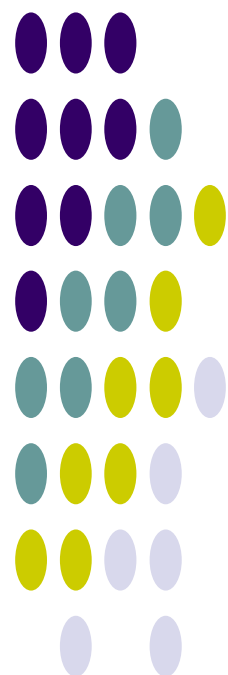


ภาคผนวกที่ 4

เอกสารสอบเทียบความถูกต้องของเครื่องมือ



ใบรับรองการสอบเทียบ “เครื่องชั่ง”

(Calibration Certificate of Electronic Balance)

Mettler-Toledo (Thailand) Ltd.

846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District

Bangna District, Bangkok 10260

+662 723 0382

MT-TH.ServiceSupport@mt.com



NSC-TISI-TIS 17025
CALIBRATION 0062

Accuracy Calibration Certificate

Customer

Company: Emex Association Co., Ltd.
Address: 27,29 Soi Rama 2, Soi 30, Rama 2 Road, Bang Mot
City: Chom Thong **Contact:** Lamai Boonsri
Zip / Postal: 10150
State / Province: Bangkok
Order Number: 
0 3 3 3 4 2 5 0 0 8

Weighing Device

Manufacturer: Mettler Toledo **Instrument Type:** Weighing Instrument
Model: XP105DR **Asset Number:** N/A
Serial No.: B138280195 **Terminal Model:** PAT/04
Building: Office **Terminal Serial No.:** B138280195
Floor: 4 **Terminal Asset No.:** N/A
Room: Laboratory 7

Range	Max. Capacity	Readability (d)
1	31 g	0.00001 g
2	120 g	0.0001 g

Procedure

Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CP/W002/20

This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.

The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.

In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature		Humidity	
As Found	Start: 23.9 °C	End: 23.7 °C	Start: 47.5 %	End: 53.4 %

As Found Calibration Date: 05-Mar-2025
As Left Calibration Date: N/A
Issue Date: 05-Mar-2025

Calibrator: 
Nithit Jongkrod

Approved Signatory: 
Technical Manager / Head of Calibration Center

Measurement Results

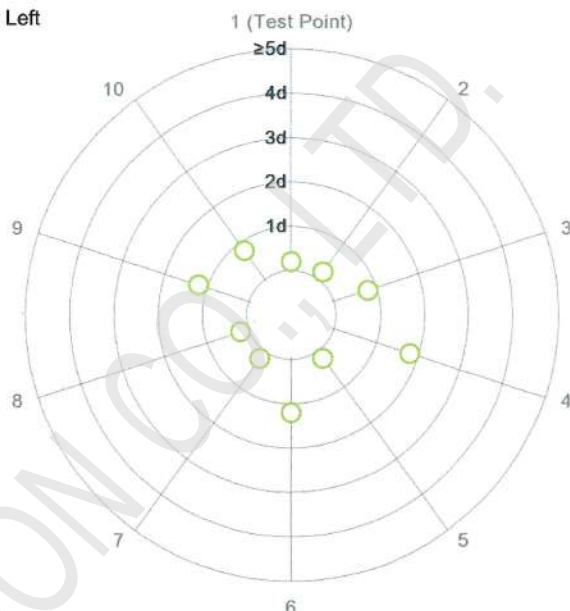
Repeatability

Test Load: 30 g

	As Found	As Left
1	29.99999 g	N/A
2	29.99999 g	N/A
3	29.99998 g	N/A
4	29.99997 g	N/A
5	29.99999 g	N/A
6	30.00000 g	N/A
7	29.99999 g	N/A
8	29.99999 g	N/A
9	30.00000 g	N/A
10	29.99998 g	N/A

Standard Deviation	0.000009 g	N/A
--------------------	------------	-----

● As Found
◆ As Left



The "d" in the graph represents the readability of the range/interval in which the test was performed.

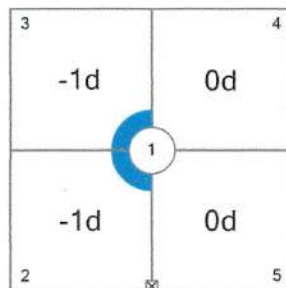
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 50 g

Position	As Found	As Left
1	50.0000 g	N/A
2	49.9999 g	N/A
3	49.9999 g	N/A
4	50.0000 g	N/A
5	50.0000 g	N/A

Maximum Deviation	0.0001 g	N/A
-------------------	----------	-----



As Found

The "d" in the graph represents the readability of the range/interval in which the test was performed.

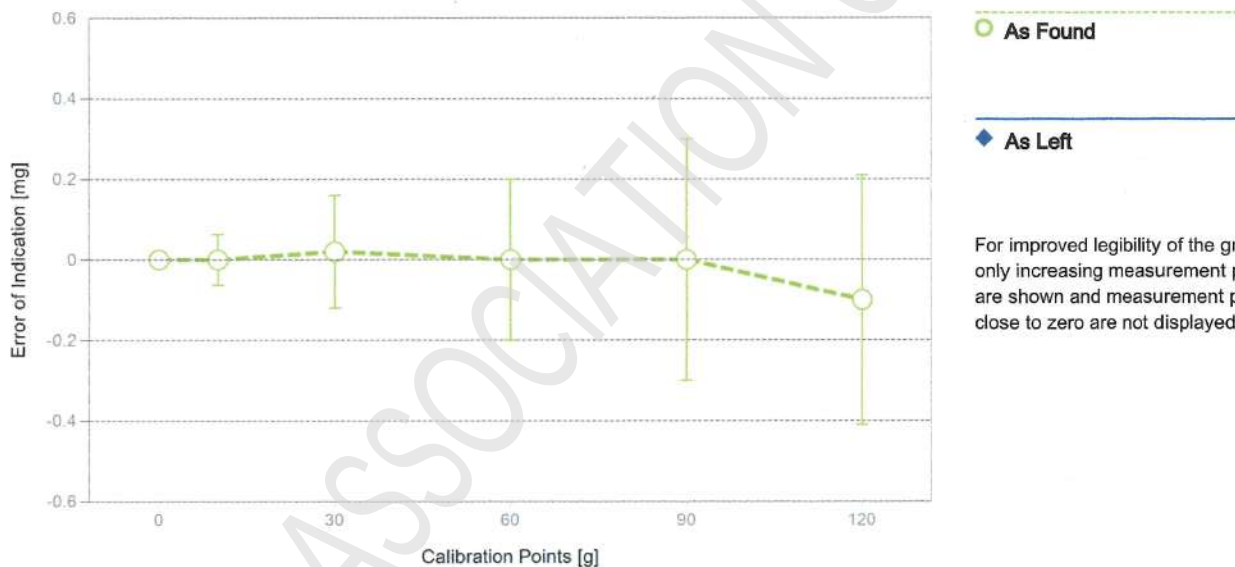
[Handwritten signature]
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Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.00000 g	0.019 mg	2
2	0.01000 g	0.01000 g	0.00000 g	0.021 mg	2
3	0.10001 g	0.10002 g	0.00001 g	0.025 mg	2
4	0.50001 g	0.50000 g	-0.00001 g	0.030 mg	2
5	1.00000 g	1.00000 g	0.00000 g	0.033 mg	2
6	5.00000 g	4.99999 g	-0.00001 g	0.049 mg	2
7	9.99998 g	9.99998 g	0.00000 g	0.063 mg	2
8	29.99997 g	29.99999 g	0.00002 g	0.14 mg	2
9 ¹	60.0000 g	60.0000 g	0.0000 g	0.20 mg	2
10	90.0000 g	90.0000 g	0.0000 g	0.30 mg	2
11 ¹	119.9999 g	119.9998 g	-0.0001 g	0.31 mg	2

¹The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



The expanded measurement uncertainty is reported as the standard measurement uncertainty multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95 %.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.
The results of this calibration certificate relate only to the calibrated item.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.:	WS52	Date of Issue:	17-Apr-2024
Certificate Number:	191753	Calibration Due Date:	15-Oct-2025

Weight Set 2: OIML E2

Weight Set No.:	WS52-1	Date of Issue:	17-May-2024
Certificate Number:	C420107128	Calibration Due Date:	17-Oct-2025

Thermo Hygrometer

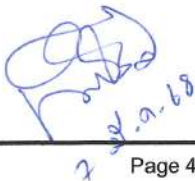
Equipment No.:	IN302	Date of Issue:	31-Oct-2024
Certificate Number:	SG-H-00908/67	Calibration Due Date:	17-Oct-2025

Remarks

FACT adjustment functionality activated
Equipment condition: Good
Next calibration according to customer's procedure
Calibration data not decide by calibration laboratory

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.



Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with $k=2$ in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $1.0 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: 3 K

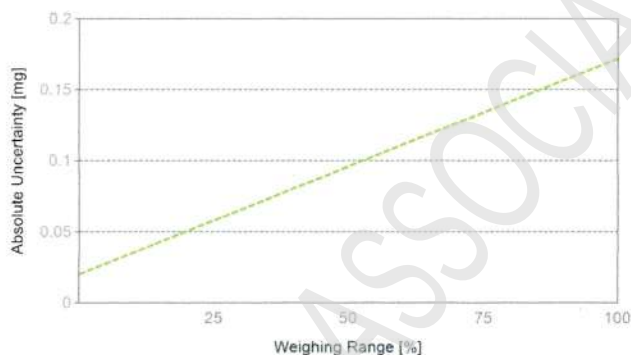
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.00001 g	31 g	$U_1 = 0.020 \text{ mg} + 0.00489 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	120 g	$U_2 = 0.18 \text{ mg} + 0.00541 \text{ mg/g} \cdot (R - 31 \text{ g})$	N/A

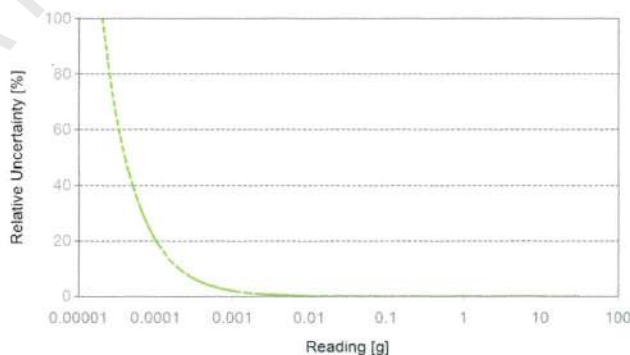
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found		As Left	
0.00120 g	0.020 mg	1.7%	N/A	N/A
0.01200 g	0.020 mg	0.17%	N/A	N/A
0.12000 g	0.021 mg	0.017%	N/A	N/A
1.20000 g	0.026 mg	0.0022%	N/A	N/A
120.0000 g	0.66 mg	0.00055%	N/A	N/A



As Found



As Left

The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.

GWP® Certificate



**As
Found**



**As
Left**



The weighing device meets the given process requirements.

The weighing device meets the given process requirements.

Tests Performed:



As Found



As Left



No adjustments/modifications made. As Left results correspond to As Found.

Process Requirements

Weighing Tolerance: 1%

Smallest Net Weight: 0.01500 g

Safety Factor: 2

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.

Minimum Weight

As Found Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.020210 g	0.040619 g	0.061231 g	0.103076 g	0.211455 g
0.2%	0.010080 g	0.020210 g	0.030389 g	0.050900 g	0.103076 g
0.5%	0.004026 g	0.008060 g	0.012102 g	0.020210 g	0.040619 g
1%	0.002012 g	0.004026 g	0.006042 g	0.010080 g	0.020210 g
2%	0.001006 g	0.002012 g	0.003019 g	0.005034 g	0.010080 g
5%	0.000402 g	0.000805 g	0.001207 g	0.002012 g	0.004026 g



Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.020210 g	0.040619 g	0.061231 g	0.103076 g	0.211455 g
0.2%	0.010080 g	0.020210 g	0.030389 g	0.050900 g	0.103076 g
0.5%	0.004026 g	0.008060 g	0.012102 g	0.020210 g	0.040619 g
1%	0.002012 g	0.004026 g	0.006042 g	0.010080 g	0.020210 g
2%	0.001006 g	0.002012 g	0.003019 g	0.005034 g	0.010080 g
5%	0.000402 g	0.000805 g	0.001207 g	0.002012 g	0.004026 g



Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with $k = 2$ and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

Measurement Results

Results Summary

	Repeatability	Eccentricity	Error of Indication
As Found	✓	✓	✓
As Left	✓	✓	✓

✓ = Passed

✗ = Failed

⚠ = Safety Factor not met

Repeatability

Test Load: 30 g

Tolerance	Control Limit	As Found		As Left	
		Std. Deviation	Result	Std. Deviation	Result
0.1%	0.000008 g	0.000009 g	✗	0.000009 g	✗
0.2%	0.000015 g		✓		⚠
0.5%	0.000038 g		✓		✓
1%	0.000075 g		✓		✓
2%	0.000150 g		✓		✓
5%	0.000375 g		✓		✓

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 50 g

Tolerance	Control Limit	As Found		As Left	
		Deviation	Result	Deviation	Result
0.1%	0.0250 g	0.0001 g	✓	0.0001 g	✓
0.2%	0.0500 g		✓		✓
0.5%	0.1250 g		✓		✓
1%	0.2500 g		✓		✓
2%	0.5000 g		✓		✓
5%	1.2500 g		✓		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

Error of Indication

As Found

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A
9.99998 g	0.00000 g	0.00500 g	0.01000 g	0.02500 g	0.05000 g	0.10000 g	0.25000 g
29.99997 g	0.00002 g	0.01500 g	0.03000 g	0.07500 g	0.15000 g	0.30000 g	0.75000 g
60.0000 g	0.0000 g	0.0300 g	0.0600 g	0.1500 g	0.3000 g	0.6000 g	1.5000 g
90.0000 g	0.0000 g	0.0450 g	0.0900 g	0.2250 g	0.4500 g	0.9000 g	2.2500 g
119.9999 g	-0.0001 g	0.0600 g	0.1200 g	0.3000 g	0.6000 g	1.2000 g	3.0000 g
Result		✓	✓	✓	✓	✓	✓

As Left

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A
9.99998 g	0.00000 g	0.00500 g	0.01000 g	0.02500 g	0.05000 g	0.10000 g	0.25000 g
29.99997 g	0.00002 g	0.01500 g	0.03000 g	0.07500 g	0.15000 g	0.30000 g	0.75000 g
60.0000 g	0.0000 g	0.0300 g	0.0600 g	0.1500 g	0.3000 g	0.6000 g	1.5000 g
90.0000 g	0.0000 g	0.0450 g	0.0900 g	0.2250 g	0.4500 g	0.9000 g	2.2500 g
119.9999 g	-0.0001 g	0.0600 g	0.1200 g	0.3000 g	0.6000 g	1.2000 g	3.0000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

ใบรับรองการสอบเทียบ “เครื่อง pH Meter”

(Calibration Certificate of pH Meter)



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.: 25CHO510

Page.: 1 of 2

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : SevenCompact
Serial No. : B535358167
ID No. : 0403-0102-16
Condition As-Received: Used Item
Received Date : 22 September 2025
Calibration Date : 23 September 2025
Reference : 2509-0701ON-9
Submitted by : Emex Association Co.,Ltd.
27, 29 Soi Rama II, Soi 30,
Bangmod, Jomthong, Bangkok 10150
Calibration Place : LABORATORY 7
Ambient Temperature : (24.8 to 24.9) °C (On-Site)
Relative Humidity : (50.5 to 50.3) % (On-Site)
Calibration Procedure : In - house method :
- CP-OCH2 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)
Calibrated by : Krisda Malee
Saithip
Approved by : _____
Approved Signatory
() Chakrit Waewwanjua
() Ponpan Paipim
(✓) Saithip Meangmai
Issue Date : 2 October 2025

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.

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Cert.No.: 25CHO510

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	43160066	130RC092	25E1217	17 Apr 2026
2) Digital Thermometer	-	130RC017	25T625	23 Apr 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 4.007	CPA chem	1114384	12 Jun 2027
pH 6.965	CPA chem	1066667	18 Jan 2026
pH 10.010	CPA chem	1114385	08 Jun 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.: B535358167	4.000	177.48	177.3	4.000	0.058	2.00
	7.000	0.00	0.0	7.000	0.058	2.00
	10.000	-177.48	-177.4	10.000	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.: 2087140	4.007	4.008	178.5	0.0045	2.00
	6.965	6.963	4.4	0.0092	2.00
	10.010	10.006	-171.1	0.011	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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ใบรับรองการสอบเทียบ “เครื่อง Hot Air Oven”

(Calibration Certificate of Hot Air Oven)



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.: 25TM1351

Page : 1 of 3

Equipment : Hot Air Oven
Manufacturer : Memmert
Model : UFB 500
Serial No. : G509.0594
ID No. : 0407-0102-09
Submitted by : Emax Association Co.,Ltd.
27 , 29 Soi Rama II, Soi 30,
Bangmod, Jomthong,
Bangkok 10150
Location : LABORATORY 8
Received Order : 22 September 2025
Calibration Date : 22 - 23 September 2025
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V

Calibrated by : Tawatchai Pama

Kunchit

Approved by :

Approved Signatory

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

Issue Date : 29 September 2025

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.

Lo 01.9.68



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2509-0701ON-3

Cert. No.: 25TM1351

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.

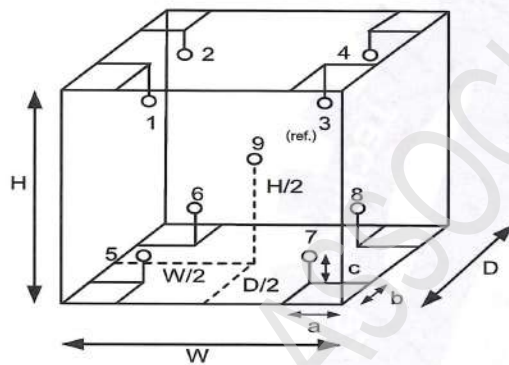
3. This measurement result is traceable to the International System of Unit maintained through :

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)	30	28
REL.Humid. (%)	26	38
AC Supply (Volt)	211	212

Ref. Std. ID No.: @ Calibration Point		
Position :	(104) °C	(150 , 180) °C
1	25-17RTD-01	21-17TC-01
2	25-17RTD-02	21-17TC-02
3	25-17RTD-03	21-17TC-03
4	25-17RTD-04	21-17TC-04
5	25-17RTD-05	21-17TC-05
6	25-17RTD-06	21-17TC-06
7	25-17RTD-07	21-17TC-07
8	25-17RTD-08	21-17TC-08
9 (ref.)	25-17RTD-09	21-17TC-09

Probe Installation Details :

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

Dimension of Chamber :

D = 0.40 m
W = 0.56 m
H = 0.48 m
Capacity = 0.11 m³

Handwritten signature and date: 20 M. A. 68



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2509-0701ON-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 25TM1351

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	104.5	104.5	0.035	0.38	0.64	2
150.0	150.0	150.0	0.16	1.1	1.9	2
180.0	180.5	180.5	0.19	1.7	2.7	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	104.134	104.039	103.941	103.973	104.422	103.998	104.390	103.850	104.208	0.42
150.0	150.107	149.669	149.105	149.309	150.351	149.624	150.773	149.260	149.807	1.1
180.0	180.162	180.097	179.363	179.558	180.885	180.065	181.757	179.600	180.251	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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ใบรับรองการสอบเทียบ “เครื่อง Incubator”
(Calibration Certificate of Incubator)



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.: 25TM1353

Page : 1 of 3

Equipment : Incubator
Manufacturer : Accuplus
Model : i250
Serial No. : i250402-0609-0265
ID No. : 0410-0101-09
Submitted by : Emex Association Co.,Ltd.
27, 29 Soi Rama II, Soi 30,
Bangmod, Jomthong,
Bangkok 10150
Location : LABORATORY 9
Received Order : 22 September 2025
Calibration Date : 22 September 2025
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V

Calibrated by :

Krisda Malee

Kunchit

Approved by :

Approved Signatory

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

Issue Date :

03 October 2025

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.

Kunchit
20.09.25



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2509-0701ON-5

Cert. No.: 25TM1353

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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).

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	MY49023932	25LM121	TPA	27 Jul 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 :

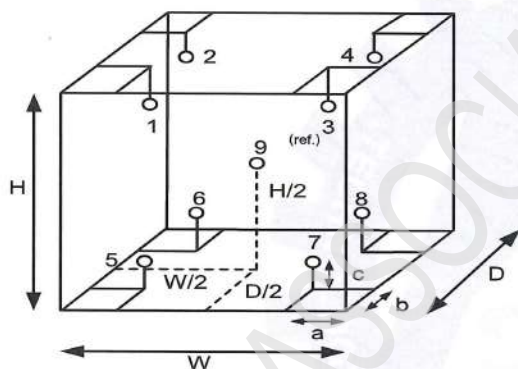
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	25	24
REL.Humid. (%)	51	53
AC Supply (Volt)	221	220



Position :	Ref. Std. ID No.:
1	20-16RTD-01
2	20-16RTD-02
3	20-16RTD-03
4	20-16RTD-04
5	22-16RTD-05
6	20-16RTD-06
7	20-16RTD-07
8	22-16RTD-08
9 (ref.)	22-16RTD-09

Probe Installation Details :

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

Dimension of Chamber :

D = 0.49 m
W = 0.48 m
H = 1.2 m
Capacity = 0.28 m³

Signature
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Equipment : Incubator
Condition As-Received : Used Item
Reference : 2509-0701ON-5
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 25TM1353

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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	19.5	19.4	0.49	0.28	1.0	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	19.887	19.925	19.898	19.990	19.961	20.011	19.890	19.825	19.895	0.69

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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ใบรับรองการสอบเทียบ “เครื่อง Water Bath”
(Calibration Certificate of Water Bath)



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.: 25TM1109

Page : 1 of 3

Equipment : Water Bath
Manufacturer : M-LAB
Model : WBN 30
Serial No. : 0138
ID No. : 0408-0101-09
Submitted by : Emax Association Co.,Ltd.
27 , 29 Soi Rama II, Soi 30,
Bangmod, Jomthong,
Bangkok 10150
Location : LABORATORY 8
Received Order : 22 September 2025
Calibration Date : 22 September 2025
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V

Calibrated by : Tawatchai Pama

Kunchit

Approved by :

Approved Signatory

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

Issue Date : 29 September 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.

Kunchit
29.9.25



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2509-0701ON-1

Cert. No.: 25TM1109
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Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT04 Based on ASTM E715 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	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 :

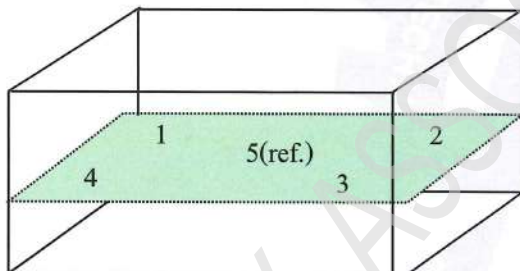
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	30	26	211
Finished of Calibration	30	24	210



Front

Position :	Ref. Std. S/N.:
1	4804539-006
2	4804539-007
3	4804539-008
4	4804539-009
5(ref.)	4804539-010


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Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2509-0701ON-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 25TM1109

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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	84.971	84.964	84.988	84.951	84.991	0.22

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor <i>k</i>
85.0	0.20	0.13	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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