



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



Certificate of Calibration

Cert.No.: 25MM394

Page.: 1 of 3

Equipment : Electronic Balance

Manufacturer : Mettler Toledo

Model : AL204

Serial No. : 1228510730

ID No. : ANB-002

Submitted by : Environment & Laboratory Co.,Ltd.
40 Soi Liangmueangnonthaburi 13
Talad Kwan, Mueang
Nonthaburi 11000

Location : Room No. 304

Received order : 08 July 2025
Calibration Date : 08 July 2025
Ambient Temperature : 15 °C to 40 °C
Relative Humidity : 30 % to 90 %

Calibrated by :

Krisda Malee

Approved by :

Approved Signatory

- () Chakrit Waewwanjua
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date :

21 July 2025

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.



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2507-0148OC-8

Cert.No.: 25MM394

Page: 2 of 3

Procedure used :-

Calibration were conducted using in-house calibration procedure CP-OB01 based on UKAS LAB 14 according to direct measurement method against standard weight.

Condition of this result of calibration

1. Reference standard instruments:-

<u>Instruments</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due date</u>
1) Standard Weight Set (E2)	24053	MM-0013-24	NIMT	25 Jan 2026
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 measurement result is traceable to the International System of Unit maintained through :				

Remark : NIMT : National Institute of Metrology Thailand

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)	(± mg)	(k)
100	100.0016	-0.0016	0.17	2
200	200.0029	-0.0029	0.30	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



Equipment : Electronic Balance
 Condition As-Received : Used Item
 Reference : 2507-0148OC-8

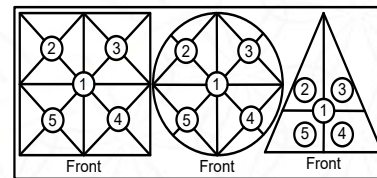
Cert.No.: 25MM394

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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	Position 2	Position 3	Position 4	Position 5	
(g)	(g)	(g)	(g)	(g)	(g)
0.0000	0.0000	-0.0001	+0.0002	+0.0003	0.0003

3. Departure from nominal value

Applied Weight	Balance Reading	Correction	Measurement Uncertainty	Coverage Factor
(g)	(g)	(g)	($\pm$ mg)	(k)
Unload	0.0000	0.0000	0.11	2.05
0.1	0.1000	0.0000	0.11	2.05
0.2	0.2000	0.0000	0.11	2.05
1	1.0001	-0.0001	0.11	2.05
5	5.0001	-0.0001	0.12	2.05
10	10.0001	-0.0001	0.12	2.05
20	20.0000	0.0000	0.12	2.04
50	50.0000	0.0000	0.14	2
100	100.0001	-0.0001	0.17	2
150	150.0001	-0.0001	0.29	2
200	199.9998	+0.0002	0.30	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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Certificate of Calibration

Cert. No.: 25TM976

Page : 1 of 3

Equipment : Incubator

Manufacturer : Songserm Intercool

Model : -

Serial No. : -

ID No. : CHI-001

Submitted by : Environment & Laboratory Co.,Ltd.
40 Soi Liangmueangnonthaburi 13
Talad Kwan, Mueang
Nonthaburi 11000

Location : Room No. 301

Received Order : 08 July 2025

Calibration Date : 08 - 09 July 2025

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

AC Line Voltage : (220 ± 22) V

Calibrated by : Krisda Malee

Approved by :

Kunchit

Approved Signatory

- () Chakrit Waewwanjua
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date : 17 July 2025

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.



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2507-0148OC-4
Procedure Used :-

Cert. No.: 25TM976
Page : 2 of 3

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 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:-

<u>Instrument</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due Date</u>
1) Data Acquisition	MY57013711	24LM115	TPA	13 Jul 2025

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

3. This measurement result is traceable to the International System of Unit maintained through :

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

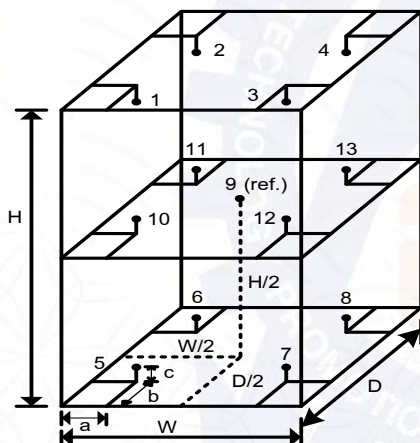
Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	26	25
REL.Humi. (%)	49	47
AC Supply (Volt)	221	220

Position :	Ref. Std. ID No.:
1	22-18RTD-2/1
2	18RTD-2/2
3	18RTD-2/3
4	18RTD-2/4
5	18RTD-2/5
6	18RTD-2/6
7	18RTD-2/7
8	18RTD-2/8
9 (ref.)	18RTD-2/9
10	21-18RTD-2/10
11	18-18RTD-01
12	24-18RTD-02
13	18-18RTD-03



Dimension of Chamber :

D = 0.60 m
W = 0.72 m
H = 1.2 m
Capacity = 0.52 m³

Probe Installation Details :

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2507-0148OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 25TM976

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	0.15	0.75	1.4	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (±°C)
	Position									
20.0	1	2	3	4	5	6	7	8	9 (ref.)	0.34
	20.029	19.954	20.637	19.540	20.031	19.854	19.849	19.958	19.959	
	10	11	12	13						
	20.269	19.859	20.139	19.774						

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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Certificate of Calibration

Cert.No.: 25CG465

Page.: 1 of 2

Equipment : Burette

Capacity : 50 mL

Serial No. : -

ID. No. : BUR-001

Manufacturer : Witeg

Made in : Germany

Submitted by : Environment & Laboratory Co.,Ltd.
40 Soi Liangmueangnonthaburi 13
Talad Kwan, Mueang, Nonthaburi 11000

Ambient Temperature : $(20 \pm 2.5) ^\circ\text{C}$

Relative Humidity : $(50 \pm 10) \%$

Barometric Pressure : 756 mmHg

Calibration Procedure : ASTM E 542 - 01

Calibrated by : Natcha Chayingcheiw

Approved by : 
Approved Signatory

(☒) Srisuda Khamtha

(☐) Ponpan Paipim

Issue Date : 6 February 2025

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Burette
Received Date : 4 February 2025
Condition As-Received : Used Item
Calibration Date : 6 February 2025
Reference : 2502-0076DC-6

Cert.No.: 25CG465

Page.: 2 of 2

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>Certificate No.</u>	<u>Traceability</u>	<u>Due date</u>
1) Balance	XP205DR	1126143764	140RC004	24MM602/1	TPA	17 Sep 2025
2) Thermo-Hygrograph	THDX-CE	00016540	140EC001	24H1153	TPA	10 June 2025
3) Thermometer	-	1594592	140EC010	24I175	TPA	20 Feb 2025

This certification is traceable to SI Unit

2. The certificate is valid only to the item calibrated on date and place of calibration.
3. True value is converted to true volume at the standard temperature of 20 °C

Calibration result :

Nominal capacity (mL)	Reading (mL)	Uncertainty (± mL)	k Factor
50	49.9874	0.010	2.00

Remark mL = cm³

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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Certificate of Calibration

Cert. No.: 25TM973

Page : 1 of 3

Equipment : Hot Air Oven
Manufacturer : FRANCE ETUVES
Model : XU058
Serial No. : P427
ID No. : CHO-003
Submitted by : Environment & Laboratory Co.,Ltd.
40 Soi Liangmueangnonthaburi 13
Talad Kwan, Mueang
Nonthaburi 11000
Location : Room No. 303
Received Order : 08 July 2025
Calibration Date : 08 July 2025
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V

Calibrated by : Krisda Malee

Approved by :

Kunchit

Approved Signatory

- () Chakrit Waewwanjua
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date : 17 July 2025

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.



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2507-0148OC-1

Cert. No.: 25TM973

Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 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	MY57013823	25LM75	TPA	06 May 2026

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

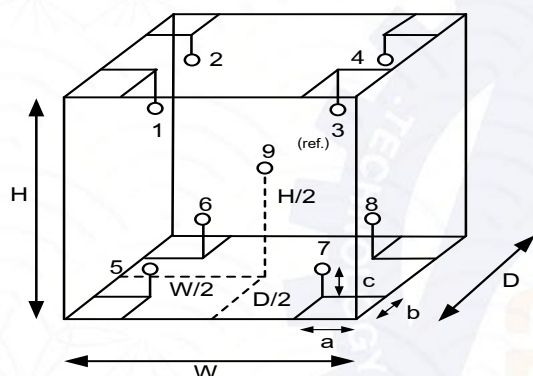
3. This measurement result is traceable to the International System of Unit maintained through :

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)	27	26
REL.Humid. (%)	45	53
AC Supply (Volt)	221	220

Ref. Std. ID No.: @ Calibration Point		
Position :	(180) °C	(104) °C
1	21-17TC-01	25-17RTD-01
2	21-17TC-02	25-17RTD-02
3	21-17TC-03	25-17RTD-03
4	21-17TC-04	25-17RTD-04
5	21-17TC-05	25-17RTD-05
6	21-17TC-06	25-17RTD-06
7	21-17TC-07	25-17RTD-07
8	21-17TC-08	25-17RTD-08
9 (ref.)	21-17TC-09	25-17RTD-09

Probe Installation Details :

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm

Dimension of Chamber :

D = 0.36 m
W = 0.40 m
H = 0.40 m
Capacity = 0.058 m³



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2507-0148OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 25TM973

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	0.11	0.84	1.1	2
180.0	180.0	180.0	0.19	0.95	1.6	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (±°C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	104.292	104.384	104.433	103.993	103.517	103.702	103.589	103.485	104.251	0.42
180.0	180.452	180.835	180.369	180.065	179.472	179.802	179.772	179.462	180.288	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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Certificate of Calibration

Cert.No.: 26CH358

Page.: 1 of 2

Equipment : pH Meter
Manufacturer : Thermo Scientific
Model : Eutech 1710
Serial No. : EA201091
ID No. : PHM-007
Condition As-Received: New Item
Received Date : 24 March 2026
Calibration Date : 26 March 2026
Reference : 2603-0807DC-1
Submitted by : Environment & Laboratory Co.,Ltd.
40 Soi Liangmueangnonthaburi 13 Talad Kwan,
Mueang, Nonthaburi 11000
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)
Calibrated by : Walalak Sirithean

Approved by : _____
Approved Signatory
() Chakrit Waewwanjua
() Ponpan Paipim
(✓) Saithip Meangmai
Issue Date : 30 March 2026

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.



Cert.No.: 26CH358

Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	54030049	130RC116	25E2743	25 Aug 2026

- This measurement result is traceable to SI through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.008	CPA chem	1187328	18 Jan 2028
pH 6.979	CPA chem	1187330	18 Jan 2027
pH 10.010	CPA chem	1150493	30 Oct 2026

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

Calibration Results

Function : mV Measurement

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

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter S/N.: EA201091	4.00	177.48	177.4	4.00	0.058	2.00
	7.00	0.00	0.0	7.00	0.058	2.00
	10.00	-177.48	-177.4	10.00	0.058	2.00

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor <i>k</i>
pH Electrode S/N.: ECFC7252201B 485	4.008	4.01	181.8	0.0079	2.00
	6.979	6.98	7.6	0.0086	2.00
	10.010	10.01	-164.9	0.0095	2.00

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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