

ภาคผนวก จ
เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์

List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*
1	Cooled Incubator	FECAL COLIFORM BACTERIA TOTAL COLIFORM BACTERIA	Binder	KB400 / WTB20200000015535	National Food Institute, Ministry of Industry, Thailand	2502229-006-01	19/3/2025	18/3/2026
2	Incubator	FECAL COLIFORM BACTERIA TOTAL COLIFORM BACTERIA	Binder	KB400 / 20220000022479	National food institute ministry of Industry	2503682 004 01	1/7/2025	30/6/2026
3	Incubator	LEGIONELLA SP.	Memmert	IPP260 / V616.0066	National Food Institute, Ministry of Industry, Thailand	2502229-002-01	19/3/2025	18/3/2026
4	pH Meter	pH	Horiba	LAQUA-PH210 / HA0D0082	technology promotion association (thailand-japan	25CH588	21/5/2025	20/5/2026

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

Calibration Certificate

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

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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
Scientist

Approved by

(Mr.Pheraphat Tuanjit)

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

เอกสารไม่ควบคุม



Calibration Report

Certificate No.: 2502229-006-01
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

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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-TF-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 :

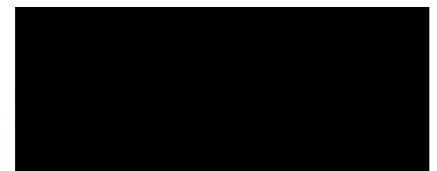
Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY49016851	TE 670477-01	4 May 2025	NATIONAL FOOD INSTITUTE
	RTD	CH#201-303 / RTD#201-303			

- 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

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



25 March 2025



Calibration Certificate

Certificate No.: 2503682-004-01
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.: 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 
(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.

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



Calibration Report

Certificate No.: 2503682-004-01
Equipment: CHAMBER (Incubator)
Model: KB 400 **Serial No.:** 20220000022479
Resolution: 0.1 °C **ID No.:** UAE.MIC.028/2566
Manufacturer: BINDER
Date of Calibration: 1 July 2025

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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	MY59003377	2501168-001-01	13 January 2026	NATIONAL FOOD INSTITUTE
	RTD	CH#101-203 / RTD#101-203			

- 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 100%
- Not Available

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



Calibration Certificate

Certificate No.: 2502229-002-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)

Manufacturer: MEMMERT

Model: IPP260

Serial No.: V616.0066

ID No.: UAE.MIC.032/2559

Order No.: 2502229

Operation No.: 2502229-002

Date of Receipt: 19 March 2025

Date of Calibration: 19 March 2025

Calibrated by Mr.Yothin Charoensuk
Scientist

Approved by

(Mr.Pheraphat Tuanjit)

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

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2008 ซอยสุขุมวิท 36 แขวงคลองตันใต้ เขตคลองเตย กรุงเทพมหานคร 10700

2008 Soi 36, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10700, Thailand



Calibration Report

Certificate No.: 2502229-002-01

Equipment: CHAMBER (Incubator)

Model: IPP260 Serial No.: V616.0066

Resolution: 0.1 °C ID No.: UAE.MIC.032/2559

Manufacturer: MEMMERT

Date of Calibration: 19 March 2025

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Location: 302, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Environment Condition:

Ambient Temperature (21.7 ± 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#201-209/ RTD#201-209			

- 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 25.0 and 36.0 °C

Fresh air Damper ☐ Open Position ☐

☒ Close Fan ☐

☐ Not Available

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



Calibration Report

Certificate No.: 2502229-002-01
Equipment: CHAMBER (Incubator)
Model: IPP260 **Serial No.:** V616.0066
Resolution: 0.1 °C **ID No.:** UAE.MIC.032/2559
Manufacturer: MEMMERT

Date of Calibration: 19 March 2025

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Calibration point: 25.0 and 36.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	21.3	58	220.0
MAX	22.0	60	225.0

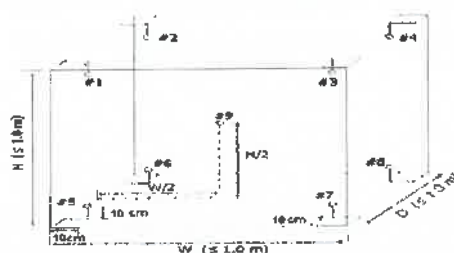


Table1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ± (°C)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
25.0	25.19	25.16	25.22	25.17	24.85	24.91	24.78	24.85	24.97	0.29
36.0	34.57	34.74	35.13	35.29	36.32	36.16	36.20	36.34	35.73	0.63

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
25.0	24.9	25.0	25.0	0.088	0.25	0.61
36.0	35.9	36.0	36.0	0.44	1.2	2.3

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 level of confidence of approximately 95 %.

----- End -----





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLIANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert.No.: 25CH588

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Equipment :	pH Meter
Manufacturer :	Horiba
Model :	LAQUA-PH210
Serial No. :	HA0D0082
ID No. :	UAE.EFM.072/2564(EFM.pH.05/64)
Condition As-Received:	Used Item
Received Date :	20 May 2025
Calibration Date :	21 May 2025
Reference :	2505-0802WSC-3
Submitted by :	United Analyst and Engineering Consultant Co.,Ltd. 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 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 :	Walalak Sirithean 
Approved by :	 Approved Signatory
() Chakrit Waewwanjua () Ponpan Paipim (✓) Salthip Meangmai	
Issue Date :	23 May 2025

The Uncertainties are for a confidence probability of approximately 95%

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

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Cert.No.: 25CH588

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Condition of this calibration result

1. Reference Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	54030049	130RC116	24E2759	25 Aug 2025
2) Ref. Standard Thermometer	4982054	110RC044	24I757	14 July 2025

- This measurement result is traceable to SI through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials :The measurement results are traceable to SI through Hach Lenge GmbH Ltd.,

Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00

:The measurement results are traceable to SI through CPA chem Ltd.,

ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.007	CPA chem	1066665	18 Jan 2027
pH 7.000	Hach Lenge GmbH	C03232	02 Dec 2026
pH 10.010	CPA chem	1066669	18 Jan 2026

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

Calibration Results

Function : mV Measurement

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

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N.: HA0D0082	4.00	177.48	177.3	4.01	0.058	2.00
	7.00	0.00	0.0	7.00	0.058	2.00
	7.00	0.00	0.0	7.00	0.058	2.00
	10.00	-177.48	-177.3	10.01	0.058	2.00

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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.: Q9AA0036	4.007	4.01	160.4	0.0086	2.05
	7.000	7.00	-13.5	0.0095	2.00
	7.000	7.01	-12.6	0.0096	2.00
	10.010	10.00	-186.0	0.0092	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : 9652-10D

- Serial No. : Q9AA0036

Dimension of probe

- Length : 103 mm.

- Diameter : 16 mm.

- Immersion Depth : 80 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (\pm °C)	Coverage factor k
15.0	15.002	15.0	-0.002	0.13	2.00
30.0	29.999	30.0	0.001	0.13	2.00
45.0	45.001	45.0	-0.001	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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