

ภาคผนวกที่ 5
เอกสารสอบเทียบเครื่องมือตรวจวัด

ภาคผนวกที่ 5-1
เอกสารสอบเทียบเครื่องมือตรวจวัดคุณภาพอากาศ

CERTIFICATE OF CALIBRATION

Certificate No. : COF-016-69

Page 1 of 2 Pages

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

RECEIVED DATE : 23 Apr 2026
MEASUREMENT DATE : 08 May 2026
ISSUE DATE : 08 May 2026

Calibration procedure:

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

Traceability:

This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: MW-0005-26.

Uncertainty of Measurement:

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

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

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

CALIBRATION CONDITION:

Preconditioning : 24 hours at ambient conditions.
Measurement Condition : The average values during measurement are 23.6 °C and 48.5 %RH.

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

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

- ☐ Mr. Sorawit Thachalad
☒ Miss Jittraporn Lertsomphol



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

MEASUREMENT RESULTS:

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

Table 1: The results of Q Standard calibration data

Plate	Flow rate m^3/min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Δp_{meter} mmHg	$\Delta p_{Orifice}$ inH ₂ O	γ	Standard Flow [Q_s] m^3/min
1	0.704	757.012	23.43	22.38	50.466	1.715	1.311	0.660
2	1.003	757.047	23.41	22.53	64.191	3.348	1.831	0.922
3	1.120	757.035	23.49	22.83	43.710	4.437	2.108	1.059
4	1.170	757.041	23.48	22.89	32.530	4.993	2.236	1.123
5	1.416	757.025	23.47	22.91	29.618	7.447	2.731	1.365

Slope (m): 2.01326
 Intercept (b): -0.02225
 Correlation coefficient (r): 0.99984
 Uncertainty ($k=2$): 0.015 m^3/min

Table 2: The results of Q actual calibration data

Plate	Flow rate m^3/min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Δp_{meter} mmHg	$\Delta p_{Orifice}$ inH ₂ O	γ	Standard Flow [Q_a] m^3/min
1	0.704	757.012	23.43	22.38	50.466	1.715	0.820	0.659
2	1.003	757.047	23.41	22.53	64.191	3.348	1.145	0.920
3	1.120	757.035	23.49	22.83	43.710	4.437	1.319	1.058
4	1.170	757.041	23.48	22.89	32.530	4.993	1.399	1.122
5	1.416	757.025	23.47	22.91	29.618	7.447	1.708	1.364

Slope (m): 1.26099
 Intercept (b): -0.01392
 Correlation coefficient (r): 0.99984
 Uncertainty ($k=2$): 0.015 m^3/min

End of Certificate of Calibration

CAL

Calibratech Co.,Ltd.

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

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



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-200468-1

Page : 1 of 2

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

Equipment : Electronic Balance
Manufacturer : SHIMADZU Model : AP225WD
Serial No. : D316301828 ID No. : LAB-BL-003
Capacity : 220000 mg
Resolution : 0.01mg/102000mg, 0.1mg/220000mg

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co.,Ltd.
Ambient Temperature : (27.3 to 27.4) °C
Relative Humidity : (53.6 to 53.7) %
Air Pressure : 1003.0 mbar

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 25 July 2025

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	C02242009	07 Nov 2025	National Institute of Metrology (Thailand), (NIMT)

Approved by :


(Satja Sangkhum)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-200468-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

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

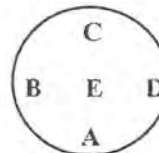
This result of calibration was found accurate as shown on date and place of calibration only.

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

Eccentric error

Load test : 50000 mg

A	B	C	D	E	
0.01	0.01	0.02	0.02	0.00	mg



Repeatability

Load test : 200000 mg

Stdev. : 0.053 mg

- o0o -



ห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์ **Blue Consultant Limited Partnership**

188/98 ซอยพุทธบูชา 36 แขวงบางมด เขตทุ่งครุ กรุงเทพฯ 10140

โทร.0-2873-6045-6 โทรสาร 0-2873-6046

ห้องปฏิบัติการวิเคราะห์เอกซเรย์อนุญาตลงวันที่ 22 สิงหาคม 2566

CALIBRATION REPORT

Equipment: SO₂ Analyzer
Serial No.: 2712, 43C-67199-356

Brand/Model: Teledyne-API/T100, Thermo/43C
Date of Calibrate: April 16, 2026

Reference Standard

Certification Date: October 29, 2019

Component: SO₂: 55.62 ppm, NO: 57.21 ppm, CO: 4,551 ppm

Cylinder No.: EB0128767

Expiry Date: October 29, 2027

Calibration Check (Before Adjust)

Serial No.	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)
2712	0.3	0	0.3	397.2	400	-2.8
43C-67199-356	0.2	0	0.2	401.0	400	1.0

Calibration Check (After Adjust)

Serial No.	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)
2712	0	0	0	400	400	0
43C-67199-356	0	0	0	400	400	0

ในนามห้องปฏิบัติการห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์

(นางสาวนิตดา อนันต์สุวรรณชัย)

ผู้จัดการห้องปฏิบัติการ

ห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์ **Blue Consultant Limited Partnership**

188/98 ซอยพุทธบูชา 36 แขวงบางมด เขตทุ่งครุ กรุงเทพฯ 10140

โทร.0-2873-6045-6 โทรสาร 0-2873-6046

ห้องปฏิบัติการวิเคราะห์เอกซเรย์ไอออนธาตุลงวันที่ 22 สิงหาคม 2566

CALIBRATION REPORT

Equipment: NOx Analyzer

Serial No.: 3205, 17C-68152-359

Brand/Model: Teledyne-API/T200, Thermo/42C

Date of Calibrate: April 16, 2026

Reference Standard

Certification Date: October 29, 2019

Component: SO2: 55.62 ppm, NO: 57.21 ppm, CO: 4,551 ppm

Cylinder No.: EB0128767

Expiry Date: October 29, 2027

Calibration Check (Before Adjust)						
Serial No.	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)
3205	3.1/1.4/4.5	0/0/0	3.1/1.4/4.5	397.3/3.4/400.7	400/0/400	-2.7/3.4/0.7
17C-68152-359	4.5/2.0/6.5	0/0/0	4.5/2.0/6.5	402.3/3.8/406.1	400/0/400	2.3/3.8/6.1
Calibration Check (After Adjust)						
Serial No.	Zero			Span		
	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)	Reading Value (ppb)	Expected Value (ppb)	Drift (ppb)
3205	0	0	0	400	400	0
17C-68152-359	0	0	0	400	400	0

ในนามห้องปฏิบัติการห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์

.....

(นางสาวนิดา อนันต์สุวรรณชัย)

ผู้จัดการห้องปฏิบัติการ

ห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์ **Blue Consultant Limited Partnership**

32/751 ถนนประชาอุทิศ แขวงทุ่งครุ เขตทุ่งครุ กรุงเทพฯ 10140

โทร.0-2873-6045-6 โทรสาร 0-2873-6046

ห้องปฏิบัติการวิเคราะห์เอกซเรย์ไอออนบวกลงวันที่ 22 สิงหาคม 2566

CALIBRATION REPORT

Equipment: CO Analyzer
Serial No.: 3445

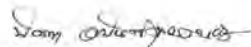
Brand/Model: Teledyne-API/T300
Date of Calibrate: February 17, 2026

Reference Standard
Certification Date: October 29, 2019
Component: SO2: 55.62 ppm, NO: 57.21 ppm, CO: 4,551 ppm

Cylinder No.: EB0128767
Expiry Date: October 29, 2027

Calibration Check (Before Adjust)						
Serial No.	Zero			Span		
	Reading Value (ppm)	Expected Value (ppm)	Drift (ppm)	Reading Value (ppm)	Expected Value (ppm)	Drift (ppm)
3445	0.1	0	0.1	40.3	40	0.3
Calibration Check (After Adjust)						
Serial No.	Zero			Span		
	Reading Value (ppm)	Expected Value (ppm)	Drift (ppm)	Reading Value (ppm)	Expected Value (ppm)	Drift (ppm)
3445	0	0	0	40	40	0

ในนามห้องปฏิบัติการห้างหุ้นส่วนจำกัด บลู คอนซัลแตนท์



(นางสาวนิตดา อนันต์สุวรรณชัย)

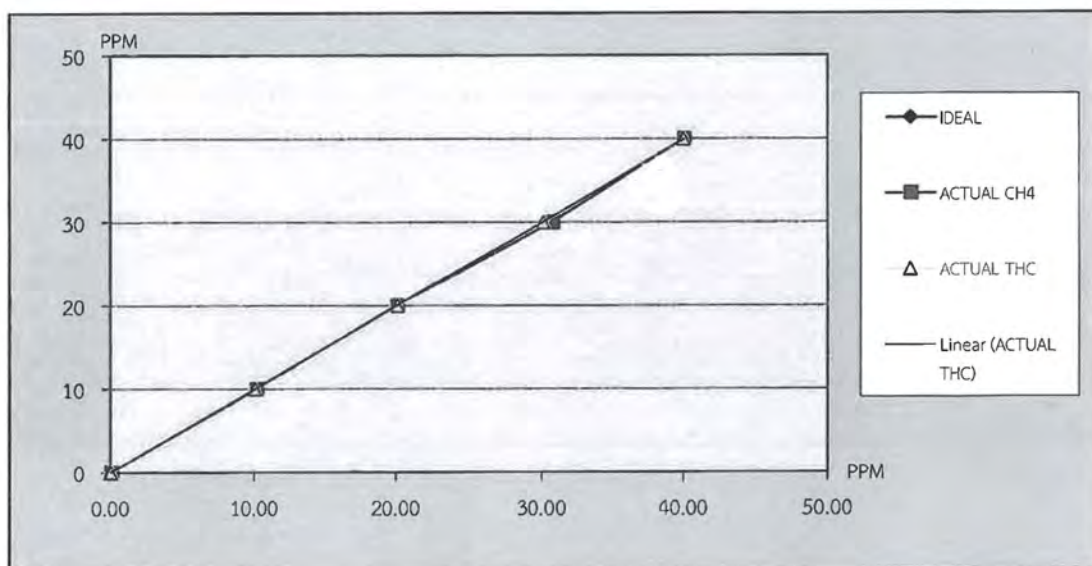
ผู้จัดการห้องปฏิบัติการ

TEST REPORT

CUSTOMER NAME	: Pacific Laboratory Co., Ltd.						
EQUIPMENT NAME	: THC Analyzer						
MANUFACTURER	: HORIBA	MODEL	: APHA-370	SERIAL NO	: 3TEBP31U		
STANDARD GAS CONCENTRATION (PPM) (CH ₄)	: 506.1 PPM			CYLINDER NO	: CC734373		
CYLINDER PRESSURE (psig)	: 1,600 PSI			CERTIFIED DATE	: 12/05/2020		
CERTIFIED BY	: AIRGAS			EXPIRED DATE	: 12/05/2028		

TEST RESULTS

POINT NO	TEST RESULTS						
	IDEAL	ACTUAL CH ₄	ERROR CH ₄	%ERROR CH ₄	ACTUAL THC	ERROR THC	%ERROR THC
ZERO	0.00	0.00	0.00	-	0.00	0.00	-
1	10.00	10.09	0.09	0.90	10.01	0.01	0.10
2	20.00	20.04	0.04	0.20	20.09	0.09	0.45
3	30.00	30.66	0.66	2.20	30.07	0.07	0.23
4	40.00	39.99	-0.01	-0.02	40.00	0.00	0.00
AVERAGE (%)				0.82			0.20



CALIBRATED BY :

อ.จิรพงศ์

DATE :

3/7/68

CHECKED BY :

ส.ศ. วัฒนา

JIRANATEE ASSOCIATES CO., LTD.

DATE :

3/7/68

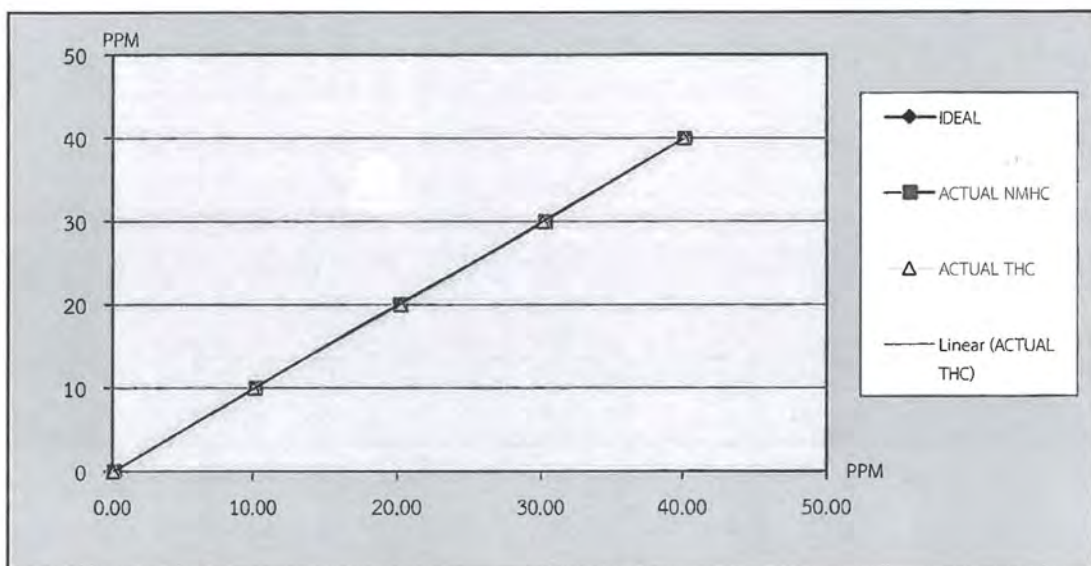
ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 15,16 , E-Mail : Engineer@jiranatee.com
เลขที่ 63/14-15,67/35-36 ถนนเพชรเกษม 7,7/1 แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-8680812-13 โทรสาร 02-868-1889

TEST REPORT

CUSTOMER NAME	: Pacific Laboratory Co., Ltd.						
EQUIPMENT NAME	: THC Analyzer						
MANUFACTURER	: HORIBA	MODEL	: APHA-370	SERIAL NO	: 3TEBP31U		
STANDARD GAS CONCENTRATION (PPM) (Propane)	200 PPM			CYLINDER NO	: D621701		
CYLINDER PRESSURE (psig)	: 1,900 PSI			CERTIFIED DATE	: 27/06/2018		
CERTIFIED BY	: Linde			EXPIRED DATE	: 27/06/2026		

TEST RESULTS

POINT NO	TEST RESULTS						
	IDEAL	ACTUAL NMHC	ERROR NMHC	%ERROR NMHC	ACTUAL THC	ERROR THC	%ERROR THC
ZERO	0.00	0.00	0.00	-	0.01	0.01	-
1	10.00	10.09	0.09	0.90	10.00	0.00	0.00
2	20.00	20.10	0.10	0.50	20.20	0.20	1.00
3	30.00	30.20	0.20	0.67	30.10	0.10	0.33
4	40.00	40.02	0.02	0.05	40.03	0.03	0.08
AVERAGE (%)				0.53			0.35



CALIBRATED BY :

ผู้จัดทำ

DATE :

3/7/68

CHECKED BY :

ผู้ตรวจ

DATE :

3/7/68

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 15,16 , E-Mail : Engineer@jiranatee.com
เลขที่ 63/14-15,67/35-36 ถนนเพชรเกษม 7,7/1 แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-8680812-13 โทรสาร 02-868-1889

CHECK LIST

CUSTOMER NAME	: Pacific Laboratory Co., Ltd.		
EQUIPMENT NAME	: THC Analyzer		
MANUFACTURER	: HORIBA	MODEL : APHA-370	SERIAL NO. : 3TEBP31U

TEST VALUES				
NO.	THC Analyzer (APHA - 370)	UNIT	BEFORE	AFTER
1	Signal (CH4)	mV	41.20	25.20
2	Signal (THC)	mV	52.80	30.70
3	Detector	Temp °C , Standard Value : Ambient temp+(5°Cto15°C)	36.70	42.90
		Pressure kPa , Standard Value : (Ambient/1013x100-20)±4kPa	81.20	80.90
4	Ambient	kPa current atmospheric pressure	101.10	100.70
5	Purifire	°C , Standard Value : 390 °C to 430 °C	271.10	419.70
		kPa , Normal value : 8 kPa to 25 kPa	9.60	9.60
6	NMHC	°C , Standard Value : 230 °C to 260 °C	117.90	234.70
7	DC 24 V	V , Standard Value : 24 V ± 0.5 V	23.90	23.90
8	DC 5 V	V , Standard Value : 5 V ± 0.5 V	5.00	5.00
9	Bypass (Optional)	L/min, Normal value : 0.9 L/min ± 0.3 L/min	-	-
10	Over Flow (Optional)	L/min, Standard Value : 0.8 L/min or More	-	-
11	CH4 Sampling Reading	PPM	3.55	2.28
12	NMHC Sampling Reading	PPM	0.39	0.39
13	THC Sampling Reading	PPM	3.99	2.67
14	Zero Gas CH4/THC	PPM	0.01/-0.02	0.00/0.00
15	Span Gas	PPM	39.82/36.12	39.99/40.00
G	Gas H2/.....	20 PSI	20	20

Remark : Reference EX-EN-017-56 , Ambient HC Monitor APHA-370 Operation Manual Page #81

Remark : (Ambient temperature = 5°C to 40°C)

อาการที่ตรวจพบ

- Service Maintenance.

รายละเอียดการดำเนินการ

- ทำ Calibration Zero/Span , Multipoint

ผลการดำเนินการ

- เรียบร้อย เครื่องสามารถดำเนินการตรวจวัดได้ตามปกติ

CALIBRATED BY : *อ.จิรพงศ์*

CHECKED BY : *ส.อ.อ. งาม*



DATE : *3/7/68*

DATE : *3/7/68*

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 15-16 , E-Mail : Engineer@jiranatee.com

เลขที่ 63/14-15,67/35-36 ซอยเพชรเกษม 7,7/1 ถนนเพชรเกษม แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02-868-1889

ภาคผนวกที่ 5-2
เอกสารสอบเทียบเครื่องมือตรวจวัดวิเคราะห์คุณภาพน้ำ

Certificate of Calibration

Certificate No. : 68-420062-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A pH

Resolution : 0.01 pH

Serial No. : 2841305

ID No. : LAB-PH-002

Electrode

Model : N/A

Serial No. : 3172493

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

Ambient Temperature : (23.5 to 25.0)° C

Relative Humidity : (50 to 55) %

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

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

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

1. Multiproduct Calibrator

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

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.007	61314276	1081108	28 Feb 2027	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.965	61318175	1081110	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61325043	1081109	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :



(Permpon Chanpu)

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. : 68-420062-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

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

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.007	4.01	0.00	0.0097
	6.965	7.00	-0.03	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 68-420062-2

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A pH

Resolution : 0.01 pH

Serial No. : 2841305

ID No. : LAB-PH-002

Electrode

Model : N/A

Serial No. : 3052953

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

Ambient Temperature : (23.5 to 25.0)° C

Relative Humidity : (50 to 55) %

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

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

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

1. Multiproduct Calibrator

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

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.007	61314276	1081108	28 Feb 2027	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.965	61318175	1081110	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61325043	1081109	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :



(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-420062-2

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

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

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.007	4.01	0.00	0.0097
	6.965	7.00	-0.03	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 68-400421-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : Temperature Indicator with Thermistor Probe

Temperature Indicator

Manufacturer : Eutech

Model : pH 700

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 2841305

ID No. : LAB-PH-002

Thermistor probe

Model : N/A

Sheath Material : Stainless

Diameter : 3 mm.

Length : 115 mm.

Serial No. : PHSTEMB01P 049

ID No. : LAB-PH-002

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

Ambient Temperature : (23.5 to 25.0) °C

Relative Humidity : (50 to 55) %

Line Voltage : (220.0 to 221.0) VAC

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

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

The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400016	TT-1019-25	13 May 2027	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400033	24E633	21 Feb 2026	National Institute of Metrology Thailand (NIMT)

Approved by :



(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 68-400421-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
115	25.002	24.9	0.1	0.19

Remark

UUC : Unit Under Calibration

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

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

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NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-200468-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co.,Ltd.

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

Equipment : Electronic Balance

Manufacturer : SHIMADZU

Model : AP225WD

Serial No. : D316301828

ID No. : LAB-BL-003

Capacity : 220000 mg

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

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

Ambient Temperature : (27.3 to 27.4) °C

Relative Humidity : (53.6 to 53.7) %

Air Pressure : 1003.0 mbar

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 25 July 2025

Calibrated by : Akaradath Thippichai

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

Edition 7 - November 2022

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

Standard Weights

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
E261-E2624	C02242009	07 Nov 2025	National Institute of Metrology (Thailand), (NIMT)

Approved by :


(Satja Sangkhum)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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

Certificate of Calibration

Certificate No. : 68-200468-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

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

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

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

Eccentric error

Load test : 50000 mg

A	B	C	D	E	
0.01	0.01	0.02	0.02	0.00	mg



Repeatability

Load test : 200000 mg

Stdev. : 0.053 mg

A handwritten signature in black ink.

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



Certificate of Calibration

Certificate No. : 68-400420-3

Page : 1 of 2

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

Equipment : Temperature controlled enclosure (Incubator)
Manufacturer : Aqua Lytic **Model :** TC 135S
Range : N/A °C **Resolution :** 0.1 °C
Serial No. : 0614/000033 **ID No. :** LAB-IB-001

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd.
Ambient Temperature : (23.0 to 24.5) °C
Relative Humidity : (40 to 45) %
Line Voltage : (220.0 to 222.0) V

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20
The temperature scale used was based on ITS-90

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

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400029 & 400048	68-400063-1	01 Aug 2025	National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400420-3

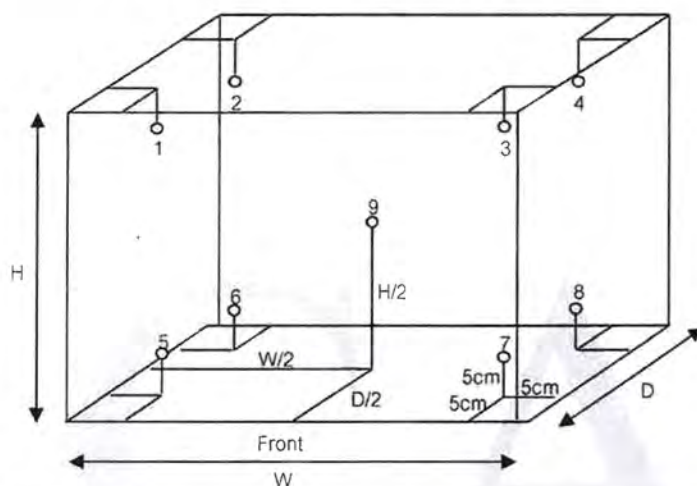
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.51 m

D = 0.04 m

H = 0.70 m

Capacity = 0.02 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
20.0	20.5	20.5	20.10	19.94	19.99	19.96	19.92	19.90	20.02	19.99	19.87	0.69

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.5	20.5	0.43	0.36	0.78

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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CAL

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



NSG-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-400420-2

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : Water Bath

Manufacturer : Memmert

Model : WNB 22

Range : N/A °C

Resolution : 0.1 °C

Serial No. : L514.0184

ID No. : LAB-WB-001

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

Ambient Temperature : (31.0 to 31.8) °C

Relative Humidity : (50 to 55) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

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

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400029 & 400031	68-400214-1	25 Oct 2025	National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

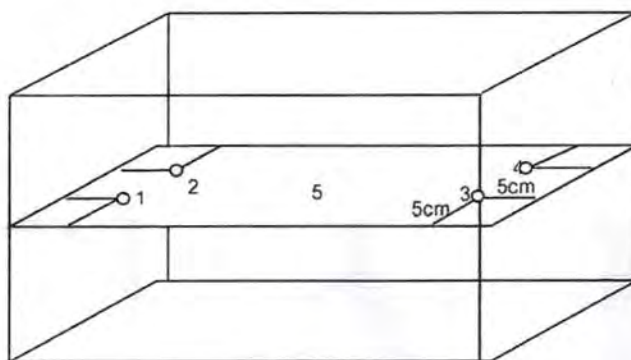
Certificate No. : 68-400420-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Temperature (° C) @ Sensor No.					Uncertainty (± " C)	Measured Uniformity (" C)	Measured Stability (° C)
			1	2	3	4	5			
65.0	65.0	65.0	64.62	64.64	64.64	64.63	64.63	0.18	0.05	0.03
95.0	95.0	95.0	94.60	94.61	94.63	94.68	94.58	0.18	0.17	0.05

Remark The uncertainty is not combine uniformity of the water bath

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

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

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CAL

Calibratech Co.,Ltd.

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

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



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-400420-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : Temperature controlled enclosure (Oven)

Manufacturer : Memmert

Model : UN 55

Range : N/A °C

Resolution : 0.1 °C

Serial No. : B214.1879

ID No. : LAB-OV-001

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

Ambient Temperature : (31.0 to 31.8) °C

Relative Humidity : (50 to 55) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

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

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400029 & 400032	68-400217-1	28 Oct 2025	National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400420-1

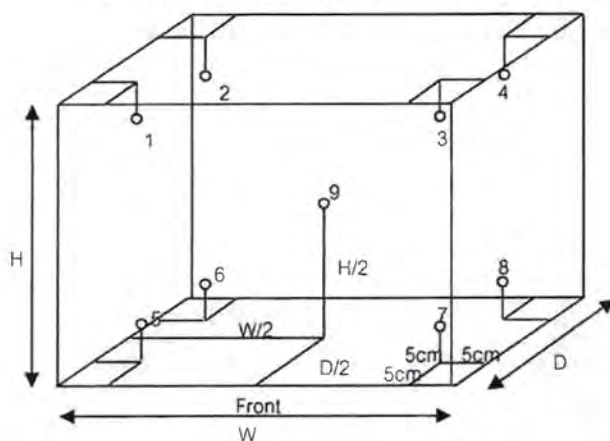
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.40 m

Capacity = 0.05 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
104.0	107.0	107.0	105.1	105.1	104.9	104.9	102.9	104.4	103.5	104.4	104.5	0.87
180.0	184.0	184.0	181.2	180.9	180.7	180.9	177.2	177.1	178.5	179.8	180.3	1.4

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	107.0	107.0	1.8	0.3	2.6
180.0	184.0	184.0	3.6	0.6	4.6

Remark The uncertainty is not combine uniformity of the air chamber

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

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

- o0o -



Calibration Certificate

Certificate No.: 2502229-006-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: BINDER
Model: KB 400
Serial No.: 20200000015535
ID No.: UAE.MIC.018/2564
Order No.: 2502229
Operation No.: 2502229-006
Date of Receipt: 19 March 2025
Date of Calibration: 19 March 2025

Calibrated by Mr.Jerawut Prapawuttipong **Approved by** 
 Scientist (Mr.Pheraphat Tuanjit) (for)
Date of Issue: 25 March 2025 **Manager, Division of Calibration Laboratory**
Responsible for the Technical Management Team

The uncertainties are for a confidence probability of approximately 95 %.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme 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. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65



รายละเอียดเพิ่มเติม
 กรุณาติดต่อ ศูนย์บริการ

List Certificate of Laboratory Instrument

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
Laboratory Instrument for Water Quality Analysis									
1	Incubator	TOTAL Coliform Bacteria	BINDER	KB400 / 20200000015535	National Food Institute, Ministry of Industry, Thailand	2502229-006-01	19 Mar 25	19 Mar 26	-
2	Incubator	Escherichia coli	BINDER	KB 75 / 01178300	National Food Institute, Ministry of Industry, Thailand	2502229-006-01	19 Mar 25	19 Mar 26	-
3	Incubator	Staphylococcus Aureus	BINDER	KB 75 / 01178300	National Food Institute, Ministry of Industry, Thailand	2502229-006-01	19 Mar 25	19 Mar 26	-
4	Incubator	Shigella flexneri	BINDER	KB 75 / 01178300	National Food Institute, Ministry of Industry, Thailand	2502229-006-01	19 Mar 25	19 Mar 26	-
5	Water Bath	Water Bath	BINDER	KB 400 / 01178300	Technology Promotion Association (Thailand) Ltd.	2576501	19 Mar 25	19 Mar 26	-
6	Water Bath	Water Bath	BINDER	KB 400 / 01178300	Technology Promotion Association (Thailand) Ltd.	2576502	19 Mar 25	19 Mar 26	-
7	Analytical Balance	Analytical Balance	OHAUS	PN6021 / 123675470	National Food Institute, Ministry of Industry, Thailand	2502229-006-01	19 Mar 25	19 Mar 26	-
8	Auto Clave	Auto Clave	ALP	CL-400 / 00000000000000000000	National Food Institute, Ministry of Industry, Thailand	2502229-006-01	19 Mar 25	19 Mar 26	-

Due Date of Calibration: Based on the annual calibration plan. At least 1 time per year.

เอกสารไม่ควบคุม

Page 1/1

บริษัท (ผู้รับ) ขอสงวนสิทธิ์ในข้อมูลทั้งหมด
 ที่ปรากฏในเอกสารนี้ (ฉบับนี้)

เอกสารไม่ควบคุม

Calibration Report

Certificate No.: Z502229-006-01
Equipment: CHAMBER (Incubator)
Model: KB 400 Serial No.: 20200000015535
Resolution: 0.1 °C ID No.: UAE.MIC.018/2564
Manufacturer: BINDER
Date of Calibration: 19 March 2025

Page 2 of 3

Location: LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (18 ± 1) °C
Relative Humidity (50 ± 5) %
Line Voltage (223 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 13 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A RTD	MY49016851 CH#201-303 / RTD#201-303	TE 670477-01	4 May 2025	NATIONAL FOOD INSTITUTE

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good

UUC Description :

Time of Record 1 Hour 9 Minute At 35.0 °C
Fresh air Damper - Open Position -
X Close Fan -
- Not Available

- Result of Calibration : ☒ Without adjustment ☐ After adjustment

P. Jongsakulkit
25 March 2025



Calibration Report

Certificate No.: Z502229-006-01
Equipment: CHAMBER (Incubator)
Model: KB 400 Serial No.: 20200000015535
Resolution: 0.1 °C ID No.: UAE.MIC.018/2564
Manufacturer: BINDER
Date of Calibration: 19 March 2025

Page 3 of 3

Calibration point: 35.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	17.1	45	220.0
MAX	18.1	55	225.0

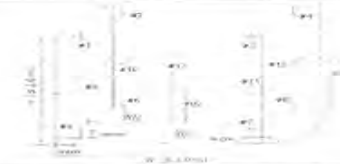


Table 1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.13 is REF)													Uncertainty ± (°C)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	# 10	# 11	# 12	# 13	
35.0	34.98	35.17	34.99	34.92	35.16	35.01	35.00	35.13	35.00	34.96	35.02	35.17	35.04	0.27

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Temperature Stability ± (°C)	Temperature Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
35.0	35.0	35.0	35.0	0.029	0.15	0.30

Note: The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

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.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

----- End -----

P. Jongsakulkit
25 March 2025





Calibration Report

Certificate No.: 2502229-005-01
Equipment: CHAMBER (Incubator)
Model: IN75 Serial No.: D317.0307
Resolution: 0.1 °C ID No.: UAE.MIC.023/2561
Manufacturer: MEMMERT
Date of Calibration: 19 March 2025 Page 2 of 3

Location: 302, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (20.9 ± 1) °C
Relative Humidity (59 ± 1) %
Line Voltage (223 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY57003188	TE 670486-01	8 June 2025	NATIONAL FOOD INSTITUTE
	RTD	CH#101-109/ RTD#101-109			

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good

UUC Description :

Time of Record 1 Hour 9 Minute At 41.0 °C

Fresh air Damper ☒ Open Position ☐
☒ Close Fan ☐
☐ Not Available

- Result of Calibration : ☒ Without adjustment ☐ After adjustment

P. Janyachait
25 March 2025

F-CS-012 Revision: 01 Date: 20-04-65

2008 ต.บางนาจตุรัส 35 หมู่ 5 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10710
2008 Soi 35, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700 Thailand
Tel : +66(0) 2-222 8688 Fax : +66(0) 2-222 8545



Calibration Report

Certificate No.: 2502229-005-01
Equipment: CHAMBER (Incubator)
Model: IN75 Serial No.: D317.0307
Resolution: 0.1 °C ID No.: UAE.MIC.023/2561
Manufacturer: MEMMERT
Date of Calibration: 19 March 2025 Page 3 of 3

Calibration point: 41.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	20.6	58	220.0
MAX	21.2	60	225.0

Table1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ± (°C)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
41.0	41.78	41.48	41.56	41.50	41.11	41.05	40.87	41.00	41.06	0.34

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
41.0	41.0	41.0	41.0	0.12	0.72	1.1

Note: The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

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.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

----- End -----

F-CS-012 Revision: 01 Date: 20-04-65

2008 ต.บางนาจตุรัส 35 หมู่ 5 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10710
2008 Soi 35, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700 Thailand
Tel : +66(0) 2-222 8688 Fax : +66(0) 2-222 8545



Calibration Certificate

Certificate No.: 2502229-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: MEMMERT
Model: IPP 260
Serial No.: V615.0187
ID No.: UAE.MIC.003/2559
Order No.: 2502229
Operation No.: 2502229-001
Date of Receipt: 19 March 2025
Date of Calibration: 19 March 2025

Calibrated by Mr.Jerawut Prapawuttipong
 Scientist

Approved by 
 (Mr.Pheraphat Tuanjit) (for)
 Manager, Division of Calibration Laboratory
 Responsible for the Technical Management Team

Date of Issue: 25 March 2025

The uncertainties are for a confidence probability of approximately 95 %.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme 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. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

FCS-009 Revision: 01 Date: 20-04-55



Calibration Report

Certificate No.: 2502229-001-01
Equipment: CHAMBER (Incubator)
 Model: IPP 260 Serial No.: V615.0187
 Resolution: 0.1 °C ID No.: UAE.MIC.003/2559
 Manufacturer: MEMMERT

Date of Calibration: 19 March 2025

Page 2 of 3

Location: LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (16.2 ± 1) °C
 Relative Humidity (32 ± 4) %
 Line Voltage (223 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
 - The temperature scale used was based on ITS - 90.
 - All data show below were final values and the initial data may be obtained upon request.
- Reference Standard Instrument :

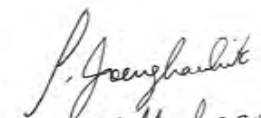
Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY49016851	TE 670477-01	4 May 2025	NATIONAL FOOD INSTITUTE.
	RTD	CH#101-109/ RTD#101-109			

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good

UUC Description :

Time of Record	I	Hour	9	Minute	At 35.0 °C
Fresh air Damper	-	Open	Position	-	
	X	Close	Fan	-	
	-	Not Available			

- Result of Calibration : ☒ Without adjustment ☐ After adjustment


 25 March 2025

FCS-012 Revision: 01 Date: 20-04-55





Equipment : Water Bath
 Condition As-Received : Used Item
 Reference : 2503-0436OC-1
 Procedure Used :-

Cert. No.: 25TM501
 Page : 2 of 3

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:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
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.

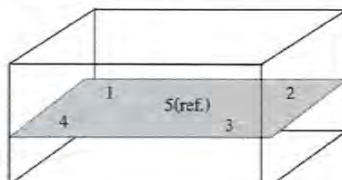
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	24	50	220
Finished of Calibration	25	53	221



Front

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

เอกสารไม่ควบคุม



Equipment : Water Bath
 Condition As-Received : Used Item
 Reference : 2503-0436OC-1
 Result of Calibration :- (*) Without Adjustment
 Function of UUC* : Temperature Source

Cert. No.: 25TM501
 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.)	
44.5	44.4	44.4	44.508	44.531	44.495	44.537	44.510	0.15

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
44.5	0.092	0.048	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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เอกสารไม่ควบคุม



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.: 25TM503
Page : 1 of 3

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 14
Serial No. : L414.1410
ID No. : UAE.MIC.015/2565
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory (302)
Received Order : 19 March 2025
Calibration Date : 19 March 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 : 27 March 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.

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2503-0436OC-3
Procedure Used :-

Cert. No.: 25TM503
Page : 2 of 3

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:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
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.

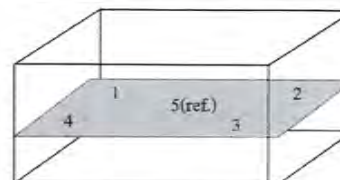
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

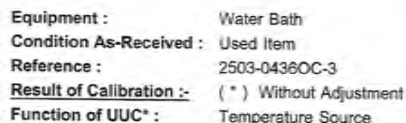
	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	24	51	221
Finished of Calibration	25	52	220



Front

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

เอกสารไม่ควบคุม



Cert. No.: 25TM503
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.)	
44.5	44.5	44.5	44.533	44.509	44.527	44.518	44.517	0.15

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
44.5	0.057	0.038	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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มูลนิธิเพื่อการพัฒนาอุตสาหกรรม
ศูนย์บริการห้องปฏิบัติการอุตสาหกรรมอาหาร
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center



Calibration Certificate

Certificate No.: 2502227-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangchack, Prakanong, Bangkok 10260

Page 1 of 3

Equipment: Electronic Balance

Manufacturer: OHAUS

Model: PX623

Serial No.: C236754745

ID No.: UAE.MIC.055/2565

Order No.: 2502227

Operation No.: 2502227-001

Date of Receipt: 19 March 2025

Date of Calibration: 19 March 2025

Calibrated by Mr.Yothin Charoensuk
Scientist

Approved by *N. Mupphab*
(Mr. Phraphat Tuanjit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 25 March 2025

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme 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. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

ECS-009 Rev(Son: 01 Date: 20-04-65

2008 ๒๖๖๑๗๕๐๓ 36 กุมภาพันธ์ ๒๕๕๑ กรุงเทพมหานคร 10700

2008 Sq. 35, Anon Armain Road, Bang Yi Khan Subdistrict, Bang Bolet District, Bangkok, Thailand

Tel: +66(0) 2422 8688 Fax: +66(0) 2422 8545

0700
K-1000
แจกฟรีไม่ครบทุก
QR Code

เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2502227-001-01
Equipment: Electronic Balance
Model: PX523
Serial No.: C236754745
Capacity: 620
Manufacturer: OHAUS
Resolution: 0.001
ID No.: UAE.MIC.055/2565

Date of Calibration: 19 March 2025 Page 2 of 3

Environment Condition: Ambient Temperature: 22.8 ± 0.3 °C Relative Humidity: 51 ± 0.95 %

Place of Calibration: 301, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-MA-001 In-House Method based on UKAS Lab 14 : 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	8505567572	TCS	M24041005	19 April 2025
Standard Weight Class E2	500g	8505567696	TCS	M24041015	19 April 2025
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-H1	NFLBTH 017/23	Quality Reborn	QR25-0542	10 February 2026

3. This certification is traceable to SI UNIT

4. This certificate was certified only for the instrument we calibrated.

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

Calibration Results:

1. Repeatability of Reading:

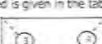
Nominal Value (g)	Standard Deviation of Reading (g)
300	0.00042
600	0.00048

2. Off-Center Error:

A mass of 200 g was placed and moved in various position on pan.

The balance reading obtained is given in the table.

Reading obtained is given in the table



☐



☒



☐

1	2	3	4	5	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
200.002	200.003	200.001	200.001	200.002	200.002	0.001

F-CS-012 Revision: 01 Date: 20-04-65

2008 อาคารศูนย์บริการ 35 ถนนสุขุมวิท แขวงคลองตัน เขตคลองเตย กรุงเทพมหานคร 10700
2008 ซ. 35 Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700
Tel: +66(0) 2422 8888 Fax: +66(0) 2422 8545



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Calibration Report

Certificate No.: 2502227-001-01
Equipment: Electronic Balance
Model: PX523
Serial No.: C236754745
Capacity: 620
Manufacturer: OHAUS
Resolution: 0.001
ID No.: UAE.MIC.055/2565

Date of Calibration: 19 March 2025 Page 3 of 3

Calibration Results: (Continued)

Calibration Range: 0-600 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value:

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (± g)	Coverage Factor k
Unload	0.0000	0.000	0.000	0.00085	2.00
1	1.0000	1.000	0.000	0.00085	2.00
5	5.0000	4.999	0.001	0.00085	2.00
10	10.0000	10.000	0.000	0.00085	2.00
20	20.0000	20.000	0.000	0.00085	2.00
50	50.0000	50.000	0.000	0.00087	2.00
100	100.0000	100.000	0.000	0.00087	2.00
200	200.0000	200.001	0.001	0.00090	2.00
300	300.0002	300.001	-0.001	0.00094	2.00
400	400.0003	399.999	0.001	0.0011	2.00
500	500.0003	499.999	0.001	0.0011	2.00
600	600.0004	600.000	0.000	0.0012	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 %.

----- End -----

F-CS-012 Revision: 01 Date: 20-04-65

2008 อาคารศูนย์บริการ 35 ถนนสุขุมวิท แขวงคลองตัน เขตคลองเตย กรุงเทพมหานคร 10700
2008 ซ. 35 Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700
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ศูนย์บริการห้องปฏิบัติการอาหาร
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center



Calibration Certificate

Certificate No.: 2502229-007-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: Autoclave
Manufacturer: ALP
Model: CL-40L
Serial No.: 808763
ID No.: UAE.MIC.026/2563
Order No.: 2502229
Operation No.: 2502229-007
Date of Receipt: 19 March 2025
Date of Calibration: 19 March 2025

Calibrated by Mr.Jerawut Prapawuttipong
Scientist

Approved by 
(Mr.Pheraphat Tuanjit) (for)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 25 March 2025

The uncertainties are for a confidence probability of approximately 95 %.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme 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. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-55

2008 ถนนสุขุมวิท 36 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110
2008 Soi 36, Arun Amarin Road, Bang Yai Khan Subdistrict, Bang Phai District, Bangkok 10700 Thailand
Tel : +66(0) 2422 8688 Fax : +66(0) 2422 8545



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ศูนย์บริการห้องปฏิบัติการอาหาร
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center



Calibration Report

Certificate No.: 2502229-007-01
Equipment: Autoclave
Model: CL-40L Serial No.: 808763
Resolution: 0.1 °C ID No.: UAE.MIC.026/2563
Manufacturer: ALP
Date of Calibration: 19 March 2025

Page 2 of 3

Location: LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (23 ± 1) °C
Relative Humidity (60 ± 5) %
Line Voltage (225 ± 1) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 3 standard Data loggers with RTD into its autoclave and calibration according to W-TE-018 based on BS 2646-1:2021, Autoclaves for sterilization in laboratories
Part 1: Design, construction, safety and performance - Specification.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.
- Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
Digital Thermometer with RTD (Data Logger)	HiTemp140-PT	S35646	TE 670370-01	23-Mar-25	NATIONAL FOOD INSTITUTE
	HiTemp140-PT	S33753	TE 670371-01	23-Mar-25	NATIONAL FOOD INSTITUTE
	HiTemp140-PT	S29973	TE 670372-01	23-Mar-25	NATIONAL FOOD INSTITUTE

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- This standard does not apply to sterilizers or disinfectors used for medical, dental, pharmaceutical.
- Condition of Calibrated item : Good

UUC Description : Setting program function sterilization : STERILIZE/NORMAL

Time of sterilization : 15 Minute At 115.0 and 121.0 °C

8. Result of Calibration :
- ☒ Without adjustment
☐ After adjustment


25 March 2025

F-CS-012 Revision: 01 Date: 20-04-55

2008 ถนนสุขุมวิท 36 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110
2008 Soi 36, Arun Amarin Road, Bang Yai Khan Subdistrict, Bang Phai District, Bangkok 10700 Thailand
Tel : +66(0) 2422 8688 Fax : +66(0) 2422 8545



nfi.or.th

Calibration Report

Certificate No.: 2502229-007-01
Equipment: Autoclave
 Model: CL-40L Serial No.: 808763
 Resolution: 0.1 °C ID No.: UAE.MIC.026/2563
 Manufacturer: ALP

Date of Calibration: 19 March 2025

Page 3 of 3

Calibration point: 115.0 and 121.0°C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
Min	22.0	55	224
Max	24.0	65	226



Checked all sensors:
 (Sensor 1) is attached to the (115.0 temperature probe)
 (Sensor 2) is at the upper right of the chamber
 (Sensor 3) is at the lower right of the chamber

Table 1 : Reporting of Temperature

Calibration Point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.2 is REF)			Uncertainty ± (°C)
	Std.# 1	Std.# 2 (Ref)	Std.# 3	
115.0	115.32	115.46	115.22	0.64
121.0	121.31	121.53	121.31	0.64

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading				Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	Min (°C)	Max (°C)	Average (°C)	MPa			
115.0	115.0	115.1	115.0	0.08	0.11	0.12	0.26
121.0	121.0	121.1	121.0	0.12	0.13	0.15	0.29

Note

The quoted uncertainty include " Stability " and " Loading effect (20% of Uniformity)"

UUC* = Unit Under Calibration

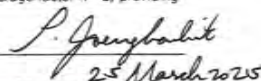
Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors,
for at least half an hour after reaching steady state.

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.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

----- End -----


 25 March 2025

FCS-012 Revision: 01 Date: 20-04-65



Certificate of Calibration

Certificate No. : 68-420062-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A

pH

Resolution : 0.01 pH

Serial No. : 2841305

ID No. : LAB-PH-002

Electrode

Model : N/A

Serial No. : 3172493

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

Ambient Temperature : (23.5 to 25.0)° C

Relative Humidity : (50 to 55) %

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpoon Chanpu

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

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

1. Multiproduct Calibrator

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

2. Standard Buffer Solution

<u>pH</u>	<u>Cert. No.</u>	<u>Lot No.</u>	<u>Exp. Date</u>	<u>Traceability</u>
4.007	61314276	1081108	28 Feb 2027	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.965	61318175	1081110	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61325043	1081109	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :



(Permpoon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-420062-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

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

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.007	4.01	0.00	0.0097
	6.965	7.00	-0.03	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

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

- 000 -



Certificate of Calibration

Certificate No. : 68-420062-2

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A pH

Resolution : 0.01 pH

Serial No. : 2841305

ID No. : LAB-PH-002

Electrode

Model : N/A

Serial No. : 3052953

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

Ambient Temperature : (23.5 to 25.0)° C

Relative Humidity : (50 to 55) %

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

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

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

1. Multiproduct Calibrator

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

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.007	61314276	1081108	28 Feb 2027	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.965	61318175	1081110	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61325043	1081109	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :



(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-420062-2

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

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

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.007	4.01	0.00	0.0097
	6.965	7.00	-0.03	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

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

- o o -



Certificate of Calibration

Certificate No. : 68-400421-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : Temperature Indicator with Thermistor Probe

Temperature Indicator

Manufacturer : Eutech

Model : pH 700

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 2841305

ID No. : LAB-PH-002

Thermistor probe

Model : N/A

Sheath Material : Stainless

Diameter : 3 mm.

Length : 115 mm.

Serial No. : PHSTEMB01P 049

ID No. : LAB-PH-002

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

Ambient Temperature : (23.5 to 25.0) °C

Relative Humidity : (50 to 55) %

Line Voltage : (220.0 to 221.0) VAC

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

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

The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400016	TT-1019-25	13 May 2027	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400033	24E633	21 Feb 2026	National Institute of Metrology Thailand (NIMT)

Approved by :



(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

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

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

Certificate of Calibration

Certificate No. : 68-400421-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
115	25.002	24.9	0.1	0.19

Remark

UUC : Unit Under Calibration

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

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

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

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



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-200468-1

Page : 1 of 2

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

Equipment : Electronic Balance
Manufacturer : SHIMADZU Model : AP225WD
Serial No. : D316301828 ID No. : LAB-BL-003
Capacity : 220000 mg
Resolution : 0.01mg/102000mg, 0.1mg/220000mg

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co.,Ltd.
Ambient Temperature : (27.3 to 27.4) °C
Relative Humidity : (53.6 to 53.7) %
Air Pressure : 1003.0 mbar

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 25 July 2025

Calibrated by : Akaradath Thippichai

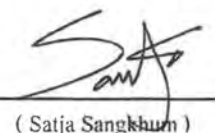
Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 7 - November 2022

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02242009	07 Nov 2025	National Institute of Metrology (Thailand), (NIMT)

Approved by :


(Satja Sangkhum)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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

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

Certificate of Calibration

Certificate No. : 68-200468-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

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

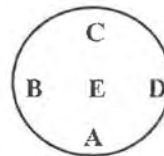
This result of calibration was found accurate as shown on date and place of calibration only.

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

Eccentric error

Load test : 50000 mg

A	B	C	D	E	
0.01	0.01	0.02	0.02	0.00	mg



Repeatability

Load test : 200000 mg

Stdev. : 0.053 mg

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Calibratech Co.,Ltd.

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

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



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-400420-3

Page : 1 of 2

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

Equipment : Temperature controlled enclosure (Incubator)
Manufacturer : Aqua Lytic Model : TC 135S
Range : N/A °C Resolution : 0.1 °C
Serial No. : 0614/000033 ID No. : LAB-IB-001

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd.
Ambient Temperature : (23.0 to 24.5) °C
Relative Humidity : (40 to 45) %
Line Voltage : (220.0 to 222.0) V

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20
The temperature scale used was based on ITS-90

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

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400029 & 400048	68-400063-1	01 Aug 2025	National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400420-3

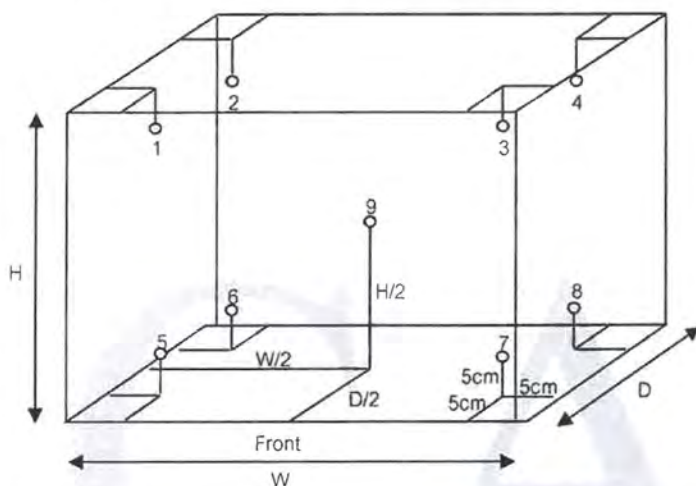
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.51 m

D = 0.04 m

H = 0.70 m

Capacity = 0.02 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
20.0	20.5	20.5	20.10	19.94	19.99	19.96	19.92	19.90	20.02	19.99	19.87	0.69

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.5	20.5	0.43	0.36	0.78

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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[Signature]



CAL

Calibratech Co.,Ltd.

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

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



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-400420-2

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : Water Bath

Manufacturer : Memmert

Model : WNB 22

Range : N/A °C

Resolution : 0.1 °C

Serial No. : L514.0184

ID No. : LAB-WB-001

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

Ambient Temperature : (31.0 to 31.8) °C

Relative Humidity : (50 to 55) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

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

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400029 & 400031	68-400214-1	25 Oct 2025	National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

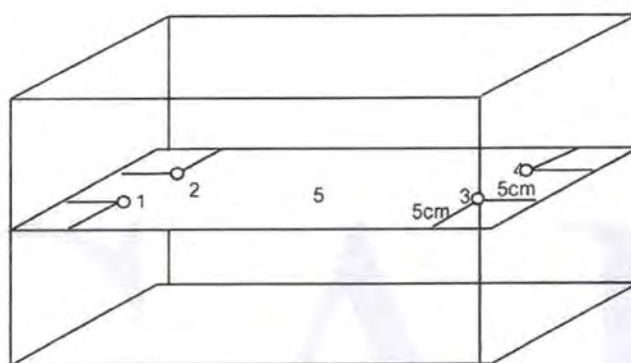
Certificate No. : 68-400420-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @					Uncertainty (± °C)	Measured Uniformity (°C)	Measured Stability (°C)
			Sensor No.							
			1	2	3	4	5			
65.0	65.0	65.0	64.62	64.64	64.64	64.63	64.63	0.18	0.05	0.03
95.0	95.0	95.0	94.60	94.61	94.63	94.68	94.58	0.18	0.17	0.05

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%

- oOo -



CAL

Calibratech Co.,Ltd.

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

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



Certificate of Calibration

Certificate No. : 68-400420-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

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

Equipment : Temperature controlled enclosure (Oven)

Manufacturer : Memmert

Model : UN 55

Range : N/A °C

Resolution : 0.1 °C

Serial No. : B214.1879

ID No. : LAB-OV-001

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

Ambient Temperature : (31.0 to 31.8) °C

Relative Humidity : (50 to 55) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

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 & 400032

68-400217-1

28 Oct 2025

National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400420-1

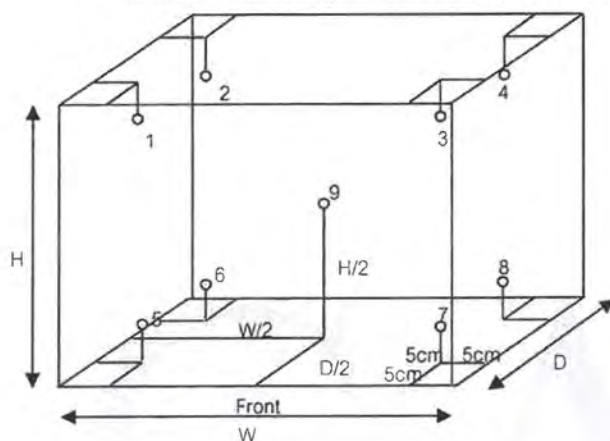
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.40 m

Capacity = 0.05 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
104.0	107.0	107.0	105.1	105.1	104.9	104.9	102.9	104.4	103.5	104.4	104.5	0.87
180.0	184.0	184.0	181.2	180.9	180.7	180.9	177.2	177.1	178.5	179.8	180.3	1.4

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	107.0	107.0	1.8	0.3	2.6
180.0	184.0	184.0	3.6	0.6	4.6

Remark The uncertainty is not combine uniformity of the air chamber

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

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

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รายการใบรับรองสอบเทียบเครื่องมือหลักประจำห้องปฏิบัติการสำหรับวิเคราะห์คุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
Equipment for Water Quality Analysis									
1	Incubator	Total Coliform Bacteria <i>E.coli</i>	Binder	KB400 / 20200000015535	National Food Institute, Ministry of Industry, Thailand	2602303-006-01	11 Mar 26	10 Mar 27	-
2	Incubator	Clostridium Perfringens Legionella spp.	Memmert	IPP 260 / V615.0187	National Food Institute, Ministry of Industry, Thailand	2602303-001-01	11 Mar 26	10 Mar 27	-
3	Incubator	Stephylococcus Aureus Pseudomonas Aeruginosa	Memmert	IF 75 / D317.0305	National Food Institute, Ministry of Industry, Thailand	2602303-004-01	11 Mar 26	10 Mar 27	-
4	Water Bath		Memmert	WNE 14 / L414.1407	Technology Promotion Association (Thailand-Japan)	26TM442	16 Mar 26	15 Mar 27	-
5	Water Bath		Memmert	WNE 14 / L414.1410	Technology Promotion Association (Thailand-Japan)	26TM444	16 Mar 26	15 Mar 27	-
6	Analytical Balance		OHAUS	PX623 / C236754745	United Analyst and Engineering Consultant Co., Ltd. (UAE)	260311-4-BL005-26	16 Mar 26	15 Mar 27	-
7	Auto Clave		ALP	CL-40L / 808763	National Food Institute, Ministry of Industry, Thailand	2602303-007-01	11 Mar 26	10 Mar 27	-

Due Date of Calibration* : Based on the annual calibration plan. At least 1 time per year.

Calibration Certificate

Certificate No.: 2602303-006-01

Page : 1 of 2

Equipment: CHAMBER (Incubator)
Manufacturer: BINDER
Model: KB 400
Serial No.: 2020000015535
ID No.: UAE-MIC-018/2564
Order No.: 2602303
Operation No.: 2602303-006
Date of Receipt: 11 March 2026
Date of Calibration: 11 March 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangchak, Prakhong, Bangkok 10260

Metrological traceability:

1. Calibration Method:

- This instrument was calibrated by inserting 9 standard thermometers into its chamber, in accordance with W-TE 014.
- based on TIAS G-20-102-08 (E), Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).
- All data shown below are final values, and the initial date may be obtained upon request.

2. Reference Standard Instrument:

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	DAQ973A RTD	MY59008964 CH201-209/RTD201-209	2502244-001-01	29 March 2026	NATIONAL FOOD INSTITUTE

- This certificate is traceable to the International System of Units (SI).
- This certificate is valid only for the instrument that was calibrated.
- The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by Mr. Nuttapol Niyomchat
 Specialist

Approved by 
 (Mr. Pheraphat Tuanjit)
 Manager, Division of Calibration Laboratory
 Responsible for the Technical Management Team

Date of Issue: 19 March 2026

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme 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. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

CS-009 Revision 02 Date 01-10-68

3008 ถนนสุขุมวิท 35 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10700
 3008 Soi 35, Arun Amarin Road, Bang Y. Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand
 Tel: +66(0) 2422-6688 Fax: +66(0) 2422-8545



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Calibration Certificate

Certificate No.: 2602303-006-01

Page : 2 of 2

Calibration Condition:

Equipment: CHAMBER (Incubator)
UUC* Resolution: 0.1 °C
Condition of the item: Normal & Good
 Without adjustment / As Found
 * Time of record : 1 hour : 9 minute / point

Place of Calibration: Microbiology Laboratory
 UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Environment Conditions: Ambient Temperature: $(17.2 \pm 1) ^\circ\text{C}$
 Relative Humidity: $(51.5 \pm 4) \%$
 Line Voltage: $(220 \pm 2) \text{ V}$

Calibration Results:

Table 1 : Reporting of Temperature

Calibration Point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Measurement Uncertainty (±°C)
	Std.#1	Std.#2	Std.#3	Std.#4	Std.#5	Std.#6	Std.#7	Std.#8	Std.#9	
35.0	34.78	34.86	34.81	34.83	35.22	35.21	35.22	35.12	34.83	0.20

Table 2 : Reporting of Characterization Results

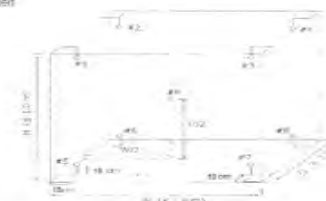
UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	Max	Min	Average			
35.0	35.0	35.0	35.0	0.034	0.39	0.50

Note

- UUC* : Unit Under Calibration
- The quoted uncertainty includes contributions from Stability and Loading Effect (20% of Temperature Uniformity).
- Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.
- 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.
- Overall Variation = The difference of The maximum and minimum measured temperatures throughout observation time.

For more information, details of the sensor installation should be reported

Fresh air Damper	On/Off	Position
X	Close	100% Fan speed
-	Not Available	
Dimension of inside chamber and sensor installation location (cm)		
W x H x D	65 x 125 x 49	
x x b x c	50 x 10 x 10	



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

-----End of Report-----

CS-009 Revision 02 Date 01-10-68

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Calibration Certificate

Certificate No.: 2602303-001-01

Page : 1 of 2

Equipment: CHAMBER (Incubator)
Manufacturer: MEMMERT
Model: IPP260
Serial No.: V615 0167
ID No.: UAE MIC 0032559
Order No.: 2602303
Operation No.: 2602303-001
Date of Receipt: 11 March 2026
Date of Calibration: 11 March 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD
Address: 3 Soi Udomsakdi 41, Sukhumvit Road,
 Bangchak, Prachinong, Bangkok 10260

Metrological traceability:

1. Calibration Method

- This instrument was calibrated by inserting 9 standard thermometers into its chamber, in accordance with WI-TE-014.
- based on TIAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).
- All data shown below are final values, and the initial data may be obtained upon request.

2. Reference Standard Instrument

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	DAD973A RTD	MY9008904 CH101-109/RTD101-109	2502244-001-01	29 March 2026	NATIONAL FOOD INSTITUTE

- This certificate is traceable to the International System of Units (SI).
- This certificate is valid only for the instrument that was calibrated.
- The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by Mr. Nuttapol Niyomchat
 Specialist

Approved by 
 (Mr. Pheraphat Tuanjit)
 Manager, Division of Calibration Laboratory
 Responsible for the Technical Management Team

Date of Issue: 19 March 2026

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme 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. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CIS-009 Revision 02 Date: 01-10-68

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 2008 Soi 36, Asoke-Mongkhon Road, Bang Yai Khan Subdistrict, Bang Phli District, Bangkok 10700, Thailand
 Tel: +66(0) 2422 8888 Fax: +66(0) 2422 8945



Calibration Certificate

Certificate No.: 2602303-001-01

Page : 2 of 2

Calibration Condition:

Equipment: CHAMBER (Incubator)
UUC* Resolution: 0.1 °C
Condition of the item: Normal & Good
 Without adjustment / As Found
 - Time of record : 1 hour / 9 minute / point

Place of Calibration: Microbiology Laboratory
 UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Environment Conditions: Ambient Temperature: $(17.2 \pm 1) ^\circ\text{C}$
 Relative Humidity: $(51.9 \pm 3) \%$
 Line Voltage: $(229 \pm 1) \text{V}$

Calibration Results:

Table 1 : Reporting of Temperature

Calibration Point (°C)	Std.#1	Std.#2	Std.#3	Std.#4	Std.#5	Std.#6	Std.#7	Std.#8	Std.#9	Measurement Uncertainty (±°C)
35.0	35.01	34.94	35.20	35.15	35.25	34.99	34.79	34.83	35.02	0.28

Table 2 : Reporting of Characterization Results

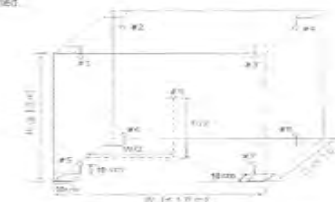
UUC* Setting (°C)	Max	UUC* Reading (°C) Min	Average	Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
35.0	35.0	35.0	35.0	0.069	0.24	0.53

Note

- UUC* : Unit Under Calibration
- The quoted uncertainty includes contributions from 'Stability' and 'Loading Effect' (20% of Temperature Uniformity).
- Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.
- Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which last observed 20.00 second time.
- Overall Variation = The difference of The maximum and minimum measured temperatures throughout observation time.

For more information, details of the sensor installation should be reported.

Fresh air Damper	Open	Position
X	Close	100% Fan speed
	Not Available	
Dimension of inside chamber and sensor installation location (mm)		
W x H x D	64 x 60 x 50	
3 x 3 x 3	10 x 10 x 10	



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

----- End of Report -----

F-CIS-009 Revision 02 Date: 01-10-68

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 2008 Soi 36, Asoke-Mongkhon Road, Bang Yai Khan Subdistrict, Bang Phli District, Bangkok 10700, Thailand
 Tel: +66(0) 2422 8888 Fax: +66(0) 2422 8945



Calibration Certificate

Certificate No.: 2602303-004-01

Page : 1 of 2

Equipment: CHAMBER (Incubator)
Manufacturer: MEMMERT
Model: IFT5
Serial No.: D317.0305
ID No.: UAE MIC.022/2561
Order No.: 2602303
Operation No.: 2602303-004
Date of Receipt: 11 March 2026
Date of Calibration: 11 March 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Address: 9 Soi Udomsak 41, Sukhumvit Road,
Bangnaek, Prathung, Bangkok 10260

Metrological traceability:

1. Calibration Method:

- This instrument was calibrated by inserting 9 standard thermometers into its chamber, in accordance with W-TE-014, based on TIAS G-20-102-06 (E) Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).
- All data shown below are final values, and the initial data may be obtained upon request.

2. Reference Standard Instrument:

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	RTD	MY59003377 CH901-309/RTD9301-309	2601300-001-01	10 January 2027	NATIONAL FOOD INSTITUTE

- This certificate is traceable to the International System of Units (SI).
- This certificate is valid only for the instrument that was calibrated.
- The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by: Mr. Manas Somsak
Specialist

Approved by: 
(Mr. Pheraphat Tuanjit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 18 March 2026

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F-CS-009 Revision 02 Date: 01-10-68

2008 ๒๕๕๑-๒๕๕๒ ๓๕ ๒๕๕๓-๒๕๕๔ ๓๖ ๒๕๕๕-๒๕๕๖ ๓๗ ๒๕๕๗-๒๕๕๘ ๓๘ ๒๕๕๙-๒๕๖๐ ๓๙ ๒๕๖๑-๒๕๖๒ ๔๐ ๒๕๖๓-๒๕๖๔ ๔๑ ๒๕๖๕-๒๕๖๖ ๔๒ ๒๕๖๗-๒๕๖๘ ๔๓ ๒๕๖๙-๒๕๗๐ ๔๔ ๒๕๗๑-๒๕๗๒ ๔๕ ๒๕๗๓-๒๕๗๔ ๔๖ ๒๕๗๕-๒๕๗๖ ๔๗ ๒๕๗๗-๒๕๗๘ ๔๘ ๒๕๗๙-๒๕๘๐ ๔๙ ๒๕๘๑-๒๕๘๒ ๕๐ ๒๕๘๓-๒๕๘๔ ๕๑ ๒๕๘๕-๒๕๘๖ ๕๒ ๒๕๘๗-๒๕๘๘ ๕๓ ๒๕๘๙-๒๕๙๐ ๕๔ ๒๕๙๑-๒๕๙๒ ๕๕ ๒๕๙๓-๒๕๙๔ ๕๖ ๒๕๙๕-๒๕๙๖ ๕๗ ๒๕๙๗-๒๕๙๘ ๕๘ ๒๕๙๙-๒๕๖๐ ๕๙ ๒๕๖๑-๒๕๖๒ ๖๐ ๒๕๖๓-๒๕๖๔ ๖๑ ๒๕๖๕-๒๕๖๖ ๖๒ ๒๕๖๗-๒๕๖๘ ๖๓ ๒๕๖๙-๒๕๗๐ ๖๔ ๒๕๗๑-๒๕๗๒ ๖๕ ๒๕๗๓-๒๕๗๔ ๖๖ ๒๕๗๕-๒๕๗๖ ๖๗ ๒๕๗๗-๒๕๗๘ ๖๘ ๒๕๗๙-๒๕๘๐ ๖๙ ๒๕๘๑-๒๕๘๒ ๗๐ ๒๕๘๓-๒๕๘๔ ๗๑ ๒๕๘๕-๒๕๘๖ ๗๒ ๒๕๘๗-๒๕๘๘ ๗๓ ๒๕๘๙-๒๕๙๐ ๗๔ ๒๕๙๑-๒๕๙๒ ๗๕ ๒๕๙๓-๒๕๙๔ ๗๖ ๒๕๙๕-๒๕๙๖ ๗๗ ๒๕๙๗-๒๕๙๘ ๗๘ ๒๕๙๙-๒๕๖๐ ๗๙ ๒๕๖๑-๒๕๖๒ ๘๐ ๒๕๖๓-๒๕๖๔ ๘๑ ๒๕๖๕-๒๕๖๖ ๘๒ ๒๕๖๗-๒๕๖๘ ๘๓ ๒๕๖๙-๒๕๗๐ ๘๔ ๒๕๗๑-๒๕๗๒ ๘๕ ๒๕๗๓-๒๕๗๔ ๘๖ ๒๕๗๕-๒๕๗๖ ๘๗ ๒๕๗๗-๒๕๗๘ ๘๘ ๒๕๗๙-๒๕๘๐ ๘๙ ๒๕๘๑-๒๕๘๒ ๙๐ ๒๕๘๓-๒๕๘๔ ๙๑ ๒๕๘๕-๒๕๘๖ ๙๒ ๒๕๘๗-๒๕๘๘ ๙๓ ๒๕๘๙-๒๕๙๐ ๙๔ ๒๕๙๑-๒๕๙๒ ๙๕ ๒๕๙๓-๒๕๙๔ ๙๖ ๒๕๙๕-๒๕๙๖ ๙๗ ๒๕๙๗-๒๕๙๘ ๙๘ ๒๕๙๙-๒๕๖๐ ๙๙ ๒๕๖๑-๒๕๖๒ ๑๐๐ ๒๕๖๓-๒๕๖๔ ๑๐๑ ๒๕๖๕-๒๕๖๖ ๑๐๒ ๒๕๖๗-๒๕๖๘ ๑๐๓ ๒๕๖๙-๒๕๗๐ ๑๐๔ ๒๕๗๑-๒๕๗๒ ๑๐๕ ๒๕๗๓-๒๕๗๔ ๑๐๖ ๒๕๗๕-๒๕๗๖ ๑๐๗ ๒๕๗๗-๒๕๗๘ ๑๐๘ ๒๕๗๙-๒๕๘๐ ๑๐๙ ๒๕๘๑-๒๕๘๒ ๑๑๐ ๒๕๘๓-๒๕๘๔ ๑๑๑ ๒๕๘๕-๒๕๘๖ ๑๑๒ ๒๕๘๗-๒๕๘๘ ๑๑๓ ๒๕๘๙-๒๕๙๐ ๑๑๔ ๒๕๙๑-๒๕๙๒ ๑๑๕ ๒๕๙๓-๒๕๙๔ ๑๑๖ ๒๕๙๕-๒๕๙๖ ๑๑๗ ๒๕๙๗-๒๕๙๘ ๑๑๘ ๒๕๙๙-๒๕๖๐ ๑๑๙ ๒๕๖๑-๒๕๖๒ ๑๒๐ ๒๕๖๓-๒๕๖๔ ๑๒๑ ๒๕๖๕-๒๕๖๖ ๑๒๒ ๒๕๖๗-๒๕๖๘ ๑๒๓ ๒๕๖๙-๒๕๗๐ ๑๒๔ ๒๕๗๑-๒๕๗๒ ๑๒๕ ๒๕๗๓-๒๕๗๔ ๑๒๖ ๒๕๗๕-๒๕๗๖ ๑๒๗ ๒๕๗๗-๒๕๗๘ ๑๒๘ ๒๕๗๙-๒๕๘๐ ๑๒๙ ๒๕๘๑-๒๕๘๒ ๑๓๐ ๒๕๘๓-๒๕๘๔ ๑๓๑ ๒๕๘๕-๒๕๘๖ ๑๓๒ ๒๕๘๗-๒๕๘๘ ๑๓๓ ๒๕๘๙-๒๕๙๐ ๑๓๔ ๒๕๙๑-๒๕๙๒ ๑๓๕ ๒๕๙๓-๒๕๙๔ ๑๓๖ ๒๕๙๕-๒๕๙๖ ๑๓๗ ๒๕๙๗-๒๕๙๘ ๑๓๘ ๒๕๙๙-๒๕๖๐ ๑๓๙ ๒๕๖๑-๒๕๖๒ ๑๔๐ ๒๕๖๓-๒๕๖๔ ๑๔๑ ๒๕๖๕-๒๕๖๖ ๑๔๒ ๒๕๖๗-๒๕๖๘ ๑๔๓ ๒๕๖๙-๒๕๗๐ ๑๔๔ ๒๕๗๑-๒๕๗๒ ๑๔๕ ๒๕๗๓-๒๕๗๔ ๑๔๖ ๒๕๗๕-๒๕๗๖ ๑๔๗ ๒๕๗๗-๒๕๗๘ ๑๔๘ ๒๕๗๙-๒๕๘๐ ๑๔๙ ๒๕๘๑-๒๕๘๒ ๑๕๐ ๒๕๘๓-๒๕๘๔ ๑๕๑ ๒๕๘๕-๒๕๘๖ ๑๕๒ ๒๕๘๗-๒๕๘๘ ๑๕๓ ๒๕๘๙-๒๕๙๐ ๑๕๔ ๒๕๙๑-๒๕๙๒ ๑๕๕ ๒๕๙๓-๒๕๙๔ ๑๕๖ ๒๕๙๕-๒๕๙๖ ๑๕๗ ๒๕๙๗-๒๕๙๘ ๑๕๘ ๒๕๙๙-๒๕๖๐ ๑๕๙ ๒๕๖๑-๒๕๖๒ ๑๖๐ ๒๕๖๓-๒๕๖๔ ๑๖๑ ๒๕๖๕-๒๕๖๖ ๑๖๒ ๒๕๖๗-๒๕๖๘ ๑๖๓ ๒๕๖๙-๒๕๗๐ ๑๖๔ ๒๕๗๑-๒๕๗๒ ๑๖๕ ๒๕๗๓-๒๕๗๔ ๑๖๖ ๒๕๗๕-๒๕๗๖ ๑๖๗ ๒๕๗๗-๒๕๗๘ ๑๖๘ ๒๕๗๙-๒๕๘๐ ๑๖๙ ๒๕๘๑-๒๕๘๒ ๑๗๐ ๒๕๘๓-๒๕๘๔ ๑๗๑ ๒๕๘๕-๒๕๘๖ ๑๗๒ ๒๕๘๗-๒๕๘๘ ๑๗๓ ๒๕๘๙-๒๕๙๐ ๑๗๔ ๒๕๙๑-๒๕๙๒ ๑๗๕ ๒๕๙๓-๒๕๙๔ ๑๗๖ ๒๕๙๕-๒๕๙๖ ๑๗๗ ๒๕๙๗-๒๕๙๘ ๑๗๘ ๒๕๙๙-๒๕๖๐ ๑๗๙ ๒๕๖๑-๒๕๖๒ ๑๘๐ ๒๕๖๓-๒๕๖๔ ๑๘๑ 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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 0-2717-3000-29 FAX 0-2719-9484



Certificate of Calibration

Cert. No.: 26TM442

Page : 1 of 3

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 14
Serial No. : L414.1407
ID No. : UAE.MIC.006/2558
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory (302)
Received Order : 16 March 2026
Calibration Date : 16 March 2026
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V

Calibrated by : Khit Ruttanaprapachai

Approved by :

Kunchit

Approved Signatory

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

Issue Date : 23 March 2026

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

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2603-0427OC-1

Cert. No.: 26TM442

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:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	25LM117	TPA	17 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 :

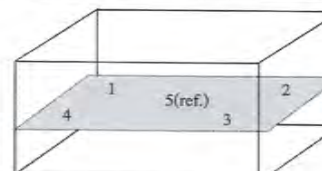
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	23	52	230
Finished of Calibration	24	55	229



Front

Position :	Ref. Std. ID No.:
1	4803988-001
2	4803988-002
3	4803988-003
4	4803988-004
5(ref.)	4803988-005

เอกสารไม่ควบคุม



Equipment : Water Bath
 Condition As-Received : Used Item
 Reference : 2603-04270C-1
 Result of Calibration :- (*) Without Adjustment
 Function of UUC* : Temperature Source

Cert. No.: 26TM442
 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.)	
44.5	44.5	44.5	44.506	44.456	44.478	44.509	44.502	0.15

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
44.5	0.063	0.068	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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เอกสารไม่ควบคุม



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.: 26TM444
 Page : 1 of 3

Equipment : Water Bath
 Manufacturer : Memmert
 Model : WNE 14
 Serial No. : L414.1410
 ID No. : UAE.MIC.015/2565
 Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangchak, Phrakhanong,
 Bangkok 10260
 Location : Microbiology Laboratory (302)
 Received Order : 16 March 2026
 Calibration Date : 16 March 2026
 Ambient Temperature : (26 ± 10) °C
 Relative Humidity : (50 ± 30) %
 AC Line Voltage : (220 ± 22) V

Calibrated by : Tawatchai Pama

Approved by :

Kunchit
 Approved Signatory

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

Issue Date : 23 March 2026

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.

เอกสารไม่ควบคุม



Equipment : Water Bath
 Condition As-Received : Used Item
 Reference : 2603-0427OC-3
 Cert. No.: 26TM444
 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:-

- | Instrument | Serial No. | Cert. No. | Traceable | Due Date |
|----------------------|------------|-----------|-----------|-------------|
| 1) Data Acquisition | MY59003411 | 25LM177 | TPA | 26 Dec 2026 |
- This certificate is valid only to the item calibrated on date and place of calibration.
 - This measurement result is traceable to the International System of Unit maintained through ;

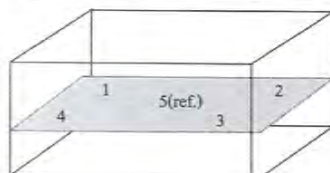
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	
Beginning of Calibration	26	67	231
Finished of Calibration	25	60	233



Front

Position :	Ref. Std. ID No.:
1	4804539-001
2	4804539-002
3	4804539-003
4	4804539-004
5(ref.)	4804539-005

เอกสารไม่ควบคุม



Equipment : Water Bath
 Condition As-Received : Used Item
 Reference : 2603-0427OC-3
 Cert. No.: 26TM444
 Page : 3 of 3

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)					Uncertainty (± °C)
			Position					
			1	2	3	4	5 (ref.)	
44.5	44.4	44.4	44.523	44.481	44.496	44.490	44.519	0.15

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
44.5	0.10	0.066	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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เอกสารไม่ควบคุม

Certificate of Calibration

Certificate No.: 260311-4-BL005-26

Code No.: BL005-26

Page: 1 of 3

Customer Name: United Analyst and Engineering Consultant Co., Ltd.
Address: 3 Soi Udomsuk 41, Sukhumvit Rd., Bang Chak, Phrakhanong, Bangkok 10260

Equipment: Electronic Balance

Manufacturer: OHAUS

Model: PX623

Serial No.: C236754745

Asset No.: UAE/JMC_055/2565

Building : UAE number 3 Floor : 3 Room : 301

Received Date: March 16, 2026

Date of Calibration : March 16, 2026

Calibration Conditions: Temperature start 26.7 °C end 27.4 °C
Humidity start 49.2 % end 50.2 %
Pressure start 757.2 mmHg end 756.2 mmHg

Calibrated by: Thanachat Chatpahol

Approved by: Suwit Chotnok

Signature: *C. Wit*

Issued Date: March 18, 2026

Note : 1) The Uncertainties are for a confidence probability of approximately 95%.

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

3) This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme 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. This certificate may not be reproduced other than in full, except with the prior written approval of the United Analyst and Engineering Consultant Co., Ltd. (UAE)

เอกสารไม่ควบคุม

Certificate No.: 260311-4-BL005-26

Code No.: BL005-26

Page: 2 of 3

Equipment: Electronic Balance Manufacturer: OHAUS
Model: PX623 Repeatability: 0.001 g
Serial No.: C236754745 ID No.: UAE/JMC_055/2565
Max. Capacity: 600 g
Calibration Date: March 16, 2026
Condition As-Received: in Condition

Condition of Equipment:

Condition of This Result of Calibration:

1. Calibration Method: Balance weighing was calibrated by method: JAI CP CAL 106. Weighing Method: OHAUS N11311-8 10202

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Traceability	Due Date
Standard Weight Class (200MA)	1 mg to 1 kg	C310041609	METTLER TOLEDO GmbH	CE10645605	AMARC	3 May 27
Standard Weight Class (700MA)	1 mg to 1 kg	B789109122	AMARC	25 000359	AMARC	23 Jun 27

Instrument	Model	Serial No.	Calibrated By	Certificate No.	Traceability	Due Date
Thermo-Hygro Baro Meter	MHB-38250	AK 86257	SUCCHISS	SCPH-00997168	ThermoFisher	26 Nov 26
Thermo-Hygro-Baro Meter	MHB-38250	AK 86457	TSA	2304466	TSA	18 Nov 26

3. This certification is traceable to SI Unit

4. This certification was certified only for the instrument we calibrated.

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

6. Through the reference standard laboratory of Mettler Toledo GmbH CE10645605, SAS accreditation number SCS 0031

7. Through the reference standard laboratory of AMARC 25-000359, TS accreditation number 0152

Calibration Result:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
300	0.00055
600	0.00055

2. Eccentric or off-center loading

A mass of 200 g was placed and moved to various position on pan

The balance reading obtained is given in the table.

					
1	2	3	4	5	Maximum Difference
(g)	(g)	(g)	(g)	(g)	
199.998	200.001	200.000	199.997	200.000	0.003

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เอกสารไม่ควบคุม



United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Tel 0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com



Certificate No.: 260311-4-BL005-26

Code No.: BL005-26

Page: 3 of 3

Equipment: Electronic Balance
Model: PK623
Serial No.: C236754765
Max. Capacity: 520 (g)
Calibration Date: March 16, 2026

Manufacturer: OHAUS
Readability: 0.001 (g)
ID No.: UAE.MK.035/2565

Calibration Result: (Continued)
Calibration Range: 0 to 600 (g)
Calibration Adjustment: Internal Calibration

3. Error of Indication from nominal or conventional mass value:

Nominal Value (g)	Reference Value (g)	Indication (g)	Correction (g)	Uncertainty ($\pm$ g)	Coverage Factor K
Unload	0.0000000	0.000	0.000	0.0011	2.09
1	1.0000119	1.000	0.000	0.0011	2.09
5	5.0000146	5.001	-0.001	0.0011	2.09
10	10.0000330	10.001	-0.001	0.0011	2.09
20	20.0000280	20.001	-0.001	0.0011	2.09
30	30.0000370	30.001	-0.001	0.0011	2.09
100	100.0000420	100.001	-0.001	0.0011	2.09
120	120.0000700	120.001	-0.001	0.0011	2.09
240	240.0002000	240.000	0.001	0.0012	2.08
360	360.0002580	360.000	0.001	0.0012	2.07
480	480.0003400	480.000	0.000	0.0013	2.05
600	599.9999800	599.998	0.002	0.0013	2.04

4. Effect of Tare test:

Tare Load (g)	Test Load (g)	Indication (g)	Correction (g)
300	30.000061	30.001	-0.001
	60.000070	60.000	0.000
	90.000091	89.999	0.001
	120.000137	119.999	0.001
	150.000146	149.998	0.002

Remark:

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

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เอกสารไม่ควบคุม



มูลนิธิเพื่อการพัฒนาอาหาร
ศูนย์บริการห้องปฏิบัติการอาหาร
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center



Calibration Certificate

Certificate No.: 2602303-007-01

Page : 1 of 2

Equipment: Autoclave
Manufacturer: ALP
Model: CL-401
Serial No.: 008763
ID No.: UAE.MK.026/2563
Order No.: 2602303
Operation No.: 2602303-007
Date of Receipt: 11 March 2026
Date of Calibration: 11 March 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road
Bangkok, Phrakhanong, Bangkok 10260

Metrological traceability:

1. Calibration Method:

- This instrument was calibrated by inserting 3 standard data loggers with RTDs into its autoclave, in accordance with W-TE-018, based on BS 2645-1:2021, Autoclaves for sterilization in laboratories Part 1: Design, construction, safety and performance - specification.
- The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).
- All data shown below are final values, and the initial data may be obtained upon request.

2. Reference Standard Instrument:

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with RTD (Data Logger)	HTemp140-PT	S33753	2502245-002-01	22 March 2026	NATIONAL JUNE INSTITUTE
	HTemp140	S25802	2601300-004-01	10 January 2027	NATIONAL RESEARCH INSTITUTE
	PRTemp140	R39545	2601300-003-01	10 January 2027	NATIONAL FOOD INSTITUTE

- This certificate is traceable to the International System of Units (SI).
- This certificate is valid only for the instrument that was calibrated.
- The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by Mr.Nuttapoi Niyomchat
Specialist

Approved by
(Mr.Pheraphat Tuanjit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 18 March 2026

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme 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. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 02 Date: 01-10-68

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2008-260898-00000000 26 0000000000000000 0000000000000000 107000000000000000
Tel: +66(0) 2-422-8668 Fax: +66(0) 2-422-8645



Calibration Certificate

Certificate No.: 2602303-007-01

Page : 2 of 2

Calibration Condition:

Equipment: Autoclave
Resolution: 0.1 °C
Condition of the item: Normal & Good
 Without adjustment / As Found
 - Setting program function sterilization STERILIZE(NORMAL)
 - Time of sterilization 15 Minute at 115.0, 121.0 °C

Place of Calibration: Room 301
Environment Conditions: Ambient Temperature (26.0 ± 1) °C
 Relative Humidity (47.5 ± 3) %
 Line Voltage (228.5 ± 4) V

Calibration Results:

Table1 : Reporting of Temperature

Calibration Point (°C)	Measured Temperature (°C) @ Sensor No.			Measurement Uncertainty (±°C)
	Std.# 1	Std.# 2 (REF)	Std.# 3	
115.0	115.29	115.33	115.37	0.64
121.0	121.17	121.18	121.06	0.64

Table 2 : Reporting of Characterization Results

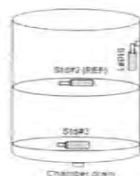
UUC* Setting (°C)	Max	UUC* Reading (°C)		MPa	Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
		Min	Average				
115.0	115.1	114.9	115.0	0.08	0.23	0.53	0.51
121.0	121.1	120.9	121.0	0.12	0.24	0.67	0.67

Note

- * UUC* : Unit Under Calibration
 - The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity)"
 - Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.
 - 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.
 - Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.
- For more information, details of the sensor installation should be reported.

Standard at position

- Std.#1 : Reference liquid temperature profile within 20 mm
- Std.#2 (REF) : Reference liquid temperature
- Std.#3 : Reference liquid temperature



Chamber diagram

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

----- End of Report -----

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