

ภาคผนวก จ
เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์

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
1	Auto Clave	TOTAL COLIFORM BACTERIA	ALP Co.,Ltd. (Japan)	CL-40L / 808763	National Food Institute, Thailand Ministry of Industry,	2602303-007-01	11 Mar 26	10 Mar 27	-
2	Incubator	FECAL COLIFORM BACTERIA TOTAL COLIFORM BACTERIA	Binder	KB400 / 20220000022479	National Food Institute, Thailand Ministry of Industry,	2503682 004 01	1 Jul 25	30 Jun 26	-
3	Incubator	FECAL COLIFORM BACTERIA TOTAL COLIFORM BACTERIA	Binder	KB400 / 20220000000391	National Food Institute, Thailand Ministry of Industry,	2503287-002-01	5 Jun 25	4 Jun 26	-
4	Water Bath	FECAL COLIFORM BACTERIA	Memmert	WNE 14 / L416.0612	Technology Promotion Association (Thailand-Japan)	26TM194	2 Feb 26	1 Feb 27	-

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

Calibration Certificate

Certificate No.: 2602303-007-01
Page : 1 of 2

Equipment: Autoclave
Manufacturer: ALP
Model: CL-40L
Serial No.: 808763
ID No.: UAE.MIC.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 Udomsak 41, Sukhumvit Road,
Bangchack, Prachanong, 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 2646-1:2021, 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)	HiTemp140-PT HiTemp140 PRTemp143	S33763 S25902 R35846	2502245-002-01 2601309-004-01 2601309-003-01	22 March 2026 13 January 2027 10 January 2027	NATIONAL FOOD INSTITUTE NATIONAL FOOD INSTITUTE 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 Niyomchai
Specialist

Approved by: [Signature]
(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.

FCS-009 Revision: 02 Date: 01-10-08



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 Minutes at 115.0, 121.0 °C

Place of Calibration: Room 201
UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD
Environment Conditions: Ambient Temperature (20.0 ± 1) °C
Relative Humidity (47.6 ± 3) %
Line Voltage (228.5 ± 4) V

Calibration Results:

Table 1 : 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	121.16	121.06	0.64

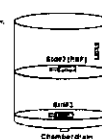
Table 2 : Reporting of Characterization Results

UUC ¹ Setting (°C)	Max	Min	Average	MPa	Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
115.0	115.1	114.9	115.0	0.06	0.23	0.63	0.51
121.0	121.1	120.9	121.0	0.12	0.24	0.67	0.67

Note

- UUC¹: 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 uncertainty
Std.#1 : Attached to the autoclave temperature probe, within 25 mm
Std.#2 (REF) : In the upper left side of the chamber
Std.#3 : In the chamber bottom, within 100 mm



The quoted 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

FCS-009 Revision: 02 Date: 01-10-08



Calibration Certificate

Certificate No.: 2503682-004-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsak 41, Sukhumvit Road,
Bangchack, Prachanong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturers: BINDER
Model: KB 400
Serial No.: 20220000022479
ID No.: UAE.MIC.028/2566
Order No.: 2503682
Operation No.: 2503682-004
Date of Receipt: 1 July 2025
Date of Calibration: 1 July 2025

Calibrated by: Mr.Pheraphat Tuanjit
Scientist

Approved by: [Signature]
(Miss Preeyaporn Jaengkarnkit)
Vice President, Department of Laboratory Services
Responsible for the Technical Management Team

Date of Issue: 3 July 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: 20-04-05



Calibration Report

Certificate No.: 2503682-004-01
Equipment: CHAMBER (Incubator)
Model: KB 400
Resolution: 0.1 °C
Manufacturer: BINDER
Serial No.: 20220000022479
ID No.: UAE.MIC.028/2566

Date of Calibration: 1 July 2025
Page 2 of 3

Location: Microbiology Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (21 ± 1) °C
Relative Humidity (55 ± 10) %
Line Voltage (230 ± 5) 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	MY59003377 CHP101-203 / RTD101-203	2501168-001-01	13 January 2026	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.

6. 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 100%
- Not Available

- Result of Calibration : X Without adjustment After adjustment

FCS-012 Revision: 01 Date: 20-04-05





Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2602-0004OC-2
Procedure Used :-

Cert. No.: 26TM194
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Certificate of Calibration

Cert. No.: 26TM194
Page : 1 of 3

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 14
Serial No. : L416.0612
ID No. : MIC.003/2560
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Sol Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory (302)
Received Order : 02 February 2026
Calibration Date : 02 February 2026
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Krisda Malee
Approved by :
() Chakrit Waewwanjua
() Suwit Injai
(✓) Kunchit Promprat
Issue Date : 17 February 2026

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 :

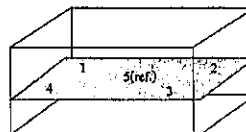
Remark : TPA : Technology Promotion Association (Thailand - Japan)

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	25	52	221
Finished of Calibration	24	51	220



Front

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

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

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2602-0004OC-2
Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 26TM194
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.)	
44.5	44.6	44.6	44.518	44.463	44.472	44.508	44.521	0.15

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
44.5	0.11	0.044	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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