

Grande Centre Point

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ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์

List of Instruments Certification for Water Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Water									
1	pH Meter	pH	Horiba	LAQUA-PH210 HA0D0081	Technology Promotion Association (Thailand-Japan)	24CH815	10 Jul 24	9 Jul 25	



Certificate of Calibration

Cert.No.: 24CH815
Page.: 1 of 3

Equipment : pH Meter
Manufacturer : Horiba
Model : LAQUA-PH210
Serial No. : HA0D0081
ID No. : UAE.EFM.074/2584(EFM,pH,07/64)
Condition As-Received: Used Item
Received Date : 09 July 2024
Calibration Date : 10 July 2024
Reference : 2407-0334WSC-3
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phraekhanong, Bangkok 10280

Ambient Temperature : $(25 \pm 2.5) ^\circ\text{C}$
Relative Humidity : $(50 \pm 15) \%$
Calibration Procedure : In-house method :
- CP-CH5 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with temperature standard

Calibrated by :

Approved by :

() Unnopphol Harachai
() Ponpan Palpin
(✓) Saithip Meangmai

Issue Date :

14 July 2024

Condition of this calibration result:

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	23E2802	27 Aug 2024
2) Ref. Standard Thermometer	2188080	130RC044	23I1218	10 Oct 2024

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

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

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	970851	25 Apr 2026
pH 6.986	CPA chem	970852	25 Apr 2025
pH 9.997	CPA chem	970853	25 Apr 2025

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

Calibration Results

Function : mV Measurement

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

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement ($\pm\text{mV}$)	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N.: HA0D0081	4.000	177.48	177.4	4.01	0.058	2.00
	7.000	0.00	0.1	6.98	0.058	2.00
	7.000	0.00	0.1	6.98	0.058	2.00
	10.00	-177.48	-177.4	10.01	0.058	2.00

The Uncertainties are for a confidence probability of approximately 95%

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

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เอกสารไม่ควบคุม



Cert.No.: 24CH815
Page.: 3 of 3

Calibration Results

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (\pm)	Coverage factor k
pH Electrode S/N.: Q9AD0211	4.008	4.01	174.4	0.0085	2.05
	6.986	7.00	-1.3	0.0099	2.00
	6.986	7.00	-1.8	0.0093	2.00
	9.997	10.01	-177.0	0.0096	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe,

- Model : 9852-10D
- Serial No. : Q9AD0211

Dimension of probe

Length : 103 mm
Diameter : 16 mm
Immersion Depth : 90 mm

Calibration Point ($^\circ\text{C}$)	Standard Temperature ($^\circ\text{C}$)	UUC* Reading ($^\circ\text{C}$)	Error ($^\circ\text{C}$)	Uncertainty of measurement ($\pm\text{ }^\circ\text{C}$)	Coverage factor k
25.0	25.002	25.0	-0.002	0.13	2.00
30.0	30.003	30.0	-0.003	0.13	2.00
35.0	35.002	35.0	-0.002	0.13	2.00

Remark : - UUC* = Unit Under Calibration

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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List of Instruments Certification for Environmental Quality Analysis

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	pH Meter	pH	HANNA instruments	HI2020-02 / C0051107	National Food Institute, Ministry of Industry, Thailand	2404042-001-01	21 Aug 24	20 Aug 25	-
2	pH Meter		Mettler-Toledo	Seven Compact S220 / C113432421	National Food Institute, Ministry of Industry, Thailand	2403175-001-01	25 Jun 24	24 Jun 25	-
3	Incubator	Coliform Bacteria	Binder	KB 400 E6 / 20220000022479	Technology Promotion Association (Thailand-Japan)	24TM938	19 Jul 24	18 Jul 25	-
4	Incubator	Staphylococcus aureus	Binder	BD 53 / 13-07343	National Food Institute, Ministry of Industry, Thailand	2403982-003-01	7 Aug 24	6 Aug 25	-
5	Water Bath	Pseudomonas aeruginosa	Memmert	WNE 14 / L407.0756	Technology Promotion Association (Thailand-Japan)	24TM1016/1	5 Aug 24	4 Aug 25	-
6	Water Bath	Leginella spp.	Memmert	WNE 14 / L401.0569	Technology Promotion Association (Thailand-Japan)	24TM1017/1	5 Aug 24	4 Aug 25	-
7	Auto Clave		ALP	CL-40L / 807298	National Food Institute, Ministry of Industry, Thailand	2403982-001-01	7 Aug 24	7 Aug 25	-
8	Auto Clave		ALP	CL-40L / 808763	National Food Institute, Ministry of Industry, Thailand	25022229-007-01	13 Mar 25	12 Mar 26	-
9	Analytical Balance		Mettler-Toledo	MS603S / 01 / B007010311	National Food Institute, Ministry of Industry, Thailand	2402284-001-01	2 Apr 24	2 Apr 25	-
10	Analytical Balance		Mettler-Toledo	XSR205DUJ / C210685394	Technology Promotion Association (Thailand-Japan)	25022226-002-01	20 Mar 25	20 Mar 26	-

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

Calibration Certificate

Certificate No.: 2404042-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhong, Bangkok 10280

Page 1 of 5

Equipment: pH Meter
Manufacturer: HANNA Instruments
Model: HI2020-02
Serial No.: C0051107
ID No.: UAE.WAO.005/2557
Order No.: 2404042
Operation No.: 2404042-001
Date of Receipt: 14 August 2024
Date of Calibration: 21 August 2024

Calibrated by Mr. Manas Somsak Specialist
Approved by [Signature]
Manager,
Responsible for the Technical Management Team

Date of Issue: 21 August 2024

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 this laboratory and its capability to recognize 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-C5-009 Revision: 01 Date: 20-04-65

Calibration Report

Certificate No.: 2404042-001-01
Equipment: pH Meter
Resolution: 0.01 pH 0.1 mV
Manufacturer: HANNA Instruments
Model: HI2020-02
Serial No.: C0051107
Type: Bench top
ID No.: UAE.WAO.005/2557

Date of Calibration: 21 August 2024 Page 2 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: (23.1 ± 0.1 °C) Relative Humidity: (55 ± 3) %
Condition of Equipment: Good Condition
Condition of this Results of Calibration

1. Calibration Method: W-CO-002 - In house method based on direct measurement by using standard voltage calibrator and certified reference material (CRM)

2. Reference Standards / Certified Reference Material:

Instrument	Serial / ID No.	Manufacturer	Certificate No.	Due Date
2.1 DC Voltage Calibrator	2769007	Fuke	24E1752	30 May 2025
2.2 Digital Thermometer	2769007	Fuke	CC 680910-41	30 October 2024
2.3 Thermal-Hygro Meter	NF512H 015/23	Isero	GR24-0432	4 March 2025
Certified Reference Material				
	Lot No.	Manufacturer	Ref. No.	Expiry Date
2.4 pH buffer 4.005 (Primary pH buffer Solution)	611603	CPAchem	PH211L.6	18 February 2025
2.5 pH buffer 6.865 (Primary pH buffer Solution)	873603	CPAchem	PH217.1.6	18 February 2025
2.6 pH buffer 10.01 (Primary pH buffer Solution)	945169	CPAchem	PH229.1.6	30 November 2024
2.7 pH buffer 7.00 (Standard pH buffer Solution)	C04104	WACHSANGE GmbH	S118004	18 October 2025

3. This calibration is traceable to The International System of Units (SI Unit)

- 3.1 Instruments No. 2.1: through NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No. 0006
- 3.2 Instruments No. 2.2: through NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No. 0281
- 3.3 Instruments No. 2.3: through NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No. 0282
- 3.4 Certified Reference Material No. 2.4 to 2.6: traceable to Primary measurement method - Hained cell using calibrated thermometer, barometer, and nanovoltmeter The Standard Solution preparation and carried by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025
- 3.5 Certified Reference Material No. 2.7: traceable to PTB Certificate Nr. PTB-PH04-96350604/23 and Certificate Nr. PTB-PH04-95650602/22 (PTB, Physikalisch-Technische Bundesanstalt, Braunschweig, Germany)

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

F-C5-012 Revision: 01 Date: 20-04-65

Calibration Report

Certificate No.: 2404042-001-01
Equipment: pH Meter
Resolution: 0.001 pH 0.1 mV
Manufacturer: HANNA Instruments
Model: HI2020-02
Serial No.: C0051107
Type: Bench top
ID No.: UAE.WAO.005/2557

Date of Calibration: 21 August 2024 Page 2 of 5

Calibration Results: (Manual Temperature Compensation at 25 °C)

1. Calibration of pH Meter

Nominal pH	DC Voltage Standard (mV)	Average Indicator Reading		Uncertainty (mV)	Coverage Factor (k)
		mV	pH		
0	414.122	421.0	-0.001	0.063	2.00
2	265.815	302.7	1.999	0.063	2.00
4	177.463	164.3	4.000	0.063	3.00
6	59.160	86.0	8.000	0.063	2.00
7	0.001	8.6	7.001	0.063	2.00
8	-59.139	-52.3	6.000	0.063	2.00
10	-177.462	-170.6	10.000	0.063	2.00
12	-265.813	-269.0	12.002	0.063	2.00
14	-414.121	-407.3	14.002	0.063	2.00

2. Calibration of pH Meter with Electrode (Manual Temperature Compensation at 25 °C)

Equipment: pH Electrode Type: Combined Electrode
Manufacturer: HANNA Instruments Model: HI1319
Serial No.: 639660 ID No.: N/A

Performance of Electrode system (Three-Point Calibration at pH 4, 7 and 10)

Certified Value (25 °C (pH))	Average Indicator Reading		Relative Slope (%)	Uncertainty (± pH)	Coverage Factor (k)
	pH	mV			
4.008	4.011	173.4	-	0.0045	2.00
7.001	7.004	-1.5	95.8	0.0073	2.00
9.997	10.011	-175.9	99.9	0.0072	2.00
6.865	6.870	6.4	-	0.0049	2.00

F-C5-012 Revision: 01 Date: 20-04-65

Calibration Report

Certificate No.: 2404042-001-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: HI2020-02
Serial No.: C0051107 ID No.: UAE.WAO.005/2557
Manufacturer: HANNA Instruments

Date of Calibration: 21 August 2024 Page 4 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: 23 °C ± 1 °C
Relative Humidity: 50 % ± 10 %

Condition of this results of Calibration:

- 1. Calibration Method: - In house method: W-TE 025 by comparison with standard thermometer.
- The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.
- The temperature scale in use at this laboratory is the International Temperature scale of 1990 (ITS-90)

2. Reference Standard Instrument:

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER	1521	A85997	TE 879101-01	16-Dec-24	NATIONAL FOOD INSTITUTE
Platinum Resistance Thermometer (PRT)		508701			

Support Equipment: - Low Temperature Bath (AMETEK RTC-167) Model: RTC-167C, S/N: 670930-00916

3. This certificate is traceable to International System of Units (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

6. Condition of Calibrated Item: Good

7. Result of Calibration: ☒ Without adjustment ☐ After adjustment

F-C5-012 Revision: 01 Date: 20-04-65

Calibration Report

Certificate No.: 2404042-001-01

Equipment: Digital Thermometer with RTD (pH Meter)

Resolution: 0.1 °C Model: HI2020-02
 Serial No.: C0051107 ID No.: UNE WAO GC 2557
 Manufacturer: HANNA Instruments

Date of Calibration: 21 August 2024

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Calibration point: 15.0, 20.0 and 25.0 °C

Calibration result:

- The probe was immersed in liquid bath or dry bath to a minimum depth of 120 mm

- Description of probe, model: HI11110 S/N: 539850

Dimension of probe: Diameter 12 mm, Length 120 mm.

Sheath material: Glass

UUC Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.0	14.998	0.0	0.099
20.0	19.999	0.0	0.099
25.0	24.999	0.0	0.099

Note

- UUC: Unit Under Calibration

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 -----

FCS-012 Revision 01 Date: 20-04-66

2006 ถนนสุขุมวิท 36 แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10700

2006 Soi 36, Anan Road, Bang Khwa Subdistrict, Bang Phae District Bangkok 10700 Thailand

Tel: +6683 4422 8059 Fax: +6683 4422 8515

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Calibration Certificate

Certificate No.: 2403175-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhong, Bangkok 10260

Page 1 of 5

Equipment: pH Meter
Manufacturer: METTLER ROLEDO
Model: SevenCompact 8220
Serial No.: C113432421
ID No.: UAE.WAT.009/2564

Order No.: 2403175
Operation No.: 2403175-001
Date of Receipt: 13 June 2024
Date of Calibration: 25 June 2024

Calibrated by Mr.Phoraphat Tuanjit
Scientist
Approved by [Signature]
Specialist, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 28 June 2024

The uncertainty is for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the recognition granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its necessity to recognize 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: 20-04-65

Calibration Report

Certificate No.: 2403175-001-01
Equipment: pH Meter
Resolution: 0.01 pH 1 mV
Manufacturer: METTLER ROLEDO
Model: SevenCompact 8220
Serial No.: C113432421
Type: Bench top
ID No.: UAE.WAT.009/2564

Date of Calibration: 25 June 2024 Page 2 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: 22.5 ± 1.5 °C Relative Humidity: $(50 \pm 3) \%$
Condition of Equipment: Good Condition
Condition of this Results of Calibration

1. Calibration Method: W-CC-002: In house method based on direct measurement by using standard voltage calibrator and certified reference material (CRM)

2. Reference Standards / Certified Reference Material:

Instrument	Serial / ID No.	Manufacturer	Certificate No.	Due Date
2.1 DC Voltage Calibrator	Z709007	Fuke	24E1752	30 May 2025
2.2 Digital Thermometer	Z709007	Fuke	CG 680570-01	30 October 2024
2.3 Thermo-Hygro Meter	NFI BTH 01023	Exmo	CR24-0482	4 March 2025
Certified Reference Material				
	Lot No.	Manufacturer	Ref No	Expiry Date
2.4 pH buffer 4.000 (Primary pH buffer Solution)	573805	CPAchem	PH219.L5	16 February 2025
2.5 pH buffer 8.965 (Primary pH buffer Solution)	573609	CPAchem	PH217.L5	16 February 2025
2.6 pH buffer 10.01 (Primary pH buffer Solution)	948169	CPAchem	PH220.L5	30 November 2024
2.7 pH buffer 7.00 (Standard pH buffer Solution)	C03109	HACH LANGE GmbH	S11M09/1	16 October 2025

3. This certification is traceable to The International System of Unit (SI Unit)

3.1 Instruments No. 2.1	through	NFI-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0055
3.2 Instruments No. 2.2	through	NFI-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0051
3.3 Instruments No. 2.3	through	NFI-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0252
3.4 Certified Reference Material No. 2.4 to 2.6	traceable to	Primary measurement method - Based on using calibrated thermometer, barometer, and microclimate. The Standard Solution preparation and certified by CPAchem Ltd is according to ISO 17034 and ISO/IEC 17025

3.5 Certified Reference Material No. 2.7
PTB Certificate No. PTB-PHCA-883/0804023 and Certificate No. PTB-PHOB-555/0802022 (PTB: Physikalisch-Technische Bundesanstalt Braunschweig, Germany)

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.

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

Calibration Report

Certificate No.: 2403175-001-01
Equipment: pH Meter
Resolution: 0.01 pH 1 mV
Manufacturer: METTLER ROLEDO
Model: SevenCompact 8220
Serial No.: C113432421
Type: Bench top
ID No.: UAE.WAT.009/2564

Date of Calibration: 25 June 2024 Page 3 of 5

Calibration Results:

1. Calibration of pH Meter (Manual Temperature Compensation at 25 °C)

Nominal pH	DC Voltage Standard (mV)	Average Indicator Reading		Uncertainty (±mV)	Coverage Factor (k)
		mV	pH		
0	414.122	414	0.00	0.56	2.00
2	286.910	286	2.00	0.56	2.00
4	177.463	177	4.00	0.56	2.00
6	59.160	59	6.00	0.56	2.00
7	0.00	0	7.00	0.56	2.00
8	-59.159	-59	8.00	0.56	2.00
10	-177.462	-177	10.00	0.56	2.00
12	-286.913	-286	12.00	0.56	2.00
14	-414.121	-414	14.00	0.56	2.00

2. Calibration of pH Meter with Electrode (Manual Temperature Compensation at 25 °C)

Equipment: pH Electrode Type: Combined Electrode
Manufacturer: METTLER ROLEDO Model: InLab Expert ProISM
Serial No.: 4114092 ID No.: N/A

Performance of Electrode system (Three-Point Calibration at pH 4, 7 and 10)

Certified Value @25 °C (pH)	Average Indicator Reading		Relative Slope (%)	Uncertainty (± pH)	Coverage Factor (k)
	pH	mV			
4.008	4.00	176	-	0.0071	2.00
7.001	7.00	1	98.60	0.0086	2.00
9.997	10.00	-174	98.60	0.0092	2.00
6.885	6.86	9	-	0.0075	2.00

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

Calibration Report

Certificate No.: 2403175-001-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenCompact 8220
Serial No.: C113432421 ID No.: UAE.WAT.009/2564
Manufacturer: METTLER TOLEDO

Date of Calibration: 25 June 2024 Page 4 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: 23.0 ± 1 °C
Relative Humidity: $50 \pm 5 \%$

Condition of this results of Calibration:

- Calibration Method:
 - In house method W-TE-025 by comparison with standard thermometer.
 - The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.
 - The temperature scale in use at this laboratory is the international Temperature scale of 1990 (ITS-90)

2. Reference Standard Instrument

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDBERG THERMOMETER	1521	A85997	TE 670101-01	16-Dec-2024	NATIONAL FOOD INSTITUTE
Platinum Resistance Thermometer (PRT)	385	309201			

Support Equipment: - Low Temperature Bath (ISOCAL-6), Model: Europa-5 Plus Basic, S/N: 3415982

3. This certificate is traceable to International System of Units (SI Units).

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.

6. Condition of Calibrated item: Good

7. Result of Calibration: ☒ Without adjustment ☐ After adjustment

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




Equipment : Incubator
Condition As-Received : Used Item
Reference : 2407-0153OC-4
Procedure Used :-

Cert. No.: 24TM838
Page : 2 of 3

Certificate of Calibration

Cert. No.: 24TM838
Page : 1 of 3

Equipment : Incubator
Manufacturer : Binder
Model : KB 400 E6
Serial No. : 20220000022479
ID No. : UAE.MIC.028/2566
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 09 July 2024
Calibration Date : 09 July 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : 
Approved by :
() Porpan Paipim
(✓) Suwit Imjai
() Kunchit Promprat

Issue Date : 19 July 2024

The Uncertainties are for a confidence probability of approximately 95%

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

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Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY49001451	24LM44	TPA	17 Mar 2025

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

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

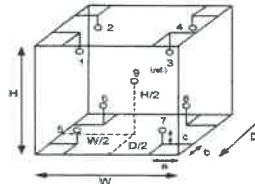
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	23	24
REL.Humid. (%)	52	54
AC Supply (Volt)	221	222



Probe Installation Details :

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

Dimension of Chamber :

D = 0.47 m
W = 0.65 m
H = 1.2 m
Capacity = 0.37 m³

Position :	Ref. Std. ID No.:
1	19RTD-2/1
2	19RTD-2/2
3	19RTD-2/3
4	19RTD-2/4
5	19RTD-2/5
6	24-19RTD-2/6
7	19RTD-2/7
8	19RTD-2/8
9 (ref.)	19RTD-2/9

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2407-0153OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 24TM838
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
35.0	35.0	35.0	0.030	0.31	0.33	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
35.0	35.093	35.011	35.081	35.118	34.840	35.054	34.924	34.973	34.824	0.30

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

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

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

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

UUC* : Unit Under Calibration

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

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

-000-

เอกสารไม่ควบคุม

Calibration Certificate

Certificate No.: 2403982-003-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udumsook 41, Sukhumvit Road,
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: BINDER
Model: BD 53
Serial No.: 13-07343
ID No.: UAE.MIC.005/2558
Order No.: 2403982
Operation No.: 2403982-003
Date of Receipt: 7 August 2024
Date of Calibration: 7 August 2024

Calibrated by Mr.Manas Somsak Specialist
Approved by [Signature]
Vice President, Department of Laboratory Services
Responsible for the Technical Management Team
Date of Issue: 14 August 2024

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: 20-04-65

2009 อาคารส่งเสริมและพัฒนาอุตสาหกรรม การบริการห้องปฏิบัติการอุตสาหกรรม 10700
2009 โซ 36, ถนนอุทุมสุโขทัย แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10700
โทร +662 2461 8558 โทร +662 2461 8545

Calibration Report

Certificate No.: 2403982-003-01
Equipment: CHAMBER (Incubator)
Model: BD 53 Serial No.: 13-07343
Resolution: 0.1 °C ID No.: UAE.MIC.005/2558
Manufacturer: BINDER

Date of Calibration: 7 August 2024 Page 2 of 3

Location: MICROBIOLOGY LABORATORY (362), UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition:
Ambient Temperature (24.8 ± 1) °C
Relative Humidity (55 ± 5) %
Line Voltage (230 ± 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	MY59002902	TE 670478-01	4 May 2025	NATIONAL FOOD INSTITUTE
	RTD	CH261-209/ RTD#261-209			

3. This certificate is traceable to International System of Units (SI Units).

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.

6. Condition of Calibrated Item : Good

UUC Description :

Time of Record 1 Hour 9 Minute At 44.0 °C
Fresh air Damper
☒ Open Position ☐ Close Fan ☐ Not Available

7. Result of Calibration : ☐ Without adjustment ☒ After adjustment

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

2009 อาคารส่งเสริมและพัฒนาอุตสาหกรรม การบริการห้องปฏิบัติการอุตสาหกรรม 10700
2009 โซ 36, ถนนอุทุมสุโขทัย แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10700
โทร +662 2461 8558 โทร +662 2461 8545

Calibration Report

Certificate No.: 2403982-003-01
Equipment: CHAMBER (Incubator)
Model: BD 53 Serial No.: 13-07343
Resolution: 0.1 °C ID No.: UAE.MIC.005/2558
Manufacturer: BINDER

Date of Calibration: 7 August 2024 Page 3 of 3

Calibration point: 44.0 °C

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	24.8	50	227.0
MAX	24.9	60	232.0

Table 1 : 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	
44.0	44.24	44.33	44.30	44.46	43.42	43.51	43.40	43.53	43.97	0.30

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
44.0	44.0	44.0	44.0	0.083	0.57	1.2

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 of confidence of approximately 95 %.

----- End -----

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

2009 อาคารส่งเสริมและพัฒนาอุตสาหกรรม การบริการห้องปฏิบัติการอุตสาหกรรม 10700
2009 โซ 36, ถนนอุทุมสุโขทัย แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10700
โทร +662 2461 8558 โทร +662 2461 8545



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2407-0153OC-6
Procedure Used :-

Cert. No.: 24TM1016/1
Page : 2 of 3

Certificate of Calibration

Cert. No.: 24TM1016/1
Page : 1 of 3

This Certificate was issued to replace to the Certificate No. 24TM1016
Equipment : Water Bath

Manufacturer : Memmert

Model : WNB 14

Serial No. : L407.0756

ID No. : UAE.MIC.024/2550

Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260

Location : Microbiology Laboratory

Received Order : 09 July 2024

Calibration Date : 09 - 10 July 2024

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by :

Approved by :

() Ponpan Paipim
(✓) Suwit Imjai
() Kunchit Promprat

Issue Date : 5 August 2024

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม

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	23LM208	TPA	27 Dec 2024

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

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

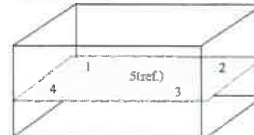
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	26	67	221
Finished of Calibration	27	66	222



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 : 2407-0153OC-6
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 24TM1016/1
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)					Uncertainty (± °C)
			1	2	3	4	5 (ref.)	
41.0	41.6	41.8	41.004	40.988	41.027	40.988	41.000	0.15
44.5	45.2	45.2	44.498	44.461	44.468	44.449	44.496	0.15
45.0	45.7	45.7	44.969	44.927	44.931	44.914	44.960	0.15

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
41.0	0.085	0.041	2
44.5	0.089	0.038	2
45.0	0.095	0.036	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

Cert. No.: 24TM1017/1
Page : 1 of 3

This Certificate was issued to replace to the Certificate No. 24TM1017

Equipment : Water Bath

Manufacturer : Memmert

Model : WB 14

Serial No. : M01.0569

ID No. : UAE.MC.004/Z544

Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phraekhanong,
Bangkok 10260

Location : Microbiology Laboratory

Received Order : 09 July 2024

Calibration Date : 09 July 2024

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by :

Approved by :

() Ponpan Paipim

(✓) Suwit Imjai

() Kunchit Promprat

Issue Date : 5 August 2024

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2407-0153OC-7
Procedure Used :-

Cert. No.: 24TM1017/1

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	MY59003411	23LM206	TPA	27 Dec 2024

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

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

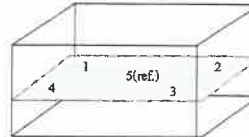
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	26	67	221
Finished of Calibration	26	70	222



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 : 2407-0153OC-7
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 24TM1017/1
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.)	
41.5	41.5	41.5	41.705	41.686	41.664	41.678	41.693	0.15

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
41.5	0.067	0.032	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 %.

-080-

เอกสารไม่ควบคุม

Calibration Certificate

Certificate No.: 2403982-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhong, Bangkok 10260

Page 1 of 3

Equipment: Autoclave
Manufacturer: ALP
Model: CL-40L
Serial No.: 807298
ID No.: UAE.MIC.019/2560
Order No.: 2403982
Operation No.: 2403982-001
Date of Receipt: 7 August 2024
Date of Calibration: 7 August 2024

Calibrated by Mr.Manee Somsak Specialist
Approved by [Redacted]
Vice President, Department of Laboratory Services
Responsible for the Technical Management Team
Date of Issue: 14 August 2024

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

Calibration Report

Certificate No.: 2403982-001-01
Equipment: Autoclave
Model: CL-40L Serial No.: 807298
Resolution: 1 °C ID No.: UAE.MIC.019/2560
Manufacturer: ALP

Date of Calibration: 7 August 2024

Page 3 of 3

Calibration point: 121 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
Min	28.0	55	224
Max	30.0	65	226



Table1 : Reporting of Temperature

Calibration Point (°C)	Measured Temperature (°C) @ Sensor No.2 (Sensor No.2 is REF)			Uncertainty ± (°C)
	Std.# 1	Std.# 2 (Ref)	Std.# 3	
121	122.43	122.44	122.44	0.65

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			
122	122	122	122	0.11	0.065	0.031	0.14

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 a level of confidence of approximately 95 %.

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

Calibration Report

Certificate No.: 2403982-001-01
Equipment: Autoclave
Model: CL-40L Serial No.: 807298
Resolution: 1 °C ID No.: UAE.MIC.019/2560
Manufacturer: ALP
Date of Calibration: 7 August 2024

Page 2 of 3

Location: MICROBIOLOGY LABORATORY (301), UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (29 ± 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)	OH-CP-HITEMP-140	Q88555	TE 670230-01	25-Feb-25	INTENSIVE FOOD INSTITUTE
	OH-CP-HITEMP-140	RS6951	TE 670231-01	25-Feb-25	NATIONAL FOOD INSTITUTE
	OH-CP-HITEMP-140	RS6916	TE 670232-01	25-Feb-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 121 °C

- Result of Calibration : ☒ Without adjustment
☐ After adjustment

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

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 **Approved by** [Redacted]
Scientist Manager, Division of Calibration Laboratory
Date of Issue: 25 March 2025 **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

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.

2. Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
Digital Thermometer with RTD (Data Logger)	HTemp190-PT	S39948	TE 670370-01	23-Mar-25	NATIONAL FOOD INSTITUTE
	HTemp140-PT	S33753	TE 670371-01	23-Mar-25	NATIONAL FOOD INSTITUTE
	HTemp140-PT	S29912	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
- Result of Calibration : ☒ Without adjustment
☐ After adjustment

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

Calibration Report

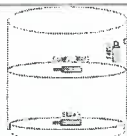
Certificate No.: 2502229-007-01
Equipment: Autoclave
Model: CL-40L **Serial No.:** 808763
Resolution: 0.1 °C **ID No.:** UAE.MIC.026/2563
Manufacturer: ALP
Date of Calibration: 19 March 2025

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	85	226



Serial Calibration
S1, S2, S3 is attached to the autoclave sensor probe.
S1, S2, S3 is in the center of the chamber.
S1, S2, S3 is in the center 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 -----

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



มูลนิธิศูนย์บริการ
การตรวจสอบและวิเคราะห์
อาหาร
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center



มูลนิธิศูนย์บริการ
การตรวจสอบและวิเคราะห์
อาหาร
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center



Calibration Certificate

Certificate No.: 2402284-001-01
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: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: MS603S/01

Serial No.: 8007010311

ID No.: UAE.TOX.008/2553

Order No.: 2402284

Operation No.: 2402284-001

Date of Receipt: 2 April 2024

Date of Calibration: 2 April 2024

Calibrated by: Mr. Jerawit Prapawuttipong
Scientist

Approved by: [Signature]
Manager

Date of Issue: 9 April 2024

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

Calibration Report

Certificate No.: 2402284-001-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: MS603S/01
Resolution: 0.001
Serial No.: 8007010311
ID No.: UAE.TOX.008/2553
Capacity: 620

Date of Calibration: 2 April 2024

Page 2 of 3

Environment Condition: Ambient Temperature: 24.5 \pm 0.5 $^{\circ}$ C Relative Humidity: 48 \pm 2.5 %

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

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-HA-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	8505567272	TCS	M220-0535	8 April 2024
Standard Weight Class E2	500g	8505567696	TCS	M220-0545	8 April 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-H1	NFI 017/17/23	Quality Robot	QR24-0344	9 February 2025

3. This certificate 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:

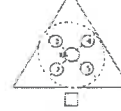
1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
300	0.00000
600	0.00048

2. Off-Center Error:

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	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
200.000	199.997	199.999	199.999	199.998	200.000	0.002

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



มูลนิธิศูนย์บริการ
การตรวจสอบและวิเคราะห์
อาหาร
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center



Calibration Report

Certificate No.: 2402284-001-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: MS603S/01
Resolution: 0.001
Serial No.: 8007010311
ID No.: UAE.TOX.008/2553
Capacity: 620

Date of Calibration: 2 April 2024

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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
Unloaded	0.0000	0.0000	0.0000	0.00082	2.00
0.1	0.1000	0.1000	0.0000	0.00082	2.00
0.5	0.5000	0.5000	0.0000	0.00082	2.00
1	1.0000	1.0000	0.0000	0.00082	2.00
2	2.0000	2.0000	0.0000	0.00082	2.00
5	5.0000	5.0000	0.0000	0.00082	2.00
10	10.0000	10.0000	0.0000	0.00082	2.00
20	20.0000	20.0000	0.0000	0.00082	2.00
50	50.0000	50.0000	0.0000	0.00082	2.00
100	100.0000	100.0000	0.0000	0.00082	2.00
150	150.0000	150.0000	0.0000	0.00082	2.00
200	200.0000	200.0000	0.0000	0.00082	2.00
300	300.0000	299.999	-0.001	0.00090	2.00
400	400.0000	399.998	-0.002	0.00100	2.00
500	500.0000	499.997	-0.003	0.0011	2.00
600	600.0000	599.996	-0.004	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 -----

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Standard Value (g)	Average Reading (g)	Error (g)	Correction (g)	Uncertainty (U) (g)	U + Error Total Error (g)	Judgment (g)	Result (Total Error < Judgment)
0	0.0000	0.000	0.000	0.00082	0.001	0.005	Pass
0.1	0.1000	0.100	0.000	0.00082	0.001	0.005	Pass
0.5	0.5000	0.500	0.000	0.00082	0.001	0.005	Pass
1	1.0000	1.000	0.000	0.00082	0.001	0.005	Pass
2	2.0000	2.000	0.000	0.00082	0.001	0.005	Pass
5	5.0000	5.000	0.000	0.00082	0.001	0.005	Pass
10	10.0000	10.000	0.000	0.00082	0.001	0.005	Pass
20	20.0000	20.000	0.000	0.00082	0.001	0.005	Pass
50	50.0000	50.000	0.000	0.00082	0.001	0.005	Pass
100	100.0000	100.000	0.000	0.00082	0.001	0.005	Pass
150	150.0000	150.000	0.000	0.00082	0.001	0.005	Pass
200	200.0000	200.000	0.000	0.00082	0.001	0.005	Pass
300	300.0000	299.999	-0.001	0.00090	0.002	0.010	Pass
400	400.0000	399.998	-0.002	0.00100	0.003	0.010	Pass
500	500.0000	499.997	-0.003	0.0011	0.004	0.010	Pass
600	600.0000	599.996	-0.004	0.0012	0.006	0.010	Pass

เอกสารไม่ควบคุม

