temperature (23 ± 3) °C , Relative humidity (55 ± 15) %

Atmospheric pressure (1010 ± 13) hPa

Calibration method : The flowmeter (UUC) was calibrated by comparison method with standard flowmeter according to CP-370.01.

The reported value is the value that converted to value at reference condition within pressure and temperature of the actual gas entering the UUC

Measurement data :

UUC Value (ml/min)	Standard Value (ml/min)	Temperature (°C)	Pressure (hPa)	Deviation (%)	Uncertainty (%)
99.60	98.717	24.350	1007.29	+0.89	0.93
200.2	199.08	24.496	1007.13	+0.58	0.93
301.2	300.97	24.582	1007.04	+0.08	0.93
403.0	402.61	24.680	1007.02	+0.09	0.93
503.0	499.13	24.702	1006.98	+0.78	0.93

The reported expanded uncertainties are based on standard uncertainties multiplied by a coverage factor $k=2$, which provides a level of confidence of approximately 95%.

The end of calibration certificate.

Tps

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

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FM.BL.MTC.002 Rev.4

Head Office

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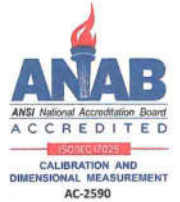
Office

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E-mail : sumalee@tistr.or.th



Professional Calibration & Services Co., Ltd.

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



Certificate of Calibration

Certificate Number : EL08179/24
Control Number : PCAL128892
Customer Control : -
Description : Sound Level Meter
Manufacturer : Rion
Model : NL-21
Serial Number : 01298952
Customer : SAFETY PLAN CO., LTD.

Page 1 of 3



1034 Moo 3, Rangsit-Pathumthani Rd., T.Bangpoon,
A.Maung, Pathumthani 12000

Date of Receipt : 20-Feb-24
Date of Calibration : 22-Feb-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

Ms. Janjira Intapat

Authorized Signature

(Mr. Songpol Naknura)

22-Feb-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL08179/24

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Calibrator	141208123	NSC : Calibration 0037	EEL.BP. 16/0366	06-Mar-24

Condition as received : Normal

Definitions :-

* NSC - National Standardization Council of Thailand

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL08179/24

Page : 3 of 3

Calibration Results

Sound Level Calibration

UUC Range	Standard Value	UUC Reading	Uncertainty (\pm)	Tolerance Limit Values
<u>A-Weighting</u>				
20-100 dB	93.90 dB	94.4 dB	0.2 dB	92.5 ~ 95.3 dB
20-110 dB	93.90 dB	94.4 dB	0.2 dB	92.5 ~ 95.3 dB
30-120 dB	93.90 dB	94.4 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.4 dB	0.2 dB	112.5 ~ 115.3 dB
40-130 dB	93.90 dB	94.4 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.4 dB	0.2 dB	112.5 ~ 115.3 dB
<u>C-Weighting</u>				
20-100 dB	93.90 dB	94.5 dB	0.2 dB	92.5 ~ 95.3 dB
20-110 dB	93.90 dB	94.4 dB	0.2 dB	92.5 ~ 95.3 dB
30-120 dB	93.90 dB	94.4 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.4 dB	0.2 dB	112.5 ~ 115.3 dB
40-130 dB	93.90 dB	94.4 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.4 dB	0.2 dB	112.5 ~ 115.3 dB
<u>P-Weighting</u>				
20-100 dB	93.90 dB	94.5 dB	0.2 dB	92.5 ~ 95.3 dB
20-110 dB	93.90 dB	94.4 dB	0.2 dB	92.5 ~ 95.3 dB
30-120 dB	93.90 dB	94.4 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.4 dB	0.2 dB	112.5 ~ 115.3 dB
40-130 dB	93.90 dB	94.4 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.4 dB	0.2 dB	112.5 ~ 115.3 dB

Notes:

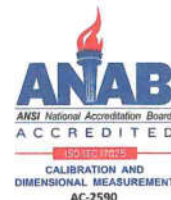
- 1). Tolerances or specifications report in table above are base on the IEC61672-1:2013.

...End...



Professional Calibration & Services Co., Ltd.

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



Certificate of Calibration

Certificate Number : EL08177/24
Control Number : PCAL128170
Customer Control : -
Description : Sound Level Meter
Manufacturer : ACO
Model : 6236
Serial Number : 46055
Customer : SAFETY PLAN CO., LTD.

Page 1 of 3



1034 Moo 3, Rangsit-Pathumthani Rd., T.Bangpoon,
A.Maung, Pathumthani 12000

Date of Receipt : 20-Feb-24
Date of Calibration : 22-Feb-24
Environment : Temperature $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$
: Relative Humidity $50\% \pm 20\%$
Calibration Method : Calibration Procedure Number CP-EL35
Calibration Results : See data attached

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

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

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

Calibrated By

Mr. Watcharapol Horasit

Authorized Signature

(Mr. Songpol Nakanurak)

23-Feb-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL08177/24

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Calibrator	141208123	NSC : Calibration 0037	EEL.BP. 16/0366	06-Mar-24

Condition as received : Normal

Definitions :-

* NSC - National Standardization Council of Thailand

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL08177/24

Page : 3 of 3

Calibration Results

Sound Level Calibration

UUC Range	Standard Value	UUC Reading	Uncertainty (\pm)	Tolerance Limit Values
<u>Mode A</u>				
20 - 100 dB	93.90 dB	94.7 dB	0.2 dB	92.5 ~ 95.3 dB
20 - 110 dB	93.90 dB	94.7 dB	0.2 dB	92.5 ~ 95.3 dB
30 - 120 dB	93.90 dB	94.7 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.8 dB	0.2 dB	112.5 ~ 115.3 dB
40 - 130 dB	93.90 dB	94.7 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.8 dB	0.2 dB	112.5 ~ 115.3 dB
<u>Mode C</u>				
20 - 100 dB	93.90 dB	94.7 dB	0.2 dB	92.5 ~ 95.3 dB
20 - 110 dB	93.90 dB	94.7 dB	0.2 dB	92.5 ~ 95.3 dB
30 - 120 dB	93.90 dB	94.7 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.8 dB	0.2 dB	112.5 ~ 115.3 dB
40 - 130 dB	93.90 dB	94.8 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.8 dB	0.2 dB	112.5 ~ 115.3 dB
<u>Mode Z</u>				
20 - 100 dB	93.90 dB	94.7 dB	0.2 dB	92.5 ~ 95.3 dB
20 - 110 dB	93.90 dB	94.7 dB	0.2 dB	92.5 ~ 95.3 dB
30 - 120 dB	93.90 dB	94.8 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.8 dB	0.2 dB	112.5 ~ 115.3 dB
40 - 130 dB	93.90 dB	94.8 dB	0.2 dB	92.5 ~ 95.3 dB
	113.85 dB	114.8 dB	0.2 dB	112.5 ~ 115.3 dB

Notes:

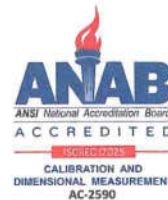
- 1). Tolerances or specifications report in table above are base on the IEC61672-2013.

...End...



Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsit-Nakornnayok Rd., Bungyeetho, Thunyaburi,
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Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : EL08178/24
Control Number : PCAL128169
Customer Control : -
Description : Sound Level Meter
Manufacturer : ACO
Model : 6238
Serial Number : 46279
Customer : SAFETY PLAN CO., LTD.
1034 Moo 3, Rangsit-Pathumthani Rd., T.Bangpoon,
A.Maung, Pathumthani 12000

Page 1 of 3



Date of Receipt : 20-Feb-24
Date of Calibration : 22-Feb-24
Environment : Temperature $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$
: Relative Humidity $50\text{ \%} \pm 20\text{ \%}$
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. Songpol Naknura)

27-Feb-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL08178/24

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Calibrator	141208123	NSC : Calibration 0037	EEL.BP. 16/0366	06-Mar-24

Condition as received : Normal

Definitions :-

* NSC - National Standardization Council of Thailand

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL08178/24

Page : 3 of 3

Calibration Results

Sound Level Calibration

UUC Range	Standard Value	UUC Reading	Uncertainty (\pm)	Tolerance Limit Values
<u>A-Weighting</u>				
20 - 100 dB	93.90 dB	94.1 dB	0.2 dB	92.8 ~ 95.0 dB
20 - 110 dB	93.90 dB	94.2 dB	0.2 dB	92.8 ~ 95.0 dB
30 - 120 dB	93.90 dB	94.2 dB	0.2 dB	92.8 ~ 95.0 dB
	113.85 dB	114.1 dB	0.2 dB	112.8 ~ 115.0 dB
40 - 130 dB	93.90 dB	94.2 dB	0.2 dB	92.8 ~ 95.0 dB
	113.85 dB	114.1 dB	0.2 dB	112.8 ~ 115.0 dB
<u>C-Weighting</u>				
20 - 100 dB	93.90 dB	94.1 dB	0.2 dB	92.8 ~ 95.0 dB
20 - 110 dB	93.90 dB	94.1 dB	0.2 dB	92.8 ~ 95.0 dB
30 - 120 dB	93.90 dB	94.2 dB	0.2 dB	92.8 ~ 95.0 dB
	113.85 dB	114.2 dB	0.2 dB	112.8 ~ 115.0 dB
40 - 130 dB	93.90 dB	94.2 dB	0.2 dB	92.8 ~ 95.0 dB
	113.85 dB	114.2 dB	0.2 dB	112.8 ~ 115.0 dB
<u>Z-Weighting</u>				
20 - 100 dB	93.90 dB	94.2 dB	0.2 dB	92.8 ~ 95.0 dB
20 - 110 dB	93.90 dB	94.1 dB	0.2 dB	92.8 ~ 95.0 dB
30 - 120 dB	93.90 dB	94.2 dB	0.2 dB	92.8 ~ 95.0 dB
	113.85 dB	114.2 dB	0.2 dB	112.8 ~ 115.0 dB
40 - 130 dB	93.90 dB	94.0 dB	0.2 dB	92.8 ~ 95.0 dB
	113.85 dB	114.2 dB	0.2 dB	112.8 ~ 115.0 dB

Notes:

- 1). Tolerances or specifications report in table above are base on the IEC61672-2013.

...End...

Request No. : 22-67 / 0353

MTC No. : PSL-P 0085 / 67

CERTIFICATE OF CALIBRATION

Nomenclature : Digital Lux Meter
Maker : TENMARS

Serial No. : 220801134
Model : TM-201L

Customer : **SAFETY PLAN CO., LTD.**

Address : 1034 Moo 3, Rangsit-Pathum Thani Rd., T.Bangpoon, A.Muang, Pathum Thani 12000

Date of receipt : 13 February 2024

Date of calibration : 22 February 2024

Place of calibration : Photometry and Temperature Standards Laboratory, MTC. (Bangpo)

Basis of calibration : calibration at 0 ~ 1200 lux.

Condition of calibration : - Ambient temperature : $(25 \pm 2) ^\circ\text{C}$
- Relative humidity : $(60 \pm 20) \%$

Reference Standard : Working Standard Luminous Intensity Lamp, Serial No.: FEL003 and 3501,
can be traceable to international system of units (SI), through calibration certificate
MTC No. PSL-P 131/66 and PSL-P 132/66, date of calibration 12 May 2023.

Traceability : This certificate is traceable to SI units through the National Institute of Metrology (Thailand).
calibration certificate No. TP-1010-23, TP-1011-23 and TP-1012-23

Support Equipment : 1. Photometric bench , 3.0 meter long
2. DC power supply, Serial No.: BC - 341006035007/2
3. Digital Multimeter , Model : R 6551 , S/N : 92041186 and 92041192

Calibration Procedure : The measurement was done in accordance with WI.CP.10.
The reported uncertainty is based on a standard uncertainty multiplied by a coverage
factor $k = 2$, providing a level of confidence of approximately 95 %.

page 1 of 2

R.P.

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

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

FM.BL.MTC.002 Rev.4

Head Office

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Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

Request No. : 22-67 / 0353

MTC No. : PSL-P 0085 / 67

Serial No. : 220801134


Results :

UUC Range (lux)	Standard (lux)	*UUC Reading Before Adj.(lux)	UUC Reading After Adj.(lux)	Uncertainty of Measurement \pm (lux)
2000	400	364	402	8.0
	600	544	601	12
	700	633	700	14
	800	724	800	16
	900	813	898	18
	1200	1083	1197	24

Note : *UUC = Unit Under Calibration.

...end of certificate...

Calibrated by :


(Ms. Rattanawadee Pholprom)

Approved by :


(Mr. Kamchai Singhapiwat)
Director

Photometry and Temperature Standards Laboratory

Ref. : 2012267021300629001

Issued date : 7 March 2024

page 2 of 2

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

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

FM.BL.MTC.002 Rev.4

Head Office

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Tel. (66) 0 2323 1672-80 ext. 115, 116
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E-mail : sumalee@tistr.or.th



Professional Calibration & Services Co., Ltd.

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Pathumthani 12130 Thailand
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Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : EL08186/24
Control Number : PCAL128276
Customer Control : -
Description : Thermometer
Manufacturer : Precision
Model : DIN 12775
Serial Number : 50948
Customer : SAFETY PLAN CO., LTD.
1034 Moo 3, Rangsit-Pathumthani Rd., T.Bangpoon,
A.Maung, Pathumthani 12000

Page 1 of 3



Date of Receipt : 20-Feb-24
Date of Calibration : 23-Feb-24
Environment : Temperature $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$
: Relative Humidity $50\text{ \%} \pm 20\text{ \%}$
Calibration Method : Calibration Procedure Number CP-EL15
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. Kantipong Vorthong

Authorized Signature


(Mr. Songpol Nakanurak)

23-Feb-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL08186/24

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Micro Bath	A63886	ANAB : AC-2590	EL13835/23	07-Apr-24
Black Stack Thermometer Readout	A62328/A62725/A6263 0	NIMT	ER0115-22	04-Oct-24
Secondary Platinum Resistance Thermometer	08041	NVLAP : Calibration 200348-0	4500028660	17-May-25

Condition as received : Normal

Definitions :-

- * ANAB - The ANSI National Accreditation Board
- * NIMT - National Institute of Metrology, Thailand
- * NVLAP - National Voluntary Laboratory Accreditation Program

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL08186/24

Page : 3 of 3

Calibration Results

Temperature Calibration

Calibration Point	UUC Indicated	Standard Value	Uncertainty (\pm)	Tolerance Limit Values
25 °C	25 °C	25.18 °C	0.14 °C	24.50 ~ 25.50 °C
35 °C	35 °C	35.22 °C	0.14 °C	34.50 ~ 35.50 °C
45 °C	45 °C	45.26 °C	0.12 °C	44.50 ~ 45.50 °C

Notes :

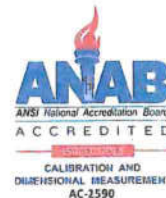
- 1). Tolerances or specifications report in table above are based on the customer specification.

...End...



Professional Calibration & Services Co., Ltd.

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Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : EL08182/24
Control Number : PCAL142978
Customer Control : -
Description : Thermometer
Manufacturer : Precision
Model : DIN 12775
Serial Number : 50945
Customer : SAFETY PLAN CO., LTD.
1034 Moo 3, Rangsit-Pathumthani Rd., T.Bangpoon,
A.Maung, Pathumthani 12000
Date of Receipt : 20-Feb-24
Date of Calibration : 23-Feb-24
Environment : Temperature $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$
: Relative Humidity $50\% \pm 20\%$
Calibration Method : Calibration Procedure Number CP-EL15
Calibration Results : See data attached

Page 1 of 3



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. Kantipong Vorthong

Authorized Signature


(Mr. Songpol Nakanurak)

26-Feb-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL08182/24

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Micro Bath	A63886	ANAB : AC-2590	EL13835/23	07-Apr-24
Black Stack Thermometer Readout	A62328/A62725/A6263 0	NIMT	ER0115-22	04-Oct-24
Secondary Platinum Resistance Thermometer	08041	NVLAP : Calibration 200348-0	4500028660	17-May-25

Condition as received : Normal

Definitions :-

- * ANAB - The ANSI National Accreditation Board
- * NIMT - National Institute of Metrology, Thailand
- * NVLAP - National Voluntary Laboratory Accreditation Program

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL08182/24

Page : 3 of 3

Calibration Results

Temperature Calibration

Calibration Point	UUC Indicated	Standard Value	Uncertainty (\pm)	Tolerance Limit Values
25 °C	25 °C	25.08 °C	0.14 °C	24.50 ~ 25.50 °C
35 °C	35 °C	35.11 °C	0.14 °C	34.50 ~ 35.50 °C
45 °C	45 °C	45.17 °C	0.12 °C	44.50 ~ 45.50 °C

Notes :

- 1). Tolerances or specifications report in table above are based on the customer specification.

...End...



Professional Calibration & Services Co., Ltd.

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Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : EL08183/24
Control Number : PCAL142977
Customer Control : -
Description : Thermometer
Manufacturer : Precision
Model : DIN 12775
Serial Number : 50923
Customer : SAFETY PLAN CO., LTD.
1034 Moo 3, Rangsit-Pathumthani Rd., T.Bangpoon,
A.Maung, Pathumthani 12000
Date of Receipt : 20-Feb-24
Date of Calibration : 23-Feb-24
Environment : Temperature $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$
Relative Humidity $50\text{ \%} \pm 20\text{ \%}$
Calibration Method : Calibration Procedure Number CP-EL15
Calibration Results : See data attached

Page 1 of 3



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. Kantipong Vorthong

Authorized Signature

(Mr. Songpol Nakamurak)

26-Feb-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL08183/24

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Micro Bath	A63886	ANAB : AC-2590	EL13835/23	07-Apr-24
Black Stack Thermometer Readout	A62328/A62725/A6263 0	NIMT	ER0115-22	04-Oct-24
Secondary Platinum Resistance Thermometer	08041	NVLAP : Calibration 200348-0	4500028660	17-May-25

Condition as received : Normal

Definitions :-

- * ANAB - The ANSI National Accreditation Board
- * NIMT - National Institute of Metrology, Thailand
- * NVLAP - National Voluntary Laboratory Accreditation Program

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL08183/24

Page : 3 of 3

Calibration Results

Temperature Calibration

Calibration Point	UUC Indicated	Standard Value	Uncertainty (\pm)	Tolerance Limit Values
25 °C	25 °C	25.02 °C	0.14 °C	24.50 ~ 25.50 °C
35 °C	35 °C	35.04 °C	0.14 °C	34.50 ~ 35.50 °C
45 °C	45 °C	45.08 °C	0.12 °C	44.50 ~ 45.50 °C

Notes :

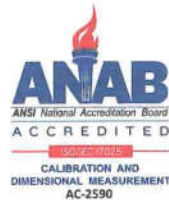
- 1). Tolerances or specifications report in table above are based on the customer specification.

...End...



Professional Calibration & Services Co., Ltd.

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Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : EL08181/24
Control Number : PCAL128278
Customer Control : -
Description : Thermometer
Manufacturer : Precision
Model : DIN 12775
Serial Number : 50935
Customer : SAFETY PLAN CO., LTD.

Page 1 of 3



1034 Moo 3, Rungsit-Pathumthani Rd., T.Bangpoon,
A.Maung, Pathumthani 12000

Date of Receipt : 20-Feb-24
Date of Calibration : 23-Feb-24
Environment : Temperature $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$
: Relative Humidity $50\% \pm 20\%$
Calibration Method : Calibration Procedure Number CP-EL15
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. Kantipong Vorthong

Authorized Signature

(Mr. Songpol Naknura)

23-Feb-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL08181/24

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Micro Bath	A63886	ANAB : AC-2590	EL13835/23	07-Apr-24
Black Stack Thermometer Readout	A62328/A62725/A6263 0	NIMT	ER0115-22	04-Oct-24
Secondary Platinum Resistance Thermometer	08041	NVLAP : Calibration 200348-0	4500028660	17-May-25

Condition as received : Normal

Definitions :-

- * ANAB - The ANSI National Accreditation Board
- * NIMT - National Institute of Metrology, Thailand
- * NVLAP - National Voluntary Laboratory Accreditation Program

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL08181/24

Page : 3 of 3

Calibration Results

Temperature Calibration

Calibration Point	UUC Indicated	Standard Value	Uncertainty (\pm)	Tolerance Limit Values
25 °C	25 °C	25.10 °C	0.14 °C	24.50 ~ 25.50 °C
35 °C	35 °C	35.14 °C	0.14 °C	34.50 ~ 35.50 °C
45 °C	45 °C	45.19 °C	0.12 °C	44.50 ~ 45.50 °C

Notes :

- 1). Tolerances or specifications report in table above are based on the customer specification.

...End...



Professional Calibration & Services Co., Ltd.

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Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : EL08184/24
Control Number : PCAL128279
Customer Control : -
Description : Thermometer
Manufacturer : Precision
Model : DIN 12775
Serial Number : 50926
Customer : SAFETY PLAN CO., LTD.
1034 Moo 3, Rangsit-Pathumthani Rd., T.Bangpoon,
A.Maung, Pathumthani 12000

Page 1 of 3



Date of Receipt : 20-Feb-24
Date of Calibration : 23-Feb-24
Environment : Temperature $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$
: Relative Humidity $50\% \pm 20\%$
Calibration Method : Calibration Procedure Number CP-EL15
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.

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Calibrated By

Mr. Kantipong Vorthong

Authorized Signature

(Mr. Songpol Naknarak)

26-Feb-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL08184/24

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Micro Bath	A63886	ANAB : AC-2590	EL13835/23	07-Apr-24
Black Stack Thermometer Readout	A62328/A62725/A6263 0	NIMT	ER0115-22	04-Oct-24
Secondary Platinum Resistance Thermometer	08041	NVLAP : Calibration 200348-0	4500028660	17-May-25

Condition as received : Normal

Definitions :-

- * ANAB - The ANSI National Accreditation Board
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CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL08184/24

Page : 3 of 3

Calibration Results

Temperature Calibration

Calibration Point	UUC Indicated	Standard Value	Uncertainty (\pm)	Tolerance Limit Values
25 °C	25 °C	25.06 °C	0.14 °C	24.50 ~ 25.50 °C
35 °C	35 °C	35.02 °C	0.14 °C	34.50 ~ 35.50 °C
45 °C	45 °C	44.95 °C	0.12 °C	44.50 ~ 45.50 °C

Notes :

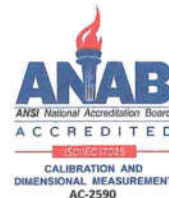
- 1). Tolerances or specifications report in table above are based on the customer specification.

...End...



Professional Calibration & Services Co., Ltd.

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



Certificate of Calibration

Certificate Number : EL08185/24
Control Number : PCAL128281
Customer Control : -
Description : Thermometer
Manufacturer : Precision
Model : DIN 12775
Serial Number : 50949
Customer : SAFETY PLAN CO., LTD.
1034 Moo 3, Rangsit-Pathumthani Rd., T.Bangpoon,
A.Maung, Pathumthani 12000

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Date of Receipt : 20-Feb-24
Date of Calibration : 23-Feb-24
Environment : Temperature $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$
: Relative Humidity $50\% \pm 20\%$
Calibration Method : Calibration Procedure Number CP-EL15
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. Kantipong Vorthong

Authorized Signature

(Mr. Songpol Naknarak)

26-Feb-24

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL08185/24

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Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Micro Bath	A63886	ANAB : AC-2590	EL13835/23	07-Apr-24
Black Stack Thermometer Readout	A62328/A62725/A6263 0	NIMT	ER0115-22	04-Oct-24
Secondary Platinum Resistance Thermometer	08041	NVLAP : Calibration 200348-0	4500028660	17-May-25

Condition as received : Normal

Definitions :-

- * ANAB - The ANSI National Accreditation Board
- * NIMT - National Institute of Metrology, Thailand
- * NVLAP - National Voluntary Laboratory Accreditation Program

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL08185/24

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Calibration Results

Temperature Calibration

Calibration Point	UUC Indicated	Standard Value	Uncertainty (\pm)	Tolerance Limit Values
25 °C	25 °C	25.08 °C	0.14 °C	24.50 ~ 25.50 °C
35 °C	35 °C	35.12 °C	0.14 °C	34.50 ~ 35.50 °C
45 °C	45 °C	45.16 °C	0.12 °C	44.50 ~ 45.50 °C

Notes :

- 1). Tolerances or specifications report in table above are based on the customer specification.

...End...