

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
Water									
1	pH	pH	Horiba	LAQUA-PH210 HA0F0026	Technology Prompton Association (Thailand-japan)	25CH22	9 Jan 25	8 Jan 26	-



Certificate of Calibration

Cert.No.: 25CH22
Page: 1 of 3

Equipment : pH Meter
Manufacturer : Horiba
Model : LAQUA-PH210
Serial No. : HAQF0026
ID No. : UAE.EFM.068/2564(EFM.pH.01/64)
Condition As-Received: Used Item
Received Date : 08 January 2025
Calibration Date : 09 January 2025
Reference : 2501-0223WSC-1
Submitted by : United Analyt 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 : Warakorn Lemgagtrakul

Approved by :

() Pomthippa Tameyakul
() Ponpen Palpim
(✓) Saithip Meangmai

Issue Date : 10 January 2025

Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	24E2759	25 Aug 2025
2) Ref. Standard Thermometer	4982084	110RC044	241757	14 July 2025

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

2. Certified Reference Materials : The measurement results are traceable to SI through Hach Lange GmbH Ltd., Deutsche Akkreditierungsstelle, Accredited No.D-RM-16184-01-09
: The measurement results are traceable to SI through CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	1034203	27 Sep 2026
pH 7.000	Hach Lange GmbH	C03185	09 July 2026
pH 10.010	CPA chem	1034205	27 Sep 2025

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

Calibration Results

Function : 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.: HAQF0026	4.00	177.48	177.5	4.01	0.058	2.00
	7.00	0.00	0.1	7.00	0.058	2.00
	7.00	0.00	0.1	7.00	0.058	2.00
	10.00	-177.48	-177.3	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.: 25CH22
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 (±)	Coverage factor k
pH Electrode S/N.: -	4.008	4.01	186.1	0.0071	2.00
	7.000	7.00	10.2	0.0095	2.00
	7.000	7.00	10.0	0.0095	2.00
	10.010	10.01	-164.3	0.0092	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model :

- Serial No. :

Dimension of probe

- Length : 104 mm.

- Diameter : 15 mm.

- Immersion Depth : 90 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
15.0	15.002	15.0	-0.002	0.13	2.00
30.0	30.002	30.0	-0.002	0.13	2.00
45.0	45.004	45.0	-0.004	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	Mettler Toledo	SevenEasy WO-00067415	DKSH Technology Limited.	C07250197	9 Apr 25	7 Apr 26	-
2	Analytical Balance	FAT OIL AND GREASE	Mettler Toledo	AB2041-S/FACT B108115858	National Food Institute, Ministry of Industry, (Thailand-japan)	2502228-001-01	19 Mar 25	18 Mar 26	-
3	Analytical Balance	TOTAL SUSPENDED SOLIDS	Mettler Toledo	X5R205DU / C009071872	National Food Institute, Ministry of Industry, (Thailand-japan)	2502226-001-01	20 Mar 25	19 Mar 26	-
4	BOD Incubator	BIOCHEMICAL OXYGEN DEMAND	ARCO	UC4-1320 / 13URC4S013201	Technology Prompton Association (Thailand-japan)	25TM205	21 Feb 25	20 Feb 26	-
5	DO Meter	BIOCHEMICAL OXYGEN DEMAND	YSI	5100 / 11B 101863	Technology Prompton Association (Thailand-japan)	25TW29	17 Feb 25	17 Feb 26	-
6	Incubator	FECAL COLIFORM BACTERIA	Binder	KB 400 / 20200000015535	National Food Institute, Ministry of Industry, (Thailand-japan)	2502229-006-01	19 Mar 25	18 Mar 26	-
7	Kjeltec System Distilling unit	TOTAL KJELDAHL NITROGEN	Foss Tecator (Labtc)	KT200 / 91790524	FOSS South East Asia	13319	27 Jan 25	27 Jan 26	-
8	Digestion Units	TOTAL KJELDAHL NITROGEN	Foss	Tecator Digestor 2520 / 91905060	National Food Institute Ministry of Industry, Thailand	2501440-001-01	27 Jan 25	26 Jan 26	-
9	Water Bath	FECAL COLIFORM BACTERIA	Memmert	WINE 14 / L407.0756	Technology Prompton Association (Thailand-japan)	25TM1037	14 Jul 25	13 Jul 26	-

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



Certificate of Calibration

Equipment: pH METER
Model: SevenEasy
Serial No. (or ID.): 1230525212 (UAE.WAS.003/2553) Job No.: WO-00067415
Manufacturer: METTLER TOLEDO Page: 1 of 3
Electrode Serial No.: 1156883 Model: InLab Solids Brand: METTLER TOLEDO
Condition: In Condition

Customer: United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak Sub-District,
Phrakhanong District, Bangkok, THAILAND 10260

Environment Condition: Temperature 23 °C ± 2 °C
Humidity 60 %RH ± 15 %RH

Calibration Place: Environment Laboratory, DKSH Technology Limited.
2533 Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260 Thailand

Calibration By: Mr.Pongpisut Suebchantha
Calibration Date: 8 April 2025
The Method used: In house method, CAL-WI-58, base on ASTM E 70-07
Traceability: This certificate is traceable to SI Units, Sample Test is assured through primary measurement method Harned cell, through CPAchem Ltd. (ISO/IEC 17034) Certificate No. 1034229, 980704, 1034231 And pH Scale traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through Industrial Foundation Electrical and Electronics Institute Certificate No. CA20240267EA

Calibration Results:

pH Scale

Input	pH Meter Reading			Uncertainty of Measurement (mV)	Coverage Factor (k)
	(mV)	Error (mV)	(pH)		
414.12	414	-0.12	0.01	0.58	2.00
354.96	355	0.04	1.01	0.58	2.00
295.8	296	0.20	2.00	0.58	2.00
236.64	237	0.36	3.00	0.58	2.00
177.48	178	0.52	4.00	0.58	2.00
118.32	118	-0.32	5.00	0.58	2.00
59.16	59	-0.16	6.01	0.58	2.00
0	0	0.00	7.01	0.58	2.00
-59.16	-59	0.16	8.01	0.58	2.00
-118.32	-118	0.32	9.02	0.58	2.00
-177.48	-177	0.48	10.02	0.58	2.00
-236.64	-236	0.64	11.02	0.58	2.00
-295.8	-296	-0.20	12.02	0.58	2.00
-354.96	-355	-0.04	13.04	0.58	2.00
-414.12	-414	0.12	14.04	0.58	2.00

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).
These results may be affected by deviations from specified conditions. The results relate only to the items listed, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

เอกสารไม่ควบคุม

CAL-FM-C07-14: 9 Apr 2024

Delivering Growth - In Asia and Beyond.

บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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CAL-FM-C07-14: 9 Apr 2024

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Certificate No.: C07250197 Page 3 of 3

Practical slope and zero point*

The three-point calibration using three standard buffer solutions; pH 4.007, pH 6.886 and pH 10.010
-During calibration, display of pH meter reading; pH 4.00, pH 7.00 and pH 10.01

The practical slope of the pH electrode; 57.71 (mV/pH), 97.55%
The zero point of the pH electrode; 6.71 (pH)

Sample Test Results

Standard Buffer Solution (pH)	Unit Under Calibration (pH)	Difference (pH)	Uncertainty of Measurement (pH)	Coverage Factor (k)
4.007	4.00	-0.007	0.0070	2.00
6.886	7.00	0.014	0.0091	2.00
10.010	10.01	0.000	0.0074	2.00

* Calibration Marked * Not TISI Accredited * in this Certificate have been included for completeness.

The End of Certificate

บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

เอกสารไม่ควบคุม

CAL-FM-C07-14: 9 Apr 2024

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Certificate of Calibration

Equipment : Digital Thermometer with Probe
Model : SevenEasy
Serial No. : 1230525212
Manufacturer : METTLER TOLEDO
ID No. : UAE.WAS.003/2553

Certificate No. : C15250523
Issued Date : 08 April 2025
Job No. : WO-00067415
Page : 1 of 2
Condition : In Condition

Customer : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak Sub-District,
Phrakhanong District, Bangkok, THAILAND 10260

Environment Condition : Temperature: 22 °C ± 3 °C
Humidity: 50 %RH ± 20 %RH
Voltage: 220 VAC ± 10 %

Calibration Place : Thermo-Hygro Laboratory, DKSH Technology Limited.
2533 Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260 Thailand

Calibration By : Mr. Anat Karapilak

Calibration Date : 08 April 2025

The Method used : In house method, CAL-WI-19, by comparison with standard thermometer

Traceability : This certificate is traceable to the International System of Unit maintained by:
Quality Reborn Co.,Ltd. (QR)

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).
These results may be affected by deviations from specified conditions. The results relate only to the items listed, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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Delivering Growth - In Asia and Beyond.

CAL-FM-C15-14: 05 Dec 2022



Certificate No.: C15250523

Page: 2 of 2

Reference standard equipment:

Equipment	Certificate no	Cal. date	Next Cal. date
Digital Thermometer with Probs	QR24-0956	02 May 2024	02 May 2025

Calibration Results:

Without Adjustment

Sensor Type: RTD		Channel: -		
Diameter (mm): 4		Length (mm): 135		Immersion (mm): 135
Calibrate Point (°C)	STD. Reading (°C)	UUC. Reading (°C)	Correction of UUC (°C)	Uncertainty (± °C)
15.0	15.005	15.2	-0.185	0.076
25.0	25.007	25.2	-0.193	0.076
35.0	35.009	35.2	-0.191	0.076

The End of Certificate

Calibration Certificate

Certificate No.: 2502228-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Sol Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: AB204-S/FACT
Serial No.: B108115858
ID No.: UAE.AIR.016/2555
Order No.: 2502228
Operation No.: 2502228-001
Date of Receipt: 19 March 2025
Date of Calibration: 19 March 2025

Calibrated by Mr.Yothin Charoensuk
Scientist

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.

FS-012 Revision: 01 Date: 30.04.45

Calibration Report

Certificate No.: 2502228-001-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: AB204-S/FACT
Serial No.: B108115858
Capacity: 220 g
Resolution: 0.0001 g
ID No.: UAE.AIR.016/2555

Date of Calibration: 19 March 2025

Page 2 of 3

Environment Condition: Ambient Temperature: 21.1 ± 0.6 °C Relative Humidity: 55 ± 0.75 %

Place of Calibration: 206 Balance Room 2, 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	8905567572	TCS	M24041005	19 April 2025
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-H1	NFLBTH1 017/23	Quality Reborn	QR25-542	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)
100	0.000079
200	0.000067

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)
100.0002	100.0000	99.9998	100.0002	100.0003	100.0001	0.0004

FS-012 Revision: 01 Date: 30.04.45

Calibration Report

Certificate No.: 2502228-001-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: AB204-S/FACT
Serial No.: B108115858
Capacity: 220 g
Resolution: 0.0001 g
ID No.: UAE.AIR.016/2555

Date of Calibration: 19 March 2025

Page 3 of 3

Calibration Results: (Continued)

Calibration Range: 0-200 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
Uncal	0.00000	0.0000	0.0000	0.000096	2.00
0.1	0.10001	0.1000	0.0000	0.000096	2.00
1	1.00000	0.9999	0.0001	0.000097	2.00
3	3.00003	3.0000	0.0000	0.000098	2.00
5	5.00002	4.9999	0.0001	0.000098	2.00
10	10.00001	10.0000	0.0000	0.000099	2.00
20	20.00003	20.0000	0.0000	0.00011	2.00
50	50.00003	50.0001	-0.0001	0.00012	2.00
70	70.00006	70.0000	0.0001	0.00014	2.00
100	100.00006	100.0000	0.0001	0.00016	2.00
150	150.00009	150.0001	0.0000	0.00021	2.00
200	200.00013	200.0001	0.0000	0.00028	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 -----

FS-012 Revision: 01 Date: 30.04.45

Calibration Certificate

Certificate No.: 2502226-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakanong, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: XSR205DU
Serial No.: C009071872
ID No.: UAE.WAO.012/2563
Order No.: 2502226
Operation No.: 2502226-001
Date of Receipt: 19 March 2025
Date of Calibration: 20 March 2025

Calibrated by Mr.Yothin Charoensuk
Scientist

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



Calibration Report

Certificate No.: 2502226-001-01
Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C009071872
Capacity: 82 g / 220 g
Manufacturers: METTLER TOLEDO
Resolutions: 0.00001 g / 0.0001 g
ID No.: UAE.WAO.012/2563

Page 2 of 4

Date of Calibration: 20 March 2025
Environment Condition: Ambient Temperature: 21.2 ± 0.6 °C Relative Humidity: 48 ± 3.5 %
Place of Calibration: 208 Balance Room, 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 8505567572 TCS M24041005 19 April 2025
Instrument Model Serial No. Calibrated By Certificate No. Due Date
Thermo Hygro Meter 608-111 NFIETH 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:

Table with 2 columns: Nominal Value (g), Standard Deviation of Reading (g). Rows for 40, 80, 100, 200g.

2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.
The balance reading obtained is given in the table

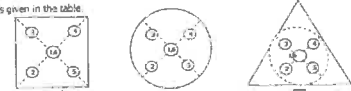


Table with 6 columns: Position (1-6), Reading (g), and Maximum Difference (g). Shows readings for 100.0001g to 100.0002g.

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



Calibration Report

Certificate No.: 2502226-001-01
Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C009071872
Capacity: 82 g / 220 g
Manufacturers: METTLER TOLEDO
Resolutions: 0.00001 g / 0.0001 g
ID No.: UAE.WAO.012/2563

Date of Calibration: 20 March 2025

Page 3 of 4

Calibration Results: (Continued)

Calibration Range: 0-80 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 0 - 82 g ; Resolution: 0.00001 g)

Table with 6 columns: Nominal Value, Standard Value, Average Reading, Correction, Uncertainty, Coverage Factor. Rows for 0.001g to 80g.

Calibration Report

Certificate No.: 2502226-001-01
Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C009071872
Capacity: 82 g / 220 g
Manufacturers: METTLER TOLEDO
Resolutions: 0.00001 g / 0.0001 g
ID No.: UAE.WAO.012/2563

Date of Calibration: 20 March 2025

Page 4 of 4

Calibration Results: (Continued)

Calibration Range: >80-200 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: >80 - 200 g ; Resolution: 0.00001 g)

Table with 6 columns: Nominal Value, Standard Value, Average Reading, Correction, Uncertainty, Coverage Factor. Rows for 90g to 200g.

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 -----

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





Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2502-0166OC-1
Procedure Used :-

Cert. No.: 25TM205
Page : 2 of 3

Certificate of Calibration

Cert. No.: 25TM205
Page : 1 of 3

Equipment : BOD Incubator
Manufacturer : Arco
Model : UC4-1320
Serial No. : 13URC4S013201
ID No. : UAE.WAO.015/2561
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Sol Udomsuk 41, Sukhumvit Road
Bangchak, Phrakhanong
Bangkok 10260
Location : Lab. Floor 2
Received Order : 08 February 2025
Calibration Date : 08 February 2025
Ambient Temperature : $(28 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$
AC Line Voltage : $(220 \pm 22) \text{ V}$

Calibrated by :

Approved by :

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

Issue Date : 21 February 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

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	MY57013823	24LM71	TPA	12 May 2025

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

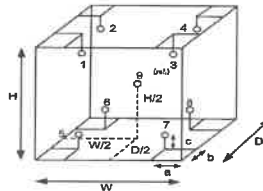
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	26	25
REL Humid. (%)	49	52
AC Supply (Volt)	221	220



Probe Installation Details :

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

Dimension of Chamber :

D = 0.62 m
W = 1.2 m
H = 1.2 m
Capacity = 0.89 m³

Position :	Ref. Std. ID No.:
1	21-17RTD-01
2	21-17RTD-02
3	17RTD-03
4	24-17RTD-04
5	17RTD-05
6	17RTD-06
7	17RTD-07
8	23-17RTD-08
9 (ref.)	23-17RTD-09



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2502-0166OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 25TM205
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
20.0	20.0	19.9	0.36	0.56	0.99	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (±°C)
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	19.841	19.714	20.110	19.862	19.747	19.710	19.676	19.789	19.695	0.54

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

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

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

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

UUC* : Unit Under Calibration

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

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

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Condition of this result of calibration

1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	14233821	110RC001	24MM131	04 July 2025

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate 5-Hydrate AR	KEMAUS	2203162447	99.6%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: 24F100202

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.22	8.22	0.0055

This report was certified only for the instrument we tested. It is allowable to use for study
Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced
other in full, without written approval of the laboratory

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Certificate of Testing

Equipment :	DO Meter
Manufacturer :	YSI
Model :	5100
Serial No. :	11B 101863
ID No. :	UAE.WAO.004/2554
Received Date :	14 February 2025
Test Date :	17 February 2025
Reference :	2502-0473DSC-1
Submitted by :	United Analyst and Engineering Consultant Co.,Ltd. 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Laboratory Condition :	Temperature (25 ± 5) °C Humidity (50 ± 20) %
Test Procedure :	In - house method : CP-CH9 by Comparison Technique with Azide Modification Method



Tested by :

Approved by :

() Chakrit Waewwanjua
() Ponpan Palpim
(✓) Saithip Meangmai

Issue Date :

18 February 2025

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 Prapewuttipong
Scientist

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: 20-04-65

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

Page 2 of 3

Location: LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Conditions: 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 TIAS 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

- Result of Calibration : X Without adjustment ☐ After adjustment

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

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

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

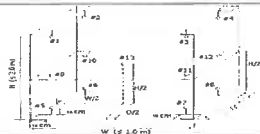


Table 1 : Reporting of Temperature

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	35.18	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 -----

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

FOSS

Customer Service Report

FOSS South East Asia
3388 Sirinrat Building, 25th - 26th Floor, Unit No. 3388/90,
Rama IV Road, Klongton, Klongtoey, Bangkok, Thailand 10110

Report No.: 13319

Date: Jan 27, 2025

Customer: UAE

Job No.: 11675

Address: Bangkok

Instrument: KT200

Serial: 91790524

Travel To Customer (Hrs)

Labour (Hrs)

Travel From Customer (Hrs)

Start
Finish

09.00
10.00

1

10.00
12.00

3

-

Job Type

Application		Special		Standard		
Distributor	x	Courtesy Visit	x	Installation	x	Training
Digital Service	x	PMA Onboarding	x	Quote	x	In House
Internal	x	Warranty	x	Repair	x	PM
Investigate	x	Sales Support	x	Remote	x	Health Check Visit

PMA Type	Smartcare	x	Smartcare Pro	x	Fosscore	x
	Smartcare Advance	x	Fosscore Pro	x	N/A	x

Details of Work / Test

- PM -	
+ Visual Check	
- No leak	- ok
- have damage on heater & main switch	- not ok
replace heater & main switch	interior Vaa - ok
replace PM kit & 1 set	- ok
Function Check	
- Power on/off	Water pump - ok
- Alkali	ok
- Steam	
- Condenser	
Instrument Ready for Use	OK
	Not OK*

Part No:	Batch	Description	Qty
10069965	11-06-2024	FOSS PM kit KT200 heater Analyser/2100	1
10003512	29.03.2024	Heating element Steam	1
15630111	19.10.2022	Switch R595kit + 2 Pa	1

This report is accurate and complete

Signed FOSS

Signed Customer

Name

Name

Email:

Customer Contact.:

*Remark:

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Verification Certificate

Certificate No.: 2501440-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 4

Equipment: Digestion Unit (Heating Block)

Manufacturer: FOSS

Model: Tecator Digestor 2520

Serial No.: 91905060

ID No.: UAE.WAS.030/2566

Order No.: 2501440

Operation No.: 2501440-001

Date of Receipt: 27 January 2025

Date of Calibration: 27 January 2025

Calibrated by Mr.Worapob Sookthong
Scientist

Date of Issue: 29 January 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: 20-04-65

Verification Report

Certificate No.: 2501440-001-01
Equipment: Digestion Unit (Heating Block)
Model: Tecator Digestor 2520 Serial No.: 91905060
Resolution: 1 °C ID No.: UAE.WAS.030/2566
Manufacturer: FOSS

Date of Calibration: 27 January 2025

Calibration point: 380 °C

Calibration result:

Table 1 : Reporting of Temperature

Block No.	UUC* Setting (°C)	UUC* Reading (°C)	Stability (±°C)	Standard Thermometer (°C)	Uncertainty (±°C)
1	380	380	0.22	377.84	2.0
2	380	380	0.19	378.68	2.0
3	380	380	0.13	378.70	2.0
4	380	380	0.12	379.82	2.0
5	380	380	0.20	381.01	2.0
6	380	380	0.16	380.48	2.0
7	380	380	0.16	378.22	2.0
8	380	380	0.19	377.99	2.0
9	380	380	0.09	378.48	2.0
10	380	380	0.15	378.17	2.0
11	380	380	0.18	377.64	2.0
12	380	380	0.11	379.27	2.0
13	380	380	0.13	378.14	2.0
14	380	380	0.25	379.11	2.0
15	380	380	0.15	379.83	2.0
16	380	380	0.18	378.05	2.0
17	380	380	0.31	378.44	2.0
18	380	380	0.18	378.29	2.0
19	380	380	0.17	378.41	2.0
20	380	380	0.13	379.24	2.0

Note:

- UUC* = Unit Under Calibration

- Immersion depth of standard thermometer in tube level high of sand is equal heater plate of UUC.

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

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

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

Verification Report

Certificate No.: 2501440-001-01
Equipment: Digestion Unit (Heating Block)
Model: Tecator Digestor 2520 Serial No.: 91905060
Resolution: 1 °C ID No.: UAE.WAS.030/2566
Manufacturer: FOSS

Date of Calibration: 27 January 2025

Location: Dry Laboratory (312), UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Environment Condition: Ambient Temperature (29 ± 1) °C

Relative Humidity (58 ± 2) %

Line Voltage (224 ± 1) Volt

Condition of this results of Calibration:

1. This instrument was calibrated by insert standard thermocouples type R into its Digestion blocks and Calibration according to NFI Method W-TE-026 based on BS 4309 : 1968

- 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 Thermocouple	34970A Type R	MY4045576/MY41194453 S/CH1, R/CH2, R/CH3	TC24/0063	5-Jun-2025	N.M. Technical Center Laboratory

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 6 Minute At 380 °C

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

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

Verification Report

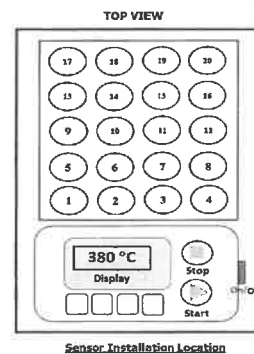
Certificate No.: 2501440-001-01
Equipment: Digestion Unit (Heating Block)
Model: Tecator Digestor ; Serial No.: 91905060
Resolution: 1 °C ID No.: UAE.WAS.030/2566
Manufacturer: FOSS

Date of Calibration: 27 January 2025

Calibration point: 380 °C

Calibration result: Continued

Figure 1. Location of Reference Standard and Block Diagram of Digestion Unit



Sensor Installation Location

----- End -----

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



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 16, SUANLIANG, SUANLIANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2507-0147OC-2
Procedure Used :-

Cert. No.: 25TM1037
Page : 2 of 3

Certificate of Calibration

Cert. No.: 25TM1037
Page : 1 of 3

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 : 07 July 2025
Calibration Date : 07 - 08 July 2025
Ambient Temperature : $\{ 26 \pm 10 \} ^\circ\text{C}$
Relative Humidity : $\{ 50 \pm 30 \} \%$
AC Line Voltage : $\{ 220 \pm 22 \} \text{V}$
Calibrated by : 
Approved by : 
() Chakrit Waeuwangjua
() Suwit Imjai
(✓) Kunchit Promprat
Issue Date : 14 July 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 & Equipment Calibration and Testing Services.

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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	MY49023932	24LM119	TPA	27 Jul 2025

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

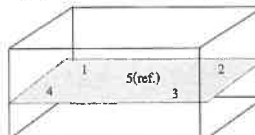
3. This measurement result is traceable to the International System of Unit maintained through :
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (") Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply (Volt)
	(°C)	(%R.H.)	
Beginning of Calibration	27	78	228
Finished of Calibration	27	65	229



Front

Position :	Ref. Std. ID No.:
1	70RC207
2	70RC208
3	70RC209
4	70RC352
5(ref.)	70RC353

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2507-0147OC-2
Result of Calibration :- (") Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 25TM1037
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	45.3	45.3	44.481	44.464	44.480	44.497	44.485	0.15
45.0	45.8	45.8	44.999	44.935	44.957	44.970	44.957	0.15

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
44.5	0.071	0.049	2
45.0	0.080	0.053	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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