



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	Ecosence	pH100A JC04742	Technology Promotion Association (Thailand-Japan)	24CH454	24 Apr 24	23 Apr 25	-



Certificate of Calibration

Cert.No.: 24CH454
Page: 1 of 3

Equipment : pH Meter
Manufacturer : EcoSense
Model : pH100A
Serial No. : JC04742
ID No. : UAE-EFM.051/2586 (EFM.pH.04/06)
Condition As-Received: Used Item
Received Date : 22 April 2024
Calibration Date : 24 April 2024
Reference : 2404-0457WSC-3
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangkok,
Phraekhanong, 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-CH6 by comparison with temperature standard

Calibrated by : Weirak Suthanon

Approved by :

() Unnophol Marachai
() Pongpan Palpin
(✓) Sathip Moongmal

Issue Date :

25 April 2024

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

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Approval of the Head of Corporate Services 3: Equipment Calibration and Testing Services.

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Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Exp. Date
1) Document Process Calibrator	54030049	130RC116	23E2602	27 Aug 2024
2) Ref. Standard Thermometer	4582054	110RC044	23R908	26 July 2024

This certification is traceable to the International System of Unit maintained through-
- Technology Promotion Association (Thailand-Japan)

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

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	970051	25 Apr 2025
pH 6.866	CPA chem	970052	25 Apr 2025
pH 9.997	CPA chem	970053	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 (±mV)	Coverage factor k
			mV	pH		
pH Meter S/N: JC04742	4.00	177.88	177	4.01	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	10.00	-177.48	-177	10.01	0.58	2.00

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Cert.No.: 24CH454
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: 23030881A605377	4.008	4.01	154	0.0079	2.00
	6.866	7.00	-20	0.0069	2.00
	6.866	7.00	-20	0.0069	2.00
	9.997	10.00	-193	0.0065	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

• Model : 23030881A605377

• Serial No. : 23030881A605377

Dimension of probe

- Length : 110 mm.

- Diameter : 12 mm.

- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (±°C)	Coverage factor k
25.0	24.999	25.0	0.001	0.13	2.00
30.0	30.000	30.0	0.000	0.13	2.00
35.0	35.000	35.0	0.000	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	Seven Easy S20 / 1231155210	National Food Institute, Ministry of Industry, Thailand	2401718-001-01	11 Mar 24	10 Mar 25	-
2	pH Meter		Mettler-Toledo	Seven Easy S20 / 1230525212	DKSH (Thailand) Ltd.	C07240167	9 Apr 24	8 Apr 25	-
3	BOD Incubator	Biochemical Oxygen Demand	Arco	UR-1320 / (UAE.WAO.018/2551)	Technology Promotion Association (Thailand-Japan)	24TW587	1 Apr 24	31 Mar 25	-
4	DO Meter		YSI	5100 / 11B101863	Technology Promotion Association (Thailand-Japan)	24TW39	21 Feb 24	20 Feb 25	-
5	Analytical Balance (Readability 0.1 mg)	Fat, Oil & Grease	Mettler-Toledo	XSR204 / C117635043	Technology Promotion Association (Thailand-Japan)	24MM293	11 May 24	10 May 25	-
6	Analytical Balance (Readability 0.01 mg)	Suspended Solids Total Dissolved Solids	Mettler-Toledo	XSR205DU / C210685394	National Food Institute, Ministry of Industry, Thailand	2402283-002-01	2 Apr 24	1 Apr 25	-
7	Hot Air Oven		Memmert	UF55 / 8216.1666	National Food Institute, Ministry of Industry, Thailand	2500116-001-01	8 Oct 24	7 Oct 25	-
8	Digester Unit	Total Kjeldahl Nitrogen	FOSS TECATOR	DT2520 / 91794969	National Food Institute, Ministry of Industry, Thailand	2402957-001-01	23 May 24	22 May 25	-
9	Distillation Unit (Kjeldahl Method)		FOSS TECATOR	KT200 / 91790524	FOSS South East Asia	9810	9 Feb 24	7 Feb 25	-
10	Incubator	Coliform Bacteria	Blinder	KB400 / 20200000015535	Technology Promotion Association (Thailand-Japan)	24TW647	1 Apr 24	31 Mar 25	-
11	Incubator		Memmert	IPP 260 / V616.0066	Technology Promotion Association (Thailand-Japan)	24TW650	2 Apr 24	1 Apr 25	-

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
12	Water Bath		Memmert	WNE 14 / L416.0606	Technology Promotion Association (Thailand-Japan)	24TM29	10 Feb 24	8 Feb 25	-
13	Water Bath		Memmert	WNE 14 / L416.0612	Technology Promotion Association (Thailand-Japan)	24TM30	10 Feb 24	8 Feb 25	-
14	Auto Clave		ALP	CL-40L / 807298	National Food Institute, Ministry of Industry, Thailand	2403982-001-01	7 Aug 24	6 Aug 25	-
15	Auto Clave		ALP	CL-40L / 808763	National Food Institute, Ministry of Industry, Thailand	2402281-001-01	2 Apr 24	1 Apr 25	-
16	Analytical Balance		OHAUS	PX623 / C236754745	DKSH (Thailand) Ltd.	2402419-001-01	19 Apr 24	18 Apr 25	-

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

Calibration Certificate

Certificate No.: 2401718-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 93oi Udomsak 41, Sukhumvit Road,
Bangchack, Prakhong, Bangkok 10269

Page 1 of 5

Equipment: pH Meter
Manufacturer: METTLER TOLEDO
Model: SevenEasy pH
Serial No.: 1231155210
ID No.: UAE.WAT.0102553
Order No.: 2401718
Operation No.: 2401718-001
Date of Receipt: 27 February 2024
Date of Calibration: 11 March 2024

Calibrated by Mr. Marnas Borwek
Specialist
Approved by (Mr. Phrasaphi Tunsit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 12 March 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 notified in 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.: 2401718-001-01
Equipment: pH Meter
Resolution: 0.01 pH : 1 mV
Manufacturer: METTLER TOLEDO
Model: SevenEasy pH
Serial No.: 1231155210
Type: Bench top
ID No.: UAE.WAT.0102553

Date of Calibration: 11 March 2024 Page 2 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: (23.4 ± 1.5) °C Relative Humidity: (51 ± 3) %
Condition of Equipment: Good Condition
Condition of this Results of Calibration

1. Calibration Method: W-CC-402 : 10 hours method based on direct measurement by using standard voltage calibration and certified reference material (CRM)

2. Reference Standards / Certified Reference Materials

Instrument	Serial No.	Manufacturer	Certificate No.	Exp. Date
2.1 DC Voltage Calibrator	2709987	Fisher	33C2003	18 June 2024
2.2 Digital Transducer	2709987	Fisher	CC-089170-01	30 October 2024
2.3 Thermo-Huge Meter	NFLBTH 014023	MTB	CC-089353-01	3 April 2024
Certified Reference Material				
2.4 pH buffer 6.00 (Primary pH buffer Solution)	446442	CPAchem	PH1215.3	13 April 2025
2.5 pH buffer 6.86 (Primary pH buffer Solution)	800049	CPAchem	PH1215.3	13 April 2025
2.6 pH buffer 10.01 (Primary pH buffer Solution)	800044	CPAchem	PH1222.1	13 April 2024
2.7 pH buffer 7.00 (Standard pH buffer Solution)	003109	HACH LANGE GmbH	5190004	18 October 2025

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

3.1 Instruments No.2.1 through HSC-TIS-17025 Laboratory Accreditation of Calibration No.8008
3.2 Instruments No.2.2 and 2.3 through HSC-TIS-17025 Laboratory Accreditation of Calibration No.8081
3.3 Certified Reference Material No.2.4 to 2.6 traceable to Primary measurement method: Method call using calibrated thermometer, barometer, and non-thermometer. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17024 and ISO/IEC 17025

3.4 Certified Reference Material No.2.7 traceable to PTB Certificate No. PTB-PH04-563/09/023 and Certificate No. PTB-PH08-089/00/002 PTB Physikalisch-Technische Bundesanstalt, Braunschweig, Germany

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

5. The 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.: 2401718-001-01
Equipment: pH Meter
Resolution: 0.01 pH : 1 mV
Manufacturer: METTLER TOLEDO
Model: SevenEasy pH
Serial No.: 1231155210
Type: Bench top
ID No.: UAE.WAT.0102553

Date of Calibration: 11 March 2024 Page 2 of 5

Calibration Results:

1. Calibration of pH Meter (Manual Temperature Compensation at 25 °C)
(offset value before adjust: -6.4 mV)

Nominal pH	DC Voltage Standard (mV)	Average Indicator Reading		Uncertainty (±mV)	Coverage Factor (A)
		mV	pH		
0	414.121	444	6.06	0.58	2.00
2	256.844	286	3.00	0.58	2.00
4	177.494	179	4.00	0.58	2.00
6	89.180	89	6.00	0.58	2.00
7	0.801	0	7.00	0.58	2.00
8	-95.169	-58	8.00	0.58	2.00
10	-177.681	-177	10.00	0.58	2.00
12	-295.811	-286	12.00	0.58	2.00
14	-414.142	-414	14.00	0.58	2.00

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

Equipment: pH Electrode Type: Combined Electrode
Manufacturer: METTLER TOLEDO Model: ME46 Solid
Serial No.: 306701 ID No.: J68

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

Calibrated Value @25 °C (mV)	Average Indicator Reading		Relative Slope (%)	Uncertainty (±pH)	Coverage Factor (A)
	pH	mV			
4.000	4.61	185	-	0.0071	2.00
7.000	7.48	15	98.9	0.0086	2.00
10.010	10.01	-160	97.2	0.0085	2.00
6.860	6.87	21	-	0.0074	2.00

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

Calibration Report

Certificate No.: 2401718-001-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenEasy pH
Serial No.: 1231155210 ID No.: UAE.WAT.0102553
Manufacturer: METTLER TOLEDO

Date of Calibration: 11 March 2024 Page 4 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: 23 °C ± 1 °C
Relative Humidity: 51 % ± 2 %

Condition of this Results of Calibration:

- Calibration Method:
 - In house method: W-TE-020 by comparison with 10 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.	Exp. Date	Through
HANNA HI9142 THERMOMETER	1523	2118184	PSL-T 087408	06-Jun-24	YSTR
Platinum Resistance Thermometer (PRT)	5627A	877352			

Report Equipment : Low Temperature Bath (SOCAL-4), Model: Europa-6 Plus Bath, Ser: 3419002

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

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

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

6. Condition of Calibrated Item: Good

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

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



Certificate of Calibration

Equipment: Digital Thermometer with Probe
Model: SevenEasy pH
Serial No.: 1230525212
Manufacturer: METTLER TOLEDO
ID No.: UAE.WAS.003/2853

Certificate No.: C15240373
Issued Date: 06 April 2024
Job No.: WVO-00024208
Page: 1 of 2
Condition: In Condition

Customer: United Analyst and Engineering Consultant Company Limited
 3 Soi Udornasuk 41 Sukhumvit Road,
 Bangkok, Prakhong, Bangkok 10260 Thailand

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, Bangkok,
 Phrakhanong, Bangkok 10260 Thailand

Calibration By: Mr. Natsakam Mijik
Calibration Date: 06 April 2024
The Method used: In house method, CAL-WA-19, by comparison with standard thermometer
Traceability: This certificate is traceable to the International System of Unit maintained by
 Quality Reborn Co., Ltd. (QR) Certificate No. QR23-1073

Reference standard equipment:

Equipment	Certificate no	Cal. date	Next Cal. date
Digital Thermometer with Probe	QR23-1073	2 May 23	2 May 24

Calibration Results:

Without Adjustment

Sensor Type: RTD

Channel: -

Diameter (mm): 4		Length (mm): 135		Immersion (mm): 110	
Calibrate Point (°C)	STD. Reading (°C)	UUC. Reading (°C)	Correction of UUC (°C)	Uncertainty (± °C)	
15.0	15.010	15.1	-0.090	0.076	
25.0	25.005	25.1	-0.094	0.076	
35.0	35.004	35.0	0.004	0.076	

The End of Certificate

(Mr. Natsakam Mijik)

Person in charge

(Mr. Pramote Ramrong)

Authorized signatory

This certificate is issued on the basis 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 tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

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 CAL-FM-C15-14: 06 Dec 2022

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 CAL-FM-C15-14: 06 Dec 2022



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
 CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
 53/4 PATTANAKARN ROAD NO. 18, BANGKOK, SUKHUMVIT BANGKOK 10260
 TEL: 0-2717-0000 FAX: 0-2710-9444



Cert. No.: 24TM567
 Page: 1 of 3

Certificate of Calibration

Equipment: BOD Incubator
Manufacturer: ARCO
Model: UR-1320
Serial No.: -
ID No.: UAE.WAO.018/2651

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

Location: Lab Floor 2

Received Order: 01 April 2024
Calibration Date: 01 April 2024
Ambient Temperature: (26 ± 10) °C
Relative Humidity: (50 ± 30) %

Calibrated by: Kirtsda Malee

Approved by: [Signature]
 Approved Signatory

Issue Date: 5 April 2024

The Uncertainties are for a confidence probability of approximately 95 %

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 Approval of the head of Corporate Services & Equipment Calibration and Testing Services.

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 A 0065063



Equipment: BOD Incubator
Condition As-Received: Used Item
Reference: 2404-0004CC-1
Procedure Used: -

Cert. No.: 24TM567
 Page: 2 of 3

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** **Date Data**
 1) Data Acquisition MY57013711 23LMH15 TPA 11 Jul 2024

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

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

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

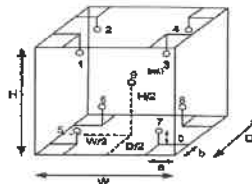
Result of Calibration:

Function of UUC: () Without Adjustment

Function of UUC: Temperature Source

Fresh air setting: Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	27	26
REL.Humid. (%)	48	49
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	18-18RTD-01
2	18-18RTD-02
3	18-18RTD-03
4	18-18RTD-04
5	18-18RTD-05
6	23-18RTD-06
7	18-18RTD-07
8	22-18RTD-08
9 (ref.)	18-18RTD-09

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 A 1209743



Equipment: BOD Incubator
Condition As-Received: Used Item
Reference: 2404-000400-1
Result of Calibration: () Without Adjustment
Function of UUC*: Temperature Source
Fresh air setting: Not Available

Cert. No.: 24TM567
Page: 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor
20.0	20.0	20.0	0.45	0.55	1.3	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	19.954	20.163	20.235	19.707	19.708	19.739	19.795	19.821	19.820	0.65

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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a 1209742



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

Cert.No.: 24TW59
Page: 1 of 2

Certificate of Testing

Equipment: DO Meter
Manufacturer: YSI
Model: 5900
Serial No.: 11B 101863
ID No.: UAE.WAO.004/2854
Received Date: 20 February 2024
Test Date: 21 February 2024
Reference: 2402-0829DSC-1
Submitted by: United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomaek 41, Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10280
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: Walailak Sirishean
Approved by: [Signature]
Approved Signatory
() Pornthipha Taweesai
() Unnaphol Haischal
(✓) Sutitip Meangmal
Issue Date: 22 February 2024

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Cert.No.: 24TW59
Page: 2 of 2

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	-	1308U10	23CG1172	22 Mar 2025
2. Balance	14233821	110RCD01	23MM405	15 July 2024

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate pentahydrate	Mordt	AKH1763316	100.2%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: 235100125

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
0.20	0.18	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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUKHUMVANG, SUKHUMVANG BANGKOK 10250
TEL. 0-2717-3000-20 FAX. 0-2719-9484



Certificate of Calibration

Cert.No.: 24MM263
Page: 1 of 3

Equipment: Electronic Balance
Manufacturer: Mettler Toledo
Model: XSR204
Serial No.: C117635043
ID No.: UAE.WAS.012/2584
Submitted by: United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomaek 41, Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10280
Location: Balance Room (106)
Received order: 11 May 2024
Calibration Date: 11 May 2024
Ambient Temperature: 15 °C to 40 °C
Relative Humidity: 30 % to 90 %
Calibrated by: [Signature]
Approved by: [Signature]
Approved Signatory
() Pongpan Palpin
() Sunthi Jwin
(✓) Kunchit Promprut
Issue Date: 15 May 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced without prior written approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

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Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2405-0166OC-2
Procedures used :-

Cert.No.: 24MM293
Page: 2 of 3

Calibration was conducted using in-house calibration procedure CP-CB01 based on UKAS LAB 14 according to direct measurement method against standard weight.
Condition of this result of calibration

1. Reference standard instruments:-

Instruments	Model	Serial No.	ID No.	Test report No.	Date date
1) Standard Weight Set (E2)	15884	24053	70RC007	MM-0013-24	25 Jan 2026

- This certificate is valid only to the item calibrated on date and place of calibration.
- This result of calibration was made on requested at the point specified by customer.
- This certificate is not certified for any commercial transaction.
- This certification is traceable to the International System of Unit.

Result of calibration () Without Adjustment (') After Adjustment by Internal Calibration
Range capacity : 0 g to 220 g Resolution 0.0001 g

Before Adjustment :

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
100	100.0000	0.0000	0.27	2.03
200	200.0001	-0.0001	0.31	2

After Adjustment :

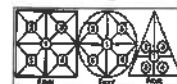
1. Determination of the standard deviation of weighing machine (n = 10)

Applied Weight (g)	Standard Deviation of Reading (g)
100	0.00007
200	0.00007



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2405-0166OC-2
Result of calibration

Cert.No.: 24MM293
Page: 3 of 3



Maximum difference between
off-center and central loading
(g)
0.0003

2. Effect of off-center loading

A mass of 100 g was placed at various position on the pan.
The weighing machine reading error obtained is given in the table

Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)
+0.0002	-0.0001	0.0000	+0.0002	0.0000

3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
1	0.0000	0.0000	0.16	2.13
5	1.0000	0.0000	0.15	2.13
10	5.0000	0.0000	0.15	2.13
20	10.0000	0.0000	0.15	2.11
50	20.0000	-0.0000	0.19	2.03
80	50.0001	-0.0001	0.19	2.06
100	80.0001	-0.0001	0.19	2.04
120	80.0001	-0.0001	0.27	2
100	100.0002	-0.0002	0.27	2.03
120	120.0001	-0.0001	0.29	2
200	200.0001	-0.0001	0.31	2

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 %.

-80-

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



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



Calibration Certificate

Certificate No.: 2402283-002-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3501 UDOMSUK 41, SUKHUMVIT ROAD,
Bangchack, Prakhewong, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: XSR205DU
Serial No.: C210685394
ID No.: UAE.WAO.010/2565
Order No.: 2402283
Operation No.: 2402283-002
Date of Receipt: 2 April 2024
Date of Calibration: 2 April 2024

Calibrated by Mr.Jerawat Prapawattipong
Scientist

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

Date of Issue: 9 April 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



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



Calibration Report

Certificate No.: 2402283-002-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: XSR205DU
Serial No.: C210685394
Capacity: 220 g
Resolution: 0.0001 g / 0.0001 g
ID No.: UAE.WAO.010/2565

Date of Calibration: 2 April 2024

Page 2 of 6

Environment Condition: Ambient Temperature: 24.5 ± 0.5 °C Relative Humidity: 47.5 ± 2.5 %
Place of Calibration: Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Condition of Equipment: Good Condition

Condition of This Result of Calibration:

1. Calibration Method: NFI Method W-44-081 In-House Method based on UKAS LAB 14 : 2019

2. Reference Standard:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Date Date
Standard Weight Class E2	851567872	TCS		M2040525	8 April 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Date Date
Thermo-Hygrometer	600-H1	NFL1070 016/23	Quality Reborn	Q124-0343	9 February 2025

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 to shown on date and place of calibration only.

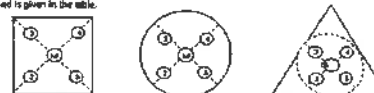
Calibration Results:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
40	0.000042
60	0.000052
80	0.000048
200	0.000048

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.



1	2	3	4	5	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
100.0002	100.0002	99.9999	99.9992	100.0001	100.0000	0.0003

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

Calibration Report

Certificate No.: 2402283-002-01
Equipment: Electronic Balance
Model: KSR205DU
Serial No.: C210605304
Capacity: 220 g
Manufacturer: METTLER TOLEDO
Resolution: 0.0001 g / 0.0001 g
ID No.: UAL-WAO.036/2565

Date of Calibration: 2 April 2024 Page 3 of 4

Calibration Results: (Continued)

Calibration Range: 0 - 50 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Values (Range: 0 - 50 g ; Resolution: 0.00001 g)

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (g)	Coverage Factor k
Unloaded	0.00000	0.00000	0.00000	0.0000006	2.00
0.001	0.001000	0.001001	-0.000001	0.0000009	2.00
0.005	0.005000	0.005000	0.000000	0.0000002	2.00
0.01	0.010000	0.010000	0.000000	0.0000009	2.00
0.05	0.050000	0.050000	0.000000	0.0000006	2.00
0.1	0.100000	0.100000	0.000000	0.0000013	2.00
0.5	0.500015	0.500015	0.000000	0.0000014	2.00
1	1.000001	1.000002	-0.000001	0.0000016	2.00
2	2.000003	2.000001	0.000002	0.0000017	2.00
5	5.000017	5.000017	0.000000	0.0000020	2.00
10	10.000009	10.000008	0.000001	0.0000026	2.00
20	20.000031	20.000028	0.000003	0.0000037	2.00
50	50.000043	50.000041	0.000002	0.0000050	2.00
100	100.000028	100.000027	0.000001	0.0000058	2.00
200	200.000048	200.000047	0.000001	0.000011	2.00

Calibration Report

Certificate No.: 2402283-002-01
Equipment: Electronic Balance
Model: KSR205DU
Serial No.: C210605304
Capacity: 220 g
Manufacturer: METTLER TOLEDO
Resolution: 0.0001 g / 0.0001 g
ID No.: UAL-WAO.036/2565

Date of Calibration: 2 April 2024 Page 4 of 4

Calibration Results: (Continued)

Calibration Range: 81 - 200 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Values (Range: 81 - 200 g ; Resolution: 0.0001 g)

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (g)	Coverage Factor k
81	80.00010	80.00001	0.00009	0.000015	2.00
100	100.00006	100.00001	0.00005	0.000015	2.00
110	110.00007	110.00001	0.00006	0.000016	2.00
120	120.00009	120.00000	0.00009	0.000017	2.00
130	130.00018	130.00000	0.00018	0.000019	2.00
140	140.00014	140.00000	0.00014	0.000020	2.00
150	150.00009	150.00001	0.00008	0.000020	2.00
160	160.00010	160.00001	0.00009	0.000022	2.00
170	170.00012	170.00001	0.00011	0.000023	2.00
200	200.00016	200.00002	0.00014	0.000026	2.00

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

End

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

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

Calibration Certificate

Certificate No.: 2500116-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Sol Udomsuk 41, Sukhumvit Road,
Bangchak, Prakhong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Hot Air Oven)

Manufacturer: MEMMERT

Model: UF55

Serial No.: B216.1666

ID No.: UAL-WAO.027/2559

Order No.: 2500116

Operation No.: 2500116-001

Date of Receipt: 8 October 2024

Date of Calibration: 8 October 2024

Calibrated by: Mr. Vudh Chaoensuk
Scientist
Approved by: (Mr. Phasphet Tamsa)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 15 October 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 retained 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.: 2500116-001-01
Equipment: CHAMBER (Hot Air Oven)
Model: UF55
Serial No.: B216.1666
Resolution: 0.1 °C
ID No.: UAL-WAO.027/2559
Manufacturer: MEMMERT

Date of Calibration: 8 October 2024 Page 2 of 3

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

Environment Condition:
Ambient Temperature (30.3 ± 1) °C
Relative Humidity (55 ± 1) %
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 WTE-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	YE 670464-01	8 June 2025	NATIONAL FOOD INSTITUTE
RTD		CH201-29W RTD-201-209			

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 104.0, 140.0 and 180.0 °C
Fresh air Damper : 1 Open Position -
X Close Fan 40%
- Not Available

7. Result of Calibration : X Without adjustment After adjustment

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

Calibration Report

Certificate No.: 2500116-001-01
Equipment: CHAMBER (Hot Air Oven)
Model: UF55 Serial No.: 8216.1665
Resolution: 0.1 °C ID No.: UAE.WAS.027/2559
Manufacturer: MEMPERT

Date of Calibration: 8 October 2024
Calibration points: 104.0, 140.0 and 180.0 °C

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (V)
MIN	29.3	54	227.0
MAX	31.2	56	232.8

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	
104.0	103.89	103.66	103.88	103.89	104.40	103.98	103.70	104.10	104.15	0.53
140.0	139.85	139.53	139.87	139.88	140.67	140.00	139.60	140.25	140.23	0.73
180.0	179.63	179.22	179.71	179.76	181.03	180.06	179.41	180.67	180.39	0.50

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
104.0	104.0	104.0	104.0	0.15	0.49	0.96
140.0	140.0	140.0	140.0	0.13	0.71	1.2
180.0	180.0	180.0	180.0	0.13	1.2	1.9

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

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

Verification Certificate

Substitute for Certificate No.: 2402957-001-01
Certificate No.: 2402957-001-02
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsak 41, Sukhumvit Road, Bangkok, Prakhong, Bangkok 10260

Page 1 of 4

Equipment: HEATING BLOCK DIGESTION

Manufacturer: FOSS

Model: 2520

Serial No.: 91794469

ID No.: UAE.WAS.011/2560

Order No.: 2402957

Operation No.: 2401957-001

Date of Receipt: 23 May 2024

Date of Calibration: 23-24 May 2024

Calibrated by Mr. Jorwut Preprawatpang
Scientist

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

Date of Issue: 18 June 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-012 Revision: 01 Date: 20-04-65

Verification Report

Certificate No.: 2402957-001-02
Equipment: HEATING BLOCK DIGESTION
Model: 2520 Serial No.: 91794469
Resolution: 1 °C ID No.: UAE.WAS.011/2560
Manufacturer: FOSS

Date of Calibration: 23-24 May 2024
Page 2 of 4

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

Environment Condition:
Ambient Temperature (25 ± 3) °C
Relative Humidity (55 ± 15) %
Line Voltage (220 ± 10) Volt

Condition of this results of Calibrations:

- This instrument was calibrated by insert standard thermocouples type R into its heating block digestion and compared to temperature obtained from reference standards thermometer at calibrated point.
 - 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	752188-702 / 04195-200	TC23/0048	2-Jun-2024	NM 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 : Hour 30 Minute At 380 °C

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

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

Verification Report

Certificate No.: 2402957-001-02
Equipment: HEATING BLOCK DIGESTION
Model: 2520 Serial No.: 91794469
Resolution: 1 °C ID No.: UAE.WAS.011/2560
Manufacturer: FOSS

Date of Calibration: 23-24 May 2024
Page 3 of 4

Calibration points: 380 °C

Calibration result:

Reporting of Temperature

Block No.	UUC* Setting (°C)	UUC* Reading (°C)	Stability (±°C)	Standard Thermometer (°C)	Uncertainty (±°C)
1	380	380	0.96	378.86	2.1
2	380	380	0.40	378.41	2.1
3	380	380	1.18	378.94	2.1
4	380	380	0.44	377.64	1.6
5	380	380	0.11	377.75	1.6
6	380	380	0.14	378.35	1.6
7	380	380	1.17	377.09	2.1
8	380	380	0.33	377.06	2.1
9	380	380	0.14	376.61	2.1
10	380	380	0.96	377.74	2.1
11	380	380	0.40	377.17	2.1
12	380	380	1.18	377.71	2.1
13	380	380	0.44	379.07	1.6
14	380	380	0.11	379.19	1.6
15	380	380	0.14	379.78	1.6
16	380	380	1.17	378.74	2.1
17	380	380	0.33	378.74	2.1
18	380	380	0.14	378.27	2.1
19	380	380	0.96	379.53	2.1
20	380	380	0.40	378.96	2.1

Note:

- UUC* = Unit Under Calibration

- Immersion depth of standard thermometer in tube level high of steel 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.

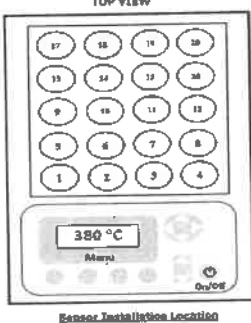
FCS-012 Revision: 01 Date: 20-04-65

Verification Report

Certificate No.: 2402957-001-02
Equipment: HEATING BLOCK DIGESTION
 Model: 2520 Serial No.: 91794469
 Resolution: 1 °C ID No.: UAE.WAS.011/2560
 Manufacturer: FOSS
Date of Calibration: 23-24 May 2024
Calibration point: 300 °C
Calibration result: Continued

Page 4 of 4

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



Remark: Edited Date of Calibration from 23-24 May 2024 to 23-24 May 2024.

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 %.

----- End -----

P-CIS-012 Revision: 01 Date: 28-01-65

FOSS

Customer Service Report

FOSS South East Asia
 3848 Siriraj Building, 25th - 26th Floor, Unit No. 3848/90,
 Rama IV Road, Bangkok, Bangkok, Thailand 10110

Report No.: 9810

Date: 9 Feb 2024

Customer: UAE

Address: Bangkok

Instrument: K9200

Serial: 91790524

Hours: Travel To Customer: 08:30
 Start: 09:30
 Finish: 12:00

Labour: 09:30
 12:00

Travel From Customer: 12:30
 1:30

Application		Special		Standard	
Normal	x	Courtesy Visit	x	Installation	x
Distributor	x	PMA Onboarding	x	Quote	x
Internal	x	Warranty	x	Repair	x
Digital Service	x	Sales Support	x	Remote	x
				Other	x

PO/Quote Number: if applicable

PMA type: FOSSEPC if applicable **Contract No.:** if applicable

Details of Work / Test		Condition / Status
# PMA K9200		
- ตรวจสอบการทำงานของ PMA		
- ตรวจสอบอุณหภูมิ 3 วัน (100 °C)		
- ตรวจสอบ 30 วัน - 30 °C		
- ตรวจสอบ PMA test		
- ตรวจสอบ PMA		
# PMA K9200 Heat Block Heater 300 °C		
10000329 Serial No. Complete 1 PC		
Instrument Ready for Use		OK Not OK
If not OK - Comment		

Part No.	Batch	Description	Qty
10009965	14.12.2020	Foss PMA test kit 300 °C Serial No. 1000	1

I confirm this report is accurate and complete

Signed FOSS: [Signature] Signed Customer: [Signature]

Name: [Name] Name: [Name]

Would you be willing to participate in a brief survey in order to tell us how we performed? Email: [Email]

เอกสารไม่ควบคุม

FOSS

Customer Service Report

FOSS South East Asia
 3848 Siriraj Building, 25th - 26th Floor, Unit No. 3848/90,
 Rama IV Road, Bangkok, Bangkok, Thailand 10110

Report No.: 9810

Date: 9 Feb 2024

Customer: UAE

Address: Bangkok

Instrument: K9200

Serial: 91790524

Hours: Travel To Customer: 08:30
 Start: 09:30
 Finish: 12:00

Labour: 09:30
 12:00

Travel From Customer: 12:30
 1:30

Application		Special		Standard	
Normal	x	Courtesy Visit	x	Installation	x
Distributor	x	PMA Onboarding	x	Quote	x
Internal	x	Warranty	x	Repair	x
Digital Service	x	Sales Support	x	Remote	x
				Other	x

PO/Quote Number: if applicable

PMA type: FOSSEPC if applicable **Contract No.:** if applicable

Details of Work / Test		Condition / Status
# PMA K9200		
- ตรวจสอบการทำงานของ PMA		
- ตรวจสอบอุณหภูมิ 3 วัน (100 °C)		
- ตรวจสอบ 30 วัน - 30 °C		
- ตรวจสอบ PMA test		
- ตรวจสอบ PMA		
# PMA K9200 Heat Block Heater 300 °C		
10000329 Serial No. Complete 1 PC		
Instrument Ready for Use		OK Not OK
If not OK - Comment		

Part No.	Batch	Description	Qty
10009965	14.12.2020	Foss PMA test kit 300 °C Serial No. 1000	1

I confirm this report is accurate and complete

Signed FOSS: [Signature] Signed Customer: [Signature]

Name: [Name] Name: [Name]

Would you be willing to participate in a brief survey in order to tell us how we performed? Email: [Email]

เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
 CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
 5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
 TEL:02-2717-3000-29 FAX:02-2719-9484



Certificate of Calibration

Cert. No.: 24TM647
 Page: 1 of 5

Equipment: Incubator
Manufacturer: Binder
Model: KB 400 E6
Serial No.: 20200000915525
ID No.: UAE.MIC.018/2564
Submitted by: United Analyst and Engineering Consultant Co., Ltd.
 3 Sol Udomak 41, Sukhumvit Road,
 Bangkok, Phrakhamong,
 Bangkok 10260
Location: Microbiology Laboratory (302)
Received Order: 01 April 2024
Calibration Date: 01 April 2024
Ambient Temperature: (26 ± 10) °C
Relative Humidity: (50 ± 30) %
Calibrated by: Man Pattanasongpaloon
Approved by: [Signature]
 Approved Signatory
 () Pongpan Palpin
 (✓) Suwit Imjai
 () Kuntit Promprut

Issue Date: 7 April 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 : Incubator
Condition As-Received : Used Item
Reference : 2404-0003OC-0
Procedure Used :-

Cert. No.: 24TM647
Page : 2 of 3

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 MY49023932 23LM122 TPA 26 Jul 2024

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

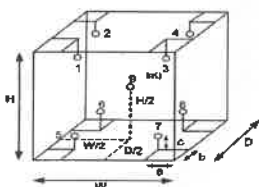
3. This certification is traceable to the International System of Unit.

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

Result of Calibration :- (°) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



Probe Installation Details :

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

Dimension of Chamber :

D = 0.48 m
W = 0.65 m
H = 1.2 m
Capacity = 0.37 m³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	24	24
REL.Humid. (%)	54	57
AC Supply (Volt)	221	223

Position :	Ref. Std. ID No.:
1	20-16RTD-01
2	20-16RTD-02
3	20-16RTD-03
4	22-16RTD-04
5	22-16RTD-05
6	20-16RTD-06
7	20-16RTD-07
8	22-16RTD-08
9 (ref.)	22-16RTD-09

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2404-0003OC-0
Result of Calibration :-
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TM647
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor
35.0	35.0	35.0	0.035	0.19	0.22	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
35.0	35.000	35.022	34.841	34.861	35.027	35.011	35.023	35.028	35.007	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 %.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
53/4 PATTANAKARN ROAD SOI 16, SUKHUMVIT, SUKHUMVIT BANGKOK 10250
TEL. 0-2717-3800-29 FAX. 0-2716-9454



Certificate of Calibration

Cert. No.: 24TM650
Page : 1 of 3

Equipment : Incubator
Manufacturer : Memmert
Model : IPP 260
Serial No. : V616.0066
ID No. : UME.MIC.032/2559
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsak 41, Sukhumvit Road,
Bangkok, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory (302)
Received Order : 01 April 2024
Calibration Date : 02 - 03 April 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Men Pattanasongpachoon
Approved by :
() Ponpan Pajpim
(✓) Sunit Imjai
() Kunchit Pongpatt

Issue Date : 7 April 2024

The Uncertainty 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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Equipment : Incubator
Condition As-Received : Used Item
Reference : 2404-0003OC-2
Procedure Used :-

Cert. No.: 24TM650
Page : 2 of 3

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 MY49023932 23LM122 TPA 26 Jul 2024

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

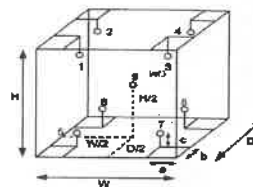
3. This certification is traceable to the International System of Unit.

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

Result of Calibration :- (°) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



Probe Installation Details :

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm

Dimension of Chamber :

D = 0.50 m
W = 0.64 m
H = 0.50 m
Capacity = 0.25 m³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	25	25
REL.Humid. (%)	57	54
AC Supply (Volt)	221	222

Position :	Ref. Std. ID No.:
1	19-16RTD-01
2	19-16RTD-02
3	19-16RTD-03
4	19-16RTD-04
5	19-16RTD-05
6	19-16RTD-06
7	21-16RTD-07
8	19-16RTD-08
9 (ref.)	19-16RTD-09

เอกสารไม่ควบคุม



Cert. No.: 24TM30
Page: 1 of 3

Certificate of Calibration

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 14
Serial No. : L418.0512
ID No. : UAE.MIC.003/2560
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Prachanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 10 February 2024
Calibration Date : 10 February 2024
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$

Calibrated by : Krieda Malee

Approved by :

() Pornthepa Tanayakul
(x) Unnophol Marschei
() Sunil Injai

Issue Date : 10 February 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 & Equipment Calibration and Testing Services.

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Room
Reference : 2402-0232OC-3
Procedures Used :-

Cert. No.: 24TM30
Page: 2 of 3

Calibration was conducted using In-house calibration procedure CP-0704 Based on ASTM E716 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 Date Date
1) Data Acquisition MY48001451 23LM27 TPA 25 Feb 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.

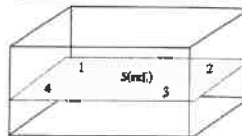
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration : (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	($^{\circ}\text{C}$)	(%R.H.)	(Volt)
Beginning of Calibration	24	54	221
Finished of Calibration	26	55	220



Front

Position :	Ref. ID No.
1	N37P301419
2	N37P300732
3	N37P301420
4	N37P301421
5(ref.)	N37P301425

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2402-0232OC-3
Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 24TM30
Page: 3 of 3

Calibration point ($^{\circ}\text{C}$)	UUC* Setting ($^{\circ}\text{C}$)	UUC* Reading ($^{\circ}\text{C}$)	Average* Standard Reading ($^{\circ}\text{C}$)					Uncertainty ($\pm ^\circ\text{C}$)
			1	2	3	4	5 (ref.)	
44.5	44.6	44.6	44.489	44.453	44.496	44.518	44.526	0.15

Calibration point ($^{\circ}\text{C}$)	Uniformity ($^{\circ}\text{C}$)	Stability ($\pm ^\circ\text{C}$)	Coverage Factor k
44.5	0.12	0.059	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 based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

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



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



Calibration Certificate

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

Page: 1 of 3

Equipment: Autoclave
Manufacturer: ALP
Model: CL-40L
Serial No.: 807298
ID No.: UAE.MIC.018/2560
Order No.: 2403982
Operation No.: 2403982-001
Date of Receipt: 7 August 2024
Date of Calibration: 7 August 2024

Calibrated by : Mr. Hans Samesk 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.

F-05-008 Revision: 01 Date: 20-04-65

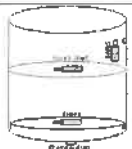
เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2402261-001-01
Equipment: Autoclave
Model: CL-40L Serial No.: 809783
Resolution: 0.1 °C ID No.: UAE.MIC.026/2563
Manufacturer: ALP

Date of Calibration: 2 April 2024
Calibration points: 115.0 and 121.0 °C

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (V/Hz)
Min	24.4	45.6	220
Max	25.5	62.1	230



Conducted in Class II
Sensors are calibrated to the local temperature (P 111, room 10 min)
Point 1 is in the upper half of the chamber
Point 2 is in the chamber area, within 100 mm

Table 1 : Reporting of Temperature

Calibration Point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No. 2 in REF)			Uncertainty ± (°C)
	Std. # 1	Std. # 2 (Ref)	Std. # 3	
115.0	115.28	115.35	115.38	0.64
121.0	121.28	121.36	121.37	0.64

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading			Stability ± (°C)	Uniformity (°C)	Overall Variation
	Min (°C)	Max (°C)	Average (°C)			
115.0	115.0	115.1	115.0	0.08	0.19	0.48
121.0	121.0	121.1	121.0	0.12	0.17	0.38

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

Calibration Certificate

Certificate No.: 2402419-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsak 41, Sukhumvit Road, Bangkok, Prakhong, Bangkok 10260

Equipment: Electronic Balance

Manufacturer: OHAUS

Model: PX623

Serial No.: C236754745

ID No.: UAE.MIC.055/2565

Order No.: 2402419

Operation No.: 2402419-001

Date of Receipt: 19 April 2024

Date of Calibration: 19 April 2024

Calibrated by: Mr. Phasaphat Tuangit

Scientist

Approved by: [Signature]

(Miss Prapatsorn Jaengkarnkit)

Vice President, Department of Laboratory Services

Responsible for the Technical Management Team

Date of Issue: 25 April 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 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-CS-009 Revision: 01 Date: 20-04-65

Calibration Report

Certificate No.: 2402419-001-01
Equipment: Electronic Balance
Manufacturer: OHAUS
Model: PX623 Resolution: 0.001 g
Serial No.: C236754745 ID No.: UAE.MIC.055/2565
Capacity: 620 g

Date of Calibration: 19 April 2024 Page 2 of 3

Environment Condition: Ambient Temperature: 25.0 ± 0.2 °C Relative Humidity: 37 ± 0.4 %

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

Condition of Equipment: Good Condition

Condition of This Result of Calibration:

1. Calibration Method: NFI Method W-MA-001 In-House Method based on OIML July 14 : 2013

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1-500g	19802	TCS	N23111025	28 November 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	606-H1	NPL8TH 019/23	Quality Room	Q024-0462	4 March 2023

3. This certification is accessible to all UNFT

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

5. The result of calibration was found accurate as shown on table and place of calibration only.

Calibration Result:

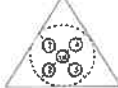
1. Repeatability of Readings:

Measured Value (g)	Standard Deviation of Reading (g)
200	0.00067
600	0.0010

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)
200.800	200.802	200.801	200.800	200.800	200.800	0.002

23 April 2024

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

Calibration Report

Certificate No.: 2402419-001-01
Equipment: Electronic Balance
Manufacturer: OHAUS
Model: PX623 Resolution: 0.001 g
Serial No.: C236754745 ID No.: UAE.MIC.055/2565
Capacity: 620 g

Date of Calibration: 19 April 2024 Page 3 of 3

Calibration Results: (Continued)

Calibration Range: 0-600 g

Calibration Adjustments: Internal Calibration

3. Departure from Nominal Values:

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (g)	Coverage Factor
Unloaded	0.000	0.000	0.000	0.00053	2.00
1	1.0000	1.000	0.000	0.00093	2.00
5	5.0000	5.000	0.000	0.00093	2.00
10	10.0000	10.000	0.000	0.00093	2.00
20	20.0000	20.000	0.000	0.00093	2.00
50	50.0000	50.000	-0.001	0.00093	2.00
100	100.0000	100.000	-0.001	0.00094	2.00
200	200.0000	200.000	-0.001	0.0011	2.00
300	300.0000	300.000	-0.003	0.0011	2.00
400	400.0000	400.000	-0.003	0.0012	2.00
500	500.0000	500.000	-0.003	0.0012	2.00
600	600.0000	600.000	-0.002	0.0014	2.00

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

***** End *****

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