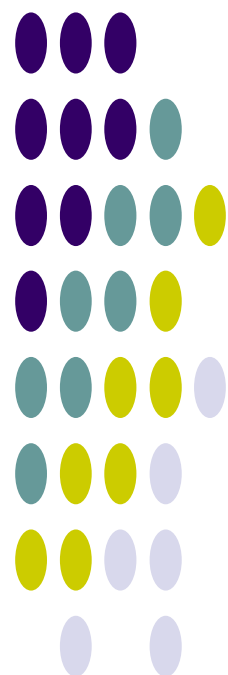


## ภาคผนวกที่ 4

เอกสารสอบเทียบความถูกต้องของเครื่องมือ



ใบรับรองการสอบเทียบ “เครื่องชั่ง”


(Calibration Certificate of Electronic Balance)

Mettler-Toledo (Thailand) Limited  
846/4 - 846/5 Lasalle Road  
Bangna Tai, Bangna, Bangkok 10260  
THAILAND  
www.mt.com



## 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 2 9 7 8 6 2 7

### Weighing Device

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

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: 24.9 °C	End: 24.5 °C	Start: 47.3 %	End: 53.8 %

As Found Calibration Date: 01-Feb-2024 Calibrator: Surachai P.  
As Left Calibration Date: N/A  
Issue Date: 02-Feb-2024  
Approved Signatory: Surachai Pidkanpai

Technical Manager / Head of Calibration Center

## Measurement Results

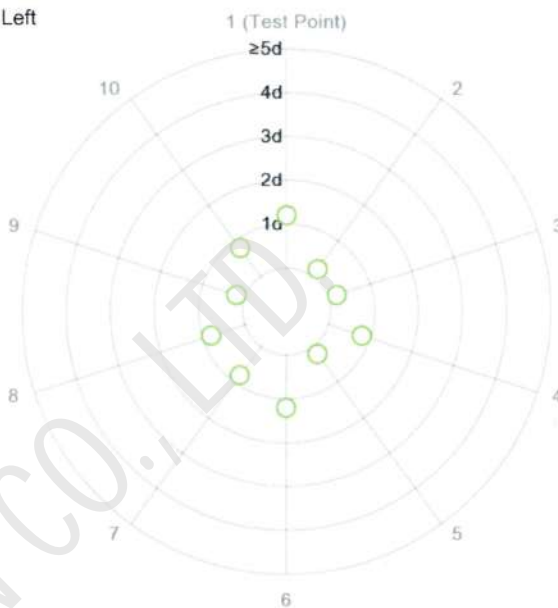
### Repeatability

Test Load: 30 g

	As Found	As Left
1	30.00005 g	N/A
2	30.00006 g	N/A
3	30.00006 g	N/A
4	30.00007 g	N/A
5	30.00006 g	N/A
6	30.00005 g	N/A
7	30.00007 g	N/A
8	30.00007 g	N/A
9	30.00006 g	N/A
10	30.00007 g	N/A

Standard Deviation	0.000008 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.

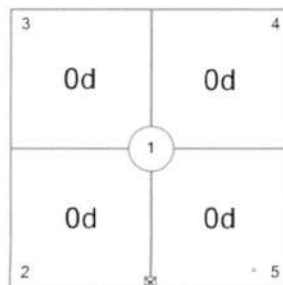
The results of this graph are based upon the absolute values of the differences from the mean value.

### Eccentricity

Test Load: 50 g

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

Maximum Deviation	0.0000 g	N/A
-------------------	----------	-----



As Found

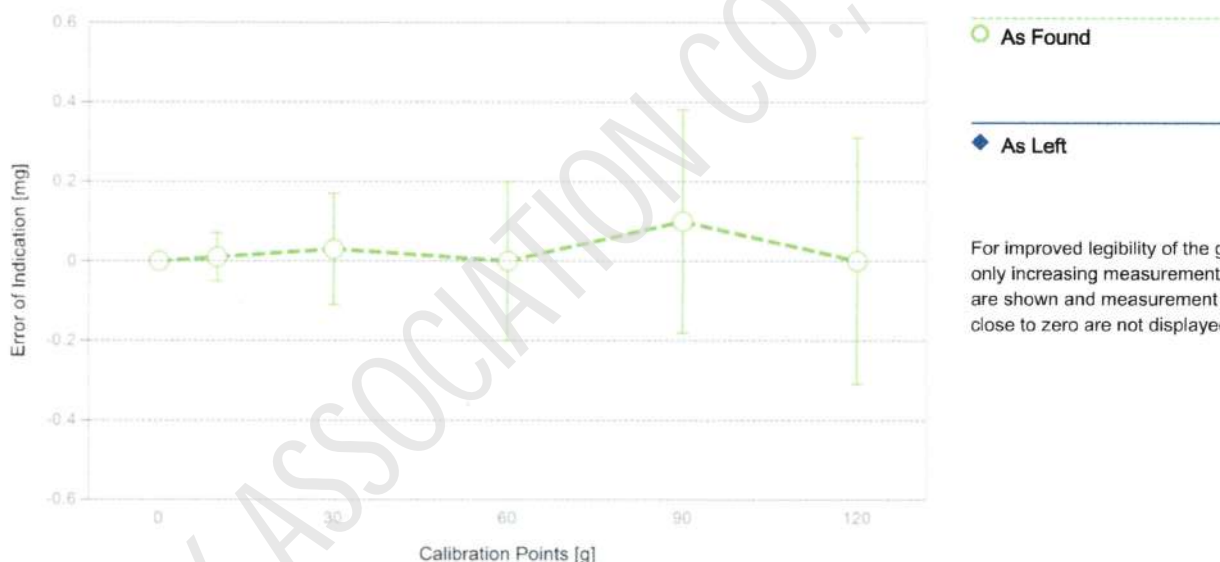
The "d" in the graph represents the readability of the range/interval in which the test was performed.

## Error of Indication

### As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.00000 g	0.017 mg	2
2	0.01000 g	0.01000 g	0.00000 g	0.019 mg	2
3	0.10000 g	0.10000 g	0.00000 g	0.023 mg	2
4	0.50000 g	0.50000 g	0.00000 g	0.028 mg	2
5	1.00001 g	1.00001 g	0.00000 g	0.032 mg	2
6	5.00001 g	5.00001 g	0.00000 g	0.048 mg	2
7	10.00001 g	10.00002 g	0.00001 g	0.061 mg	2
8	30.00003 g	30.00006 g	0.00003 g	0.14 mg	2
9 <sup>1</sup>	60.0000 g	60.0000 g	0.0000 g	0.20 mg	2
10	90.0000 g	90.0001 g	0.0001 g	0.28 mg	2
11 <sup>1</sup>	120.0001 g	120.0001 g	0.0000 g	0.31 mg	2

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



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor  $k$  – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of 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.:	WS93	Date of Issue:	27-Jul-2023
Certificate Number:	C321203759-1	Calibration Due Date:	24-Nov-2024

Thermo Hygrometer

Equipment No.:	IN305	Date of Issue:	11-Oct-2023
Certificate Number:	SG-H-00655/66	Calibration Due Date:	08-Oct-2024

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.

  
S. N. N. 67



## 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

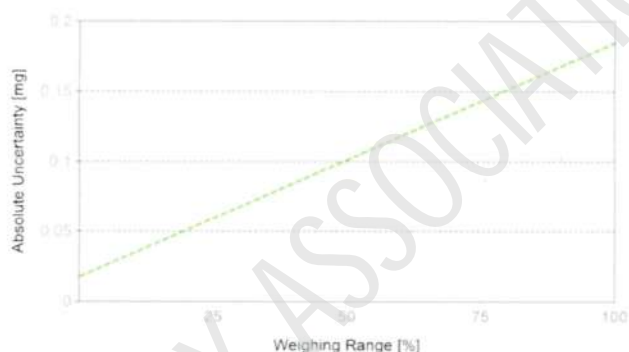
### Linearization of Uncertainty Equation

Range			As Found	As Left
	d	Max		
1	0.00001 g	31 g	$U_1 = 0.018 \text{ mg} + 0.00539 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	120 g	$U_2 = 0.19 \text{ mg} + 0.00584 \text{ mg/g} \cdot (R - 31 \text{ g})$	N/A

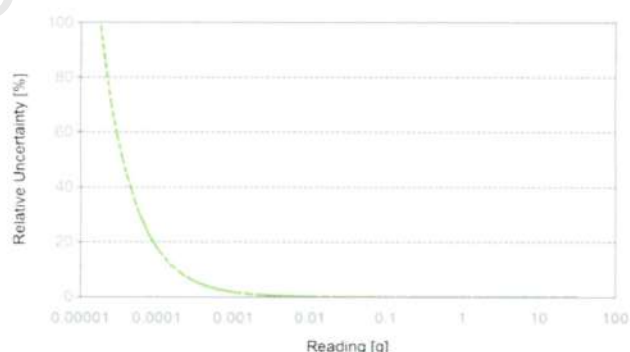
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

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

Net Indication	As Found		As Left	
0.00120 g	0.018 mg	1.5%	N/A	N/A
0.01200 g	0.018 mg	0.15%	N/A	N/A
0.12000 g	0.019 mg	0.016%	N/A	N/A
1.20000 g	0.024 mg	0.0020%	N/A	N/A
120.0000 g	0.71 mg	0.00059%	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.

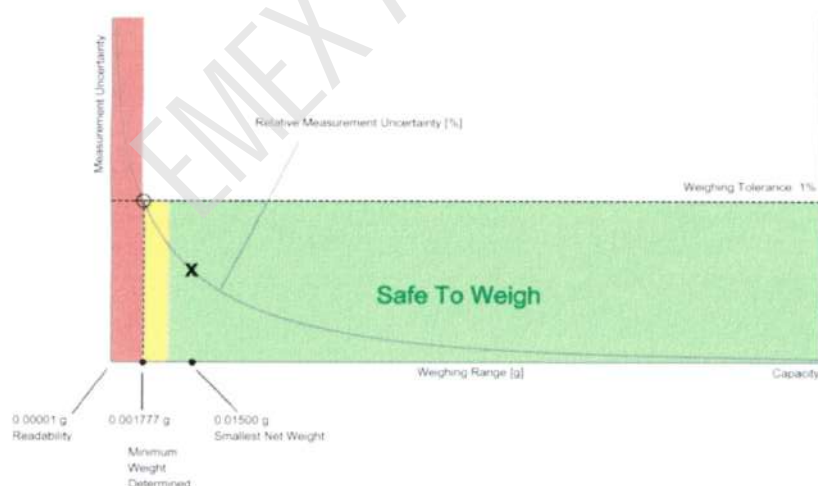
## Process Requirements

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%	0.017860 g	0.035915 g	0.054167 g	0.091277 g	0.187750 g
0.2%	0.008906 g	0.017860 g	0.026863 g	0.045016 g	0.091277 g
0.5%	0.003557 g	0.007121 g	0.010693 g	0.017860 g	0.035915 g
1%	0.001777 g	0.003557 g	0.005338 g	0.008906 g	0.017860 g
2%	0.000888 g	0.001777 g	0.002667 g	0.004447 g	0.008906 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 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%	0.017860 g	0.035915 g	0.054167 g	0.091277 g	0.187750 g
0.2%	0.008906 g	0.017860 g	0.026863 g	0.045016 g	0.091277 g
0.5%	0.003557 g	0.007121 g	0.010693 g	0.017860 g	0.035915 g
1%	0.001777 g	0.003557 g	0.005338 g	0.008906 g	0.017860 g
2%	0.000888 g	0.001777 g	0.002667 g	0.004447 g	0.008906 g
5%	0.000355 g	0.000711 g	0.001066 g	0.001777 g	0.003557 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.

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N.W. 67

# 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	0.000008 g	✗	0.000008 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	0.0000 g	✓	0.0000 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
10.00001 g	0.00001 g	0.00500 g	0.01000 g	0.02500 g	0.05000 g	0.10000 g	0.25000 g
30.00003 g	0.00003 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	0.0001 g	0.0450 g	0.0900 g	0.2250 g	0.4500 g	0.9000 g	2.2500 g
120.0001 g	0.0000 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
10.00001 g	0.00001 g	0.00500 g	0.01000 g	0.02500 g	0.05000 g	0.10000 g	0.25000 g
30.00003 g	0.00003 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	0.0001 g	0.0450 g	0.0900 g	0.2250 g	0.4500 g	0.9000 g	2.2500 g
120.0001 g	0.0000 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.

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N.W. 67

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.: 24CHO518

Page.: 1 of 3

**Equipment :** pH Meter  
**Manufacturer :** Mettler Toledo  
**Model :** SevenCompact  
**Serial No. :** B535358167  
**ID No. :** 0403-0102-16  
**Condition As-Received:** Used Item  
**Received Date :** 07 October 2024  
**Calibration Date :** 07 October 2024  
**Reference :** 2410-0089ON-9  
**Submitted by :** Emex Association Co.,Ltd.  
27,29 Soi Rama II, Soi 30, Bangmod  
Jomthong, Bangkok 10150  
**Calibration Place :** LABORATORY 7  
**Ambient Temperature :** ( 25.0 to 25.1 ) °C (On-Site)  
**Relative Humidity :** ( 52 to 57 ) % (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 :** Uthen Kankawi  
  
**Approved by :**   
Approved Signatory  
( ) Unnopphol Harachai  
( ) Ponpan Paipim  
(✓) Saithip Meangmai  
**Issue Date :** 10 October 2024

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.

  
22 M. O. 67





Cert.No.: 24CHO518

Page.: 2 of 3

**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	58440003	130RC120	23E3607	13 Nov 2024
2) Digital Thermometer	-	130RC017	24T707	21 Apr 2025

- This Certification 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

:The measurement results are traceable to SI through Hach Lenge GmbH Ltd.,  
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.008	CPA chem	1034203	27 Sep 2026
pH 6.999	Hach Lenge GmbH	C03145	28 Feb 2026
pH 10.010	CPA chem	1034205	27 Sep 2025

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

**Calibration Results**

**Function : pH Measurement**

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

<u>Unit Under Calibration</u>	<u>Standard pH Buffer Solution</u>	<u>Actual pH Reading</u>	<u>Actual mV Reading (mV)</u>	<u>Uncertainty of pH Measurement (±)</u>	<u>Coverage factor k</u>
pH Electrode S/N.: 2087140	4.008	3.995	177.5	0.0052	2.05
	6.999	7.004	1.2	0.0092	2.00
	10.010	10.006	-174.6	0.014	2.09

  
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Cert.No.: 24CHO518

Page.: 3 of 3

**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 ( $\pm$ mV)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter S/N.: B535358167	0.000	414.12	413.9	0.000	0.058	2.00
	1.000	354.96	354.7	1.000	0.058	2.00
	2.000	295.80	295.6	2.000	0.058	2.00
	3.000	236.64	236.5	3.000	0.058	2.00
	4.000	177.48	177.3	4.000	0.058	2.00
	5.000	118.32	118.2	5.000	0.058	2.00
	6.000	59.16	59.1	6.000	0.058	2.00
	7.000	0.00	-0.1	7.000	0.058	2.00
	8.000	-59.16	-59.2	8.000	0.058	2.00
	9.000	-118.32	-118.3	9.000	0.058	2.00
	10.000	-177.48	-177.5	10.000	0.058	2.00
	11.000	-236.64	-236.6	11.000	0.058	2.00
	12.000	-295.80	-295.8	12.001	0.058	2.00
	13.000	-354.96	-354.9	13.001	0.058	2.00
	14.000	-414.12	-414.0	14.001	0.058	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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22 M.A. 62

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.: 24TM1390

Page : 1 of 3

**Equipment :** Hot Air Oven

**Manufacturer :** Memmert

**Model :** UFB 500

**Serial No. :** G509.0594

**ID No. :** 0407-0102-09

**Submitted by :** Emex Association Co.,Ltd.  
27,29 Soi Rama II, Soi 30,  
Bangmod, Jomthong,  
Bangkok 10150

**Location :** LABORATORY 8

**Received Order :** 07 October 2024

**Calibration Date :** 07 - 08 October 2024

**Ambient Temperature :** (  $26 \pm 10$  ) °C

**Relative Humidity :** (  $50 \pm 30$  ) %

**AC Line Voltage :** (  $220 \pm 22$  ) V

**Calibrated by :** Kunchit Promprat

**Approved by :**

Approved Signatory

- ( ) Unnophol Harachai  
( ) Ponpan Paipim  
(✓) Suwit Imjai

**Issue Date :** 17 October 2024

**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.

  
22 M. A. 62





Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2410-0089ON-3

Cert. No.: 24TM1390

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:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1 ) Data Acquisition	MY57013823	24LM71	TPA	12 May 2025

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.

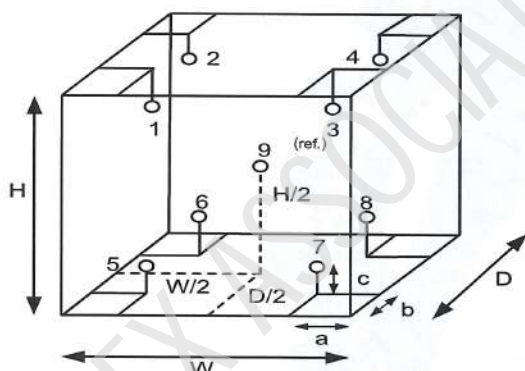
**Remark :** TPA : Technology Promotion Association ( Thailand - Japan )

**Result of Calibration :-** ( \* ) Before Adjustment

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Close

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	29	29
REL.Humid. ( % )	42	45
AC Supply ( Volt )	215	215



Ref. Std. ID No.: @ Calibration Point		
Position :	( 104 ) °C	( 150, 180 ) °C
1	21-17RTD-01	19-17TC-20
2	21-17RTD-02	23-17TC-12
3	17RTD-03	19-17TC-13
4	24-17RTD-04	19-17TC-14
5	23-17RTD-10	19-17TC-15
6	17RTD-06	19-17TC-16
7	17RTD-07	19-17TC-17
8	23-17RTD-08	19-17TC-18
9 (ref.)	23-17RTD-09	19-17TC-19

**Probe Installation Details : Dimension of Chamber :**

a = 5.0 cm	D = 0.40 m
b = 5.0 cm	W = 0.56 m
c = 5.0 cm	H = 0.48 m
	Capacity = 0.11 m <sup>3</sup>

*Handwritten signature and date:*  
22 M.9.62





Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2410-0089ON-3  
Result of Calibration :- ( \* ) Before Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 24TM1390

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	0.036	0.33	0.67	2
150.0	150.0	150.0	0.11	0.80	1.5	2
180.0	180.0	180.0	0.14	1.2	2.2	2

Calibration Point ( °C )	Measured Temperature ( °C )									Uncertainty  ( ± °C )
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	104.410	104.039	103.903	103.858	104.181	103.960	104.475	104.094	104.164	0.42
150.0	149.877	149.705	149.490	149.267	149.965	149.833	150.650	150.041	150.018	1.1
180.0	180.006	179.697	179.400	179.141	180.196	180.032	181.121	180.240	180.238	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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22 M. 9. 62

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.: 24TM1388

Page : 1 of 3

Equipment : Water Bath  
Manufacturer : M-LAB  
Model : WBN 30  
Serial No. : 0138  
ID No. : 0408-0101-09  
Submitted by : Emex Association Co.,Ltd.  
27,29 Soi Rama II, Soi 30,  
Bangmod, Jomthong,  
Bangkok 10150  
Location : LABORATORY 8  
Received Order : 07 October 2024  
Calibration Date : 07 October 2024  
Ambient Temperature : ( 26 ± 10 ) °C  
Relative Humidity : ( 50 ± 30 ) %

Calibrated by : Suwit Imjai

Approved by :

Kunchit

Approved Signatory

( ) Unnophol Harachai

( ) Ponpan Paipim

(✓) Kunchit Promprat

Issue Date :

13 October 2024

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.

22 M.O. 67





**Equipment :** Water Bath  
**Condition As-Received :** Used Item  
**Reference :** 2410-0089ON-1

**Cert. No.:** 24TM1388

**Page :** 2 of 3

**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	23LM71	TPA	12 May 2025

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.

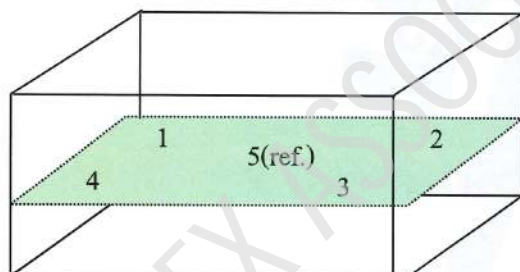
**Remark :** TPA : Technology Promotion Association ( Thailand - Japan )

**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

**Heat transfer medium used :** Water

	<u>Environmental</u>		<u>AC Voltage Supply</u>
	( °C )	( %R.H. )	( Volt )
<b>Beginning of Calibration</b>	29	35	215
<b>Finished of Calibration</b>	29	34	216



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

Front

  
22 May 2024



Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2410-0089ON-1  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source

Cert. No.: 24TM1388  
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	84.857	84.909	84.973	84.914	84.946	0.15

Calibration point ( °C )	Uniformity ( °C )	Stability ( ± °C )	Coverage Factor <i>k</i>
85.0	0.14	0.047	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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22 M.O. 67



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.: 24TM1061

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 : 07 October 2024  
Calibration Date : 09 October 2024  
Ambient Temperature : ( 26 ± 10 ) °C  
Relative Humidity : ( 50 ± 30 ) %  
AC Line Voltage : ( 220 ± 22 ) V

Calibrated by : Kunchit Promprat

Approved by :

Approved Signatory

- ( ) Unnopphol Harachai  
( ) Ponpan Paipim  
(✓) Suwit Imjai

Issue Date : 17 October 2024

**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.

  
22 M.O.B.



**Equipment :** Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2410-0089ON-5

**Cert. No.:** 24TM1061

**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 ).

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	24LM71	TPA	12 May 2025

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.

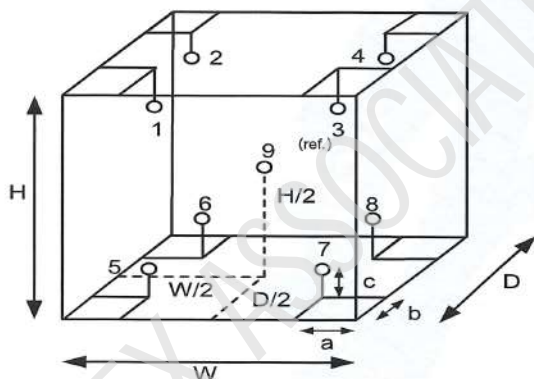
**Remark :** TPA : Technology Promotion Association ( Thailand - Japan )

**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Not Available

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	24	24
REL.Humid. ( % )	52	47
AC Supply ( Volt )	215	215



Position :	Ref. Std. ID No.:
1	21-17RTD-01
2	21-17RTD-02
3	17RTD-03
4	24-17RTD-04
5	23-17RTD-10
6	17RTD-06
7	17RTD-07
8	23-17RTD-08
9 (ref.)	23-17RTD-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 m<sup>3</sup>

*[Signature]*  
22 May 67





**Equipment :** Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2410-0089ON-5  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source  
**Fresh air setting :** Not Available

**Cert. No.:** 24TM1061

**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	19.5	19.5	0.42	0.26	0.91	2

Calibration Point ( °C )	Measured Temperature ( °C )									Uncertainty  ( ±°C )
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.059	20.012	19.955	20.008	20.013	20.063	19.968	19.885	19.993	0.59

**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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22 M. 0.62