

ภาคผนวก จ
เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์



รายงานผลการปฏิบัติงานตามมาตรฐานการปฏิบัติงานของห้องปฏิบัติการ และมาตรฐานการดำเนินงานของห้องปฏิบัติการ
โครงการ Grande Centre Point Hotel Terminal 21 (ขอผลดำเนินงาน) ระหว่างเดือนกรกฎาคม - ธันวาคม พ.ศ. 2566
บริษัท แอช เคส โฮเทล แมเนจเม้นท์ จำกัด

รายการใบรับรองสอบเทียบ/พจนานุกรม เครื่องมือห้องปฏิบัติการที่ใช้ตรวจหาจุลินทรีย์

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือที่ใช้ประจำห้องปฏิบัติการตรวจหาจุลินทรีย์									
1	pH Meter	pH	Mettler-Toledo	Seven Easy S20 / 123115210	National Food Institute, Ministry of Industry, Thailand	2301846-001-01	24 Feb 23	23 Feb 24	-
2	pH Meter		Mettler-Toledo	Seven Easy S20 / 1230323212	National Food Institute, Ministry of Industry, Thailand	2302181-001-01	24 Mar 23	23 Mar 24	-
3	Analytical Balance (Readability 0.01 mg)	Suspended Solid	Mettler-Toledo	XS205DU / C21088394	Technology Promotion Association (Thailand-Japan)	23040113	26 Apr 23	25 Apr 24	-
4	Hot Air Oven		Mettler	UF55 / B212.0411	Technology Promotion Association (Thailand-Japan)	23TM373	11 Apr 23	12 Apr 24	-
5	Analytical Balance (Readability 0.1 mg)	Fat, Oil and Grease	Mettler-Toledo	XS205 / C117635043	National Food Institute, Ministry of Industry, Thailand	2302827-001-01	10 May 23	8 May 24	-
6	BOD Incubator		AVCO	UC4-1320 / (UAE:WAO.015/2561)	Technology Promotion Association (Thailand-Japan)	23TM249	15 Feb 23	14 Feb 24	-
7	BOD Incubator	Biochemical Oxygen Demand	AVCO	UR-1320 / (UAE:WAO.018/2551)	Technology Promotion Association (Thailand-Japan)	23TM375	17 Apr 23	10 Apr 24	-
8	Digestor Unit		FOSS TECATOR	2528auto / 91794469	National Food Institute, Ministry of Industry, Thailand	2302413-001-01	30 Mar 23	28 Mar 24	-
9	Distillation Unit. (Kjeldahl Method)	Total Kjeldahl Nitrogen	FOSS TECATOR	K78100 / 91889052	FOSS South East Asia	8411	29 May 23	27 May 24	-
10	Incubator		Mettler	IPP 260 / V615.0187	Technology Promotion Association (Thailand-Japan)	23TM378	12 Apr 23	10 Apr 24	-
11	Incubator	Coliform Bacteria Standard Plate count E.Coli Legionella sp.	Binder	80 53 / 13-07343	Technology Promotion Association (Thailand-Japan)	23TM192	16 Feb 23	15 Feb 24	-
12	Water Bath		Mettler	WNE 14 / L416.0606	Technology Promotion Association (Thailand-Japan)	23TM199	15 Feb 23	14 Feb 24	-
13	Water Bath		Mettler	WNE 14 / L416.0612	Technology Promotion Association (Thailand-Japan)	23TM194	15 Feb 23	14 Feb 24	-

รายการใบรับรองสอบเทียบ/ทวนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์ สำหรับวิเคราะห์คุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์คุณภาพน้ำ									
14	Auto Clave	Coliform Bacteria Standard Plate Count	ALP	CL-40L / 898763	Technology Promotion Association (Thailand-Japan)	23TMT63	27 Apr 23	23 Apr 24	-
15	Auto Clave	E-Coli Legionella sp.	ALP	CL-40L / 810010		C11230106	9 Jun 23	7 Jun 24	-
16	Analytical balance		Mettler-Toledo	National Food Institute, Ministry of Industry, Thailand	National Food Institute, Ministry of Industry, Thailand	2303174-001-01	26 May 23	25 May 24	-

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

Calibration Certificate

Certificate No.: 2301846-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 8 Sol Udomsuk 41, Sukhumvit Road,
Bangkok, Prathung, Bangkok 10200

Page 1 of 8

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: SevenEasy TM 820 pH
Serial No.: 1201152210
ID No.: UAE.WAT.010/2553
Order No.: 2301846

Operation No.: 2301846-001
Date of Receipt: 11 February 2023
Date of Calibration: 24 February 2023

Calibrated by: Mr. Worapong Boonkong
Approved: (Mr. Natapong Wyomchart)
Date of Issue: 24 February 2023
Responsible for the Technical Management Team

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

This Certificate is issued in accordance with the standards of accreditation granted by the TAF Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its conformity to specified national standards and to the rules of measurement issued at the corresponding national standards laboratory. The certificate may not be reproduced other than in full, except with the prior written approval of the National Food Institute.

FC-009 Revision: 01 Date: 20-04-65

Calibration Report

Certificate No.: 2301846-001-01
Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: SevenEasy TM 820 pH
Serial No.: 1201152210
ID No.: UAE.WAT.010/2553

Date of Calibration: 24 February 2023
Location: Chemical Calibration Laboratory, National Food Institute
Environment Conditions: Ambient Temperature: (25.1 ± 1.0) °C Relative Humidity: (58 ± 3) %
Condition of Equipment: Good Condition
Condition of this Results of Calibration:

1. Calibration Method: In-house method: W-002 based on direct measurement by using standard buffer solution and certified reference material (CRM)
2. Reference Standards / Certified Reference Material

Instrument	Serial / ID No.	Manufacturer	Certificate No.	Exp. Date
2.1 DC Voltage Calibrator	2108007	Fuke	ZZ411803	17 June 2023
2.2 Digital Thermometer	2203017	Fuke	CC 80077-01	30 October 2023
2.3 Thermohygro meter	NP-071100718	POMPE 400	CR22-0608	26 April 2023
Certified Reference Material				
2.4 pH buffer 4.008 (Primary pH buffer solution)	552908	CPAchem	P0011813	8 August 2024
2.5 pH buffer 6.868 (Primary pH buffer solution)	888807	CPAchem	P0021713	8 August 2024
2.6 pH buffer 9.011 (Primary pH buffer solution)	830400	CPAchem	P1020113	8 August 2023
2.7 pH buffer 7.00 (Standard pH buffer solution)	812010	CPAchem	P1011118	8 August 2023

3. The certificate is traceable to The International System of Units (SI Units)
3.1 Instruments No.2.1 through NIS-TS-718 17025 Laboratory Accreditation of Calibration No.0029
3.2 Instruments No.2.2 through NIS-TS-718 17025 Laboratory Accreditation of Calibration No.0087
3.3 Instruments No.2.3 through NIS-TS-718 17025 Laboratory Accreditation of Calibration No.0088
3.4 Certified Reference Material No. 2.4 to 2.5 traceable to Primary measurement method: Normal cell using cytochrome chromometer, thermocouple, and thermocouple. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17025 and ISO/IEC 17025
3.5 Certified Reference Material No.2.7 traceable to BSM RM 14-21 Lot# 0438-2021, BSM RM 14-22 Lot# 28.05.2021; BSM RM 14-27 Lot# 0438-2021, BSM RM 14-28 Lot# 28.05.2021, the Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17025 and ISO/IEC 17025

4. This certificate was certified only for the instrument as calibrated.
5. The name of calibration was found accurate as shown on date and place of calibration only.

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

Calibration Report

Certificate No.: 2301846-001-01
Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: SevenEasy TM 820 pH
Serial No.: 1201152210
ID No.: UAE.WAT.010/2553

Date of Calibration: 24 February 2023
Calibration Results: (Manual Temperature Compensation at 25 °C)

Normal pH	DC Voltage Standard (mV)	Average Indicator Reading (mV)	Uncertainty (mV)	Coverage Factor (k)
5	414.159	414	0.00	2.50
3	280.814	289	2.00	2.50
4	177.484	178	4.00	2.50
6	59.180	59	0.00	2.50
7	0.820	0	7.00	2.50
8	-96.138	-96	6.00	2.50
10	-177.480	-177	10.00	2.50
12	-280.811	-288	12.00	2.50
14	-414.152	-414	14.00	2.50

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

Equipment: pH Electrode
Manufacturer: Mettler Toledo
Model: InLab Solid
Serial No.: 8049511
ID No.: N/A

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

Certified Value @25 °C pH	Average Indicator Reading		Relative Slope (%)	Uncertainty (pH)	Coverage Factor (k)
	pH	mV			
4.000	4.01	100	-	0.0071	2.50
6.865	6.90	19	97.88	0.0078	2.50
10.000	10.01	-190	97.23	0.0086	2.50
8.988	8.99	95	-	0.0082	2.50

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

Calibration Report

Certificate No.: 2301846-001-01
Equipment: Digital Thermometer with RTD
Resolution: 0.1 °C
Model: SevenEasy TM 820 pH
Serial No.: 1201152210
ID No.: UAE.WAT.010/2553
Manufacturer: Mettler Toledo

Date of Calibration: 24 February 2023
Page 4 of 8

Location: Chemical Calibration Laboratory, National Food Institute
Environment Conditions: Ambient Temperature: 25 °C ± 1 °C
Relative Humidity: 48 % ± 3 %

Condition of this results of Calibration:

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

2. Reference Standard Instrument:

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HAND-HELD THERMOMETER	1523	2118154	PSL-T 0673/05	07-Jun-23	TISTR
Platinum Resistance Thermometer (PRT)	5623A	877332			

Support Equipment: - Low Temperature Bath (Micro Bath), Model: 2103, S/N: A39538, AHS181.

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument as calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated Item: Good
- Result of Calibration: ☒ Without adjustment ☐ After adjustment

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

Certificate No.:	Z301845-001-01		
Equipment:	Digital Thermometer with RTD		
	Resolution:	0.1 °C	Model: SevenEasy TH 520 prt
	Serial No.:	123155210	ID No.: UACWAT 010/2553
	Manufacturer: Mettler Toledo		
Date of Calibration:	24 February 2023		
	Page 5 of 8		

Calibration points: 15.0, 25.0 and 35.0 °C

Calibration results

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

- Description of probe, model : S/N :

Dimension of probe : Diameter 9 mm., Length 320 mm.

Sheath material : Stainless Steel

UUCF Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.1	15.015	- 0.1	0.11
25.0	25.014	0.0	0.11
35.1	35.016	+ 0.1	0.11

Note

- UUC^a : Unit Under Collaboration

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

===== End =====

FACS-012 Revision: 01 Date: 20-04-95

Calibration Report

Certificate No.: 2302181-001-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenEasy pH
Serial No.: 123052512 ID No.: UAE-WAS-003/2553
Manufacturer: METTLER TOLEDO

Date of Calibration: 24 March 2023 Page 5 of 5

Calibration points: 15.0, 25.0 and 30.0 °C

Calibration result:

- The probe was immersed in liquid bath or dry bath to a minimum depth of 120 mm.
- Description of probe, model: N/A S/N: N/A
- Dimension of probe: Diameter 3 mm, Length 120 mm,
- Sheath material: N/A

UUC* Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.2	14.999	- 0.2	0.12
25.2	24.999	- 0.2	0.12
30.2	29.999	- 0.2	0.12

Note:

- UUC* : Unit Under Calibration

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



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
3344 PATTAKARN ROAD BOX 15, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 0-2717-3008-29 FAX: 0-2719-4444



Cert.No.: 23MM113
Page: 1 of 3

Certificate of Calibration

Equipment : Electronic Balance
Manufacturer : Mettler Toledo
Model : XSR205
Serial No. : C210885394
ID No. : UAE.WAO.0102885
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Sol Udomsuk 41, Sukhumvit Road,
Bangkok, Phakhanong,
Bangkok 10280

Location : Balance Room

Received order : 28 April 2023
Calibration Date : 28 April 2023
Ambient Temperature : 15 °C to 40 °C
Relative Humidity : 30 % to 90 %

Calibrated by : Mettler Calibration

Approved by :
() Ponthipha Tameyakul
() Meeke Buktrees
(x) Suwit Injai

Issue Date : 2 May 2023

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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Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-0459QC-2
Procedure used :

Cert.No.: 23MM113
Page: 2 of 3

Calibration was conducted using in-house calibration procedure CP-0801 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.	Due date
1) Standard Weight Set (E2)	15884	24063	70RC007	MM-0010-22	29 Jan 2024

- 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 81 g Resolution 0.00001 g
81 g to 220 g Resolution 0.0001 g

Before Adjustment :

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
80	79.99992	+0.00008	0.15	2.00
200	199.99985	+0.00005	0.29	2.00

After Adjustment :

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

Applied Weight (g)	Standard Deviation of Reading (g)
80	0.000007
200	0.00004

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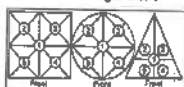
Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-0459QC-2

Cert.No.: 23MM113
Page: 3 of 3

Result of calibration

2. Effect of off-center loading

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



Maximum difference between
off-center and central loading
(g)
0.0001

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

3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
Unloaded	0.00000	0.00000	0.014	2.11
0.05	0.04999	+0.00001	0.016	2.09
0.1	0.09999	+0.00001	0.015	2.07
1	1.00000	0.00000	0.018	2.04
5	5.00000	0.00000	0.026	2.00
20	20.00002	-0.00002	0.045	2.00
50	50.00002	-0.00002	0.080	2.00
80	80.00002	-0.00002	0.15	2.00
100	100.00000	0.00000	0.17	2.00
150	150.00000	0.00000	0.29	2.00
200	199.99988	+0.00011	0.29	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 %.



Cert. No.: 23TM373
Page: 1 of 3

Certificate of Calibration

Equipment: Hot Air Oven
Manufacturer: Memmert
Model: UF 55
Serial No.: B212.0411
ID No.: UAE.WAO 005/2556
Submitted by: United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location: Lab Floor 2
Received Order: 11 April 2023
Calibration Date: 11 - 12 April 2023
Ambient Temperature: $(28 \pm 10) ^\circ\text{C}$
Relative Humidity: $(50 \pm 30) \%$
Calibrated by: Krida Mahee
Approved by:
() Pornthipha Temeyakul
() Mahee Butkruea
() Suwit Injai
Issue Date: 24 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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

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A 0053359



Equipment: Hot Air Oven
Condition As-Received: Used Item
Reference: 2304-0156DC-1

Cert. No.: 23TM373
Page: 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument -

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY59003411	22LM155	25 Nov 2023

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

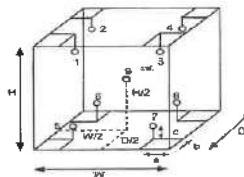
3. This certification is traceable to the International System of Unit.

Result of Calibration :-

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	27	28
REL. Humid. (%)	45	44
AC Supply (Volt)	221	220



Probe Installation Details :

Dimension of Chamber :
a = 5.0 cm D = 0.50 m
b = 5.0 cm W = 0.80 m
c = 5.0 cm H = 0.75 m
Capacity = 0.30 m³

Ref. Std. ID No.: @ Calibration Point		
Position	(120 to 180) °C	(104) °C
1	18-20TC-01	20RTD-2/1
2	18-20TC-02	20RTD-2/2
3	18-20TC-03	20RTD-2/3
4	18-20TC-04	20RTD-2/4
5	18-20TC-05	20RTD-2/5
6	18-20TC-06	20RTD-2/6
7	18-20TC-07	20RTD-2/7
8	18-20TC-08	20RTD-2/8
9 (ref.)	18-20TC-09	20RTD-2/9

เอกสารไม่ควบคุม

a



Equipment: Hot Air Oven
Condition As-Received: Used Item
Reference: 2304-0156DC-1
Result of Calibration :-
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 23TM373
Page: 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor #
104.0	104.0	104.0	0.054	0.69	0.95	2
120.0	120.0	120.0	0.12	0.69	1.5	2
180.0	180.0	180.0	0.12	1.5	2.5	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	104.612	104.016	104.542	104.407	103.704	103.728	104.167	104.156	104.001	0.42
120.0	120.317	119.766	120.524	120.232	119.363	119.209	119.888	119.797	119.735	1.1
180.0	180.678	179.816	181.357	180.871	179.303	179.138	180.230	180.055	179.980	1.1

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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Calibration Certificate

Certificate No.: 230227-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udonnuek 61, Ratchamvit Road,
Bangkok, Phraethung, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: XMR204
Serial No.: C117638043
ID No.: UAE-WAS-012/2564
Order No.: 230227
Operation No.: 230227-001
Date of Receipt: 16 May 2023
Date of Calibration: 16 May 2023

Calibrated by: Mr. Narek Sornak
Specialist

Approved by: [Signature]
(Mr. Phongsak Tavee)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 16 May 2023

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 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.

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

Calibration Report

Certificate No.: 230227-002-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: XMR204
Serial No.: C117638043
Capacity: 220 g

Date of Calibration: 16 May 2023

Page 2 of 4

Environment Condition: Ambient Temperature: 23.4 ± 0.2 °C Relative Humidity: 43.4 ± 0.9 %
Place of Calibration: Balance room (Pilot Analysis Unit), UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-M-001 In-House Method based on UKAS Lab M1: 2019

2. Reference Standard:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Issue Date
Standard Weight Class G3	Eng to 30g	800557572	TCS	M2040495	6 April 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Issue Date
Thermo-Hygro Meter	608-H1	NFI.2711 018/23	Quelby Labors	Q123-0489	21 February 2024

3. This calibration is traceable to SI UNIT
4. This certificate is valid only for the instrument we calibrated.

5. This result of calibration may find accurate as shown in date and place of calibration only.

Calibration Results:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
100	0.00013
200	0.00032

2. Off-Center Error:

A mass of 100 g was placed and moved to various positions on the 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)
100.0001	100.0002	100.0004	100.0002	100.0002	100.0002	0.0004

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

Calibration Report

Certificate No.: 230227-001-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: XMR204
Serial No.: C117638043
Capacity: 220 g

Date of Calibration: 16 May 2023

Page 2 of 4

Calibration Results: (Continued)

Calibration Range: 0 - 200g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Values:

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (g)	Coverage Factor
Unloaded	0.0000	0.0000	0.0000	0.000005	2.00
0.01	0.0000	0.0100	0.0000	0.000005	2.00
0.05	0.0000	0.0000	0.0000	0.000005	2.00
0.10	0.0000	0.0000	0.0000	0.000005	2.00
0.20	0.0000	0.0000	0.0000	0.000005	2.00
0.5	0.1000	0.1000	0.0000	0.000005	2.00
0.2	0.2000	0.2000	0.0000	0.000005	2.00
0.5	0.5000	0.5000	0.0000	0.000005	2.00
1	1.0000	1.0000	0.0000	0.000005	2.00
2	2.0000	2.0000	0.0000	0.000005	2.00
3	3.0000	3.0000	0.0000	0.000005	2.00
5	5.0000	5.0000	0.0000	0.000005	2.00
10	10.0000	10.0000	0.0000	0.000005	2.00
20	20.0000	20.0000	0.0000	0.000005	2.00
30	30.0000	30.0000	0.0000	0.000005	2.00
40	40.0000	40.0000	0.0000	0.000011	2.00
45	45.0000	45.0000	0.0000	0.000011	2.00

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

Calibration Report

Certificate No.: 230227-001-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: XMR204
Serial No.: C117638043
Capacity: 220 g

Date of Calibration: 16 May 2023

Page 3 of 4

Calibration Results: (Continued)

Calibration Range: 0 - 200g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Values:

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (g)	Coverage Factor
50	50.0000	50.0000	0.0000	0.000011	2.00
55	55.0000	55.0000	0.0000	0.000012	2.00
60	60.0000	60.0000	0.0000	0.000012	2.00
65	65.0000	65.0000	0.0000	0.000012	2.00
70	70.0000	70.0000	0.0000	0.000013	2.00
75	75.0000	75.0000	0.0000	0.000013	2.00
80	80.0000	80.0000	0.0000	0.000014	2.00
85	85.0000	85.0000	0.0000	0.000014	2.00
90	90.0000	90.0000	0.0000	0.000015	2.00
100	100.0000	100.0000	0.0000	0.000016	2.00
120	120.0000	120.0000	0.0000	0.000019	2.00
150	150.0000	150.0000	0.0000	0.000023	2.00
200	200.0000	200.0000	0.0000	0.000026	2.00

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

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



Cert. No.: 23TM249
Page : 1 of 3

Certificate of Calibration

Equipment : BOD Incubator
Manufacturer : Arco
Model : UC4-1320
Serial No. : 13URC4S013201
ID No. : UAE.WAD.0152561
Submitted by : United Analyst and Engineering Consultant Co., Ltd
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, PhraAhnong,
Bangkok 10250
Location : Lab Floor 2
Received Order : 15 February 2023
Calibration Date : 15 February 2023
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$

Calibrated by : Preacha Hahib

Approved by :

() Pornthippa Tameyakul
(✓) Malee Bulkuew
() Suwit Injai

Issue Date : 24 February 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate and any other associated data are for internal use only and are not to be used for any other purpose.
Approved by the head of Corporate Services : Technology Promotion Association Calibration and Testing Services

เอกสารไม่ควบคุม

A 0051476



Equipment : BOD incubator
Condition As-Received : Used Item
Reference : 2302-02970C-1

Cert. No.: 23TM249
Page : 2 of 3

Procedure Used :-

Calibration was conducted using calibration procedure CP-OT02 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	Model	Serial No.	Cert. No.	Due Date
() Data Acquisition	34972A	MY57013711	22LM93	02 Jul 2023

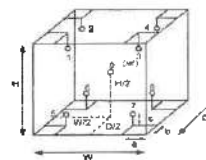
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- () Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available



Probe Installation Details : Dimension of Chamber :

a = 10 cm	D = 0.82 m
b = 10 cm	W = 1.2 m
c = 10 cm	H = 1.2 m
	Capacity = 0.89 m ³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	29	31
REL.Humid. (%)	83	87
AC Supply (Volt)	220	220

Position :	Ref. Std. ID No.:
1	22-16RTD-2/1
2	16RTD-2/2
3	16RTD-2/3
4	16RTD-2/4
5	16RTD-2/5
6	16RTD-2/6
7	16RTD-2/7
8	16RTD-2/8
9 (ref.)	16RTD-2/9

เอกสารไม่ควบคุม

n 4440547



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2302-02970C-1
Result of Calibration : () Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 23TM249
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (± °C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
20.0	20.0	19.3	0.32	0.67	1.0	0.60	2

Measured Temperature (°C)								
Calibration Point (°C)	Position							
	1	2	3	4	5	6	7	8
20.0	20.086	19.915	20.388	19.976	19.973	19.638	19.837	19.821
								19.940

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 %.

-050-

เอกสารไม่ควบคุม

a 1149512



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & INSTRUMENT CALIBRATION AND TESTING SERVICES
2544 PATTAYAKARN ROAD 801 (8.85AM) BANGKOK 10260
TEL: 0-23713-9820-21 FAX: 0-23713-9434



Cert. No.: 23TM375
Page: 1 of 3

Certificate of Calibration

Equipment: BOD Incubator
Manufacturer: ARCO
Model: UR-1320
Serial No.:
ID No.: UAE.WAD.019/2551
Submitted by: United Analyt and Engineering Consultant Co., Ltd.
3-801 Udonnuek 41, Sukhumvit Road,
Bangkok, Phrakhanong,
Bangkok 10260
Location: Lab Floor 2
Received Order: 11 April 2023
Calibration Date: 12 April 2023
Ambient Temperature: $(26 \pm 10) ^\circ\text{C}$
Relative Humidity: $(50 \pm 30) \%$
Calibrated by: Kriada Malee
Approved by:
() Pongthapa Tameysai
() Malee Bubrua
() Suwit Injai
Issue Date: 24 April 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced or used in full, except with the prior written
Approval of the Issuer of Calibration Services: Equipment Calibration and Testing Services.

เอกสารไม่ควบคุม
A 0053360



Equipment: BOD Incubator
Condition As-Received: Used Item
Reference: 2304-015600-2
Procedure Used:-

Cert. No.: 23TM375
Page: 2 of 3

Calibration were conducted using calibration procedure CP-OT02 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 Model Serial No. Cert. No. Due Date
1) Data Acquisition 34972A MYS8003411 22LM165 26 Nov 2023

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

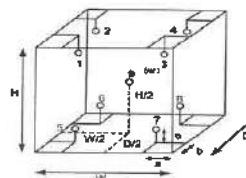
3. This certificate is traceable to the International System of Unit.

Result of Calibration:- () Without Adjustment

Function of UUC:- Temperature Source

Fresh air setting: Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	28	27
REL.Humid. (%)	42	45
AC Supply (Volt)	219	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	20RTD-2/1
2	20RTD-2/2
3	20RTD-2/3
4	20RTD-2/4
5	20RTD-2/5
6	20RTD-2/6
7	20RTD-2/7
8	20RTD-2/8
9 (ref.)	20RTD-2/9

เอกสารไม่ควบคุม
A 1158259



Equipment: BOD Incubator
Condition As-Received: Used Item
Reference: 2304-015600-2
Result of Calibration:- () Without Adjustment
Function of UUC:- Temperature Source
Fresh air setting: Not Available

Cert. No.: 23TM375
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	0.42	1.2	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.040	20.170	20.203	20.089	19.749	19.704	19.920	20.191	20.020	0.66

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 sensor and the measured temperature at the reference location, which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

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

UUC*: Unit Under Calibration

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

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

-000-

เอกสารไม่ควบคุม
A 1158258

Verification Certificate

Certificate No.: 2302413-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Prakhlang, Bangkok 10260

Page 2 of 4

Equipment: HEATING BLOCK DIGESTION
Manufacturer: FOSS
Model: 2520
Serial No.: 91794469
ID No.: UAE.WAS.011/2560
Order No.: 2302413
Operation No.: 2302413-001
Date of Receipt: 28 March 2023
Date of Calibration: 30-31 March 2023

Calibrated by: Mr. Nattapol Wiyomhat Specialist
Approved by: (Mr. Phrasaph Tuen) Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 10 April 2023

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

ข้อมูลเอกสารนี้เป็นเอกสารของบริษัทฯ และสงวนลิขสิทธิ์ไว้
การนำเอกสารนี้ไปใช้โดยไม่ได้รับอนุญาตจากบริษัทฯ ถือว่าผิดกฎหมาย
เอกสารนี้เป็นเอกสารของบริษัทฯ และสงวนลิขสิทธิ์ไว้
การนำเอกสารนี้ไปใช้โดยไม่ได้รับอนุญาตจากบริษัทฯ ถือว่าผิดกฎหมาย

Verification Report

Certificate No.: 2302413-001-01
Equipment: HEATING BLOCK DIGESTION
Model: 2520 **Serial No.:** 91794469
Resolution: 1 °C **ID No.:** UAE.WAS.011/2560
Manufacturer: FOSS
Date of Calibration: 30-31 March 2023

Page 3 of 4

Location: Laboratory Room, NATIONAL FOOD INSTITUTE
Environment Conditions: Ambient Temperature (25 ± 3) °C
Relative Humidity (55 ± 15) %
Line Voltage (220 ± 10) Volt

Condition of this results of Calibration:
1. 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 shown below were final values and the initial data may be obtained upon request.

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
Digital Thermometer with Thermocouple	34570A	91794469	TC22/0044	5-May-2023	N.F.I. 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-009 Revision 01 Date: 20-04-65

ข้อมูลเอกสารนี้เป็นเอกสารของบริษัทฯ และสงวนลิขสิทธิ์ไว้
การนำเอกสารนี้ไปใช้โดยไม่ได้รับอนุญาตจากบริษัทฯ ถือว่าผิดกฎหมาย
เอกสารนี้เป็นเอกสารของบริษัทฯ และสงวนลิขสิทธิ์ไว้
การนำเอกสารนี้ไปใช้โดยไม่ได้รับอนุญาตจากบริษัทฯ ถือว่าผิดกฎหมาย

Verification Report

Certificate No.: 2302413-001-01
Equipment: HEATING BLOCK DIGESTION
Model: 2520 **Serial No.:** 91794469
Resolution: 1 °C **ID No.:** UAE.WAS.011/2560
Manufacturer: FOSS
Date of Calibration: 30-31 March 2023

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	377.74	2.1
2	380	380	0.40	377.28	2.1
3	380	380	1.15	377.82	2.1
4	380	380	0.44	377.19	1.6
5	380	380	0.11	377.39	1.6
6	380	380	0.14	377.90	1.6
7	380	380	1.17	373.85	2.1
8	380	380	0.33	376.96	2.1
9	380	380	0.14	374.18	2.1
10	380	380	0.96	378.54	2.0
11	380	380	1.04	378.34	2.0
12	380	380	0.55	378.06	2.0
13	380	380	0.48	377.85	1.6
14	380	380	0.39	379.19	1.6
15	380	380	0.59	377.48	1.6
16	380	380	0.48	378.33	1.7
17	380	380	0.71	377.60	1.7
18	380	380	0.35	376.77	1.7
19	380	380	0.84	377.05	1.8
20	380	380	0.41	378.68	1.8

Notes:
- 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.

FCS-009 Revision 01 Date: 20-04-65

Verification Report

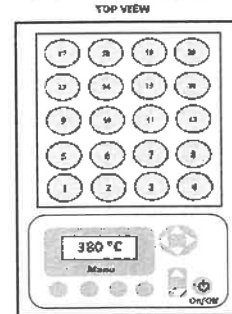
Certificate No.: 2302413-001-01
Equipment: HEATING BLOCK DIGESTION
Model: 2520 **Serial No.:** 91794469
Resolution: 1 °C **ID No.:** UAE.WAS.011/2560
Manufacturer: FOSS
Date of Calibration: 30-31 March 2023

Page 4 of 4

Calibration points: 380 °C

Calibration results: Continued

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



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 providing a level of confidence of approximately 95 %.

FCS-009 Revision 01 Date: 20-04-65

ข้อมูลเอกสารนี้เป็นเอกสารของบริษัทฯ และสงวนลิขสิทธิ์ไว้
การนำเอกสารนี้ไปใช้โดยไม่ได้รับอนุญาตจากบริษัทฯ ถือว่าผิดกฎหมาย
เอกสารนี้เป็นเอกสารของบริษัทฯ และสงวนลิขสิทธิ์ไว้
การนำเอกสารนี้ไปใช้โดยไม่ได้รับอนุญาตจากบริษัทฯ ถือว่าผิดกฎหมาย

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: 8411

Date: 29/05/23
Customer: UAE
Instrument: KT8100

Address: Bangkok, Thailand
Serial: 91829052

Hours
Start 07:00
Finish 08:30
Travel To Customer 1.5 hr

Labour
09:00
18:00
6 hr.

Travel From Customer
16:30
18:30
2 hr

Job Type							
Application		Special		Standard			
Normal	x	Courtesy Visit	x	Installation	x	Training	x
Distributor	x	PMA Onboarding	x	Quote	x	In House	x
Internal	x	Warranty	x	Repair	x	PM	x
Digital Service	x	Sales Support	x	Remote	x	Other	x

PO/Quote Number: if applicable

PMA Type: if applicable Contract No. if applicable

Details of Work / Test	Condition / Status
- น้ำยา Function Test เครื่อง PM	OK
- ตรวจสอบ Part Gas PM - kit 2100/8200 12 Mo	OK
- ตรวจสอบ Heating Coil = 32.3 °C	OK
- ตรวจสอบ Splash head Steam Generator	OK
- ตรวจสอบ Steam Valve = 54.8 °C	OK
- ตรวจสอบ Condenser Water Cooling Valve A, B = 48.2 °C	OK
- ตรวจสอบ Water 100 ml → 100 ml Alkal/ acid → 8.1 ml	OK
- ตรวจสอบ Water 170 ml	OK
- ตรวจสอบ Blank = 0.12 Recovery = 100 %	
Instrument Ready for Use	OK Not OK If not OK - Comment

Part No:	Batch	Description	Qty
60031857	18:07-2022	Foss PM kit KT8100/8200 12 Mo	1

I confirm this report is accurate and complete

Signed FOSS		Signed Customer	นางสาว
Name		Name	

Would you be willing to participate in a brief survey in order to tell us how we performed? karnphong.200@vaeconsultant.co.th

เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTARAKARN ROAD SOI 15, SIANGKANG, SIANLUANG BANGKOK 10250
TEL. 0-2717-0001-25 FAX. 0-2719-9464



Cert. No.: 23TM378
Page: 1 of 3

Certificate of Calibration

Equipment : Incubator
Manufacturer : Memmert
Model : IPP 260
Serial No. : V815.0187
ID No. : UAE.MIC.003/2559
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsak 41, Sukhumvit Road,
Bangchak, Phra Khanong
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 11 April 2023
Calibration Date : 12 April 2023
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$
Calibrated by : Preecha Hahib
Approved by :
() Pornthippa Tameyakul
(/) Malee Bulkruea
() Suwit Imjai
Issue Date : 24 April 2023

The Uncertainties are for a confidence probability of approximately 95 %

This certificate may only be reproduced in whole or in part without the prior written
Approval of the Metrology Institute of Thailand - Equipment Calibration and Testing Service.

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2304-0155OC-1
Procedure Used :-

Cert. No.: 23TM378
Page: 2 of 3

Calibration were conducted using calibration procedure CP-OT02 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	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY49001451	23LM27	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.

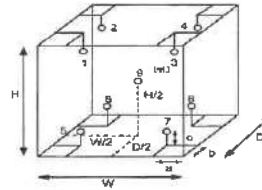
Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration

	Beginning	Finished
Temp (°C)	25	26
REL.Humid. (%)	57	61
AC Supply (Volt)	220	220



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 = 0.80 m
Capacity = 0.26 m³

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

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2304-0155OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 23TM378
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	0.062	0.53	0.60	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
35.0	35.062	35.148	34.817	35.149	34.994	35.323	34.773	35.058	34.802	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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เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES: EQUIPMENT CALIBRATION AND TESTING SERVICES
334/1 PATTANA KARN ROAD SOI 13, SUANLUK VEG. STANLEAD BANGKOK 10250
TEL: 02-717-3090-29 FAX: 02-719-6484



Cert. No.: 23TM192
Page : 1 of 3

Certificate of Calibration

Equipment : Incubator
Manufacturer : Binder
Model : BD 53 E2
Serial No. : 13-07343
ID No. : UAE.MIC.005/2558
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsak 41, Sukhumvit Road,
Bangchak, Phraekhonong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 15 February 2023
Calibration Date : 15 February 2023
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$
Calibrated by : Sunil Imjai
Approved by :
() Pongthep Tameyakul
() Meechai Butthavee
Issue Date : 24 February 2023

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

This certificate, when not reproduced in full, except with the prior written
Approval of the Issuer (Corporate Services) : Equipment Calibration and Testing Services

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2302-028500-1

Cert. No.: 23TM192
Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-0702 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	Model	Serial No.	Cert. No.	Exp. Date
1) Data Acquisition	34972A	MY59003411	22LM185	29 Nov 2023

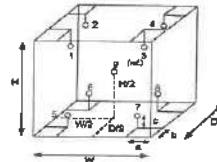
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration : (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



Probe Installation Details :

Probe Installation Details :		Dimension of Chamber :	
a =	5.0 cm	D =	0.33 m
b =	5.0 cm	W =	0.40 m
c =	5.0 cm	H =	0.40 m
		Capacity =	0.083 m ³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	23	23
REL.Humid. (%)	65	61
AC Supply (Volt)	231	231

Position :	Ref. Std. ID No.:
1	23RTD-2/1
2	23RTD-2/2
3	23RTD-2/3
4	23RTD-2/4
5	23RTD-2/5
6	23RTD-2/6
7	23RTD-2/7
8	23RTD-2/8
9 (ref.)	23RTD-2/9

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2302-028500-1
Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 23TM192
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
35.0	35.4	35.4	0.037	0.56	0.86	0.30	2

Calibration Point (°C)	Measured Temperature (°C)								
	1	2	3	4	5	6	7	8	9 (ref.)
35.0	35.286	35.308	35.116	35.453	34.700	34.798	34.718	34.657	34.698

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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เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
314/4 PATTANAKARN ROAD SOI 18, SUKHUMVIT 21, SUKHUMVIT BANGKOK 10110
TEL: 02-257-9900 FAX: 02-257-9901



Cert. No.: 23TM193
Page : 1 of 3

Certificate of Calibration

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 14
Serial No. : L418.0608
ID No. : UAE.MIC.002/2560
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phraekhlong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 15 February 2023
Calibration Date : 15 February 2023
Ambient Temperature : $(25 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$
Calibrated by : Suwit Injai

Approved by : 
Approved Signatory

() Pongthappa Jamsayakul
(/) Malee Butruwa

Issue Date : 24 February 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may only be reproduced or copied in full, except with the prior written
approval of the head of Corporate Services. Equipment Calibration and Testing Service

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2302-0295OC-2
Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT04 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	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY56003411	22LM165	26 Nov 2023

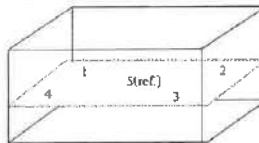
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

	Environmental		AC Voltage Supply
	($^{\circ}\text{C}$)	(%RH)	(Volt)
Beginning of Calibration	22	65	231
Finished of Calibration	23	61	231



Front

Position	Ref. Std. ID No.
1	4804539-001
2	4804539-002
3	4804539-003
4	4804539-004
5(ref.)	4804539-005

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2302-0295OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 23TM193
Page : 3 of 3

Calibration point ($^{\circ}\text{C}$)	UUC* Setting ($^{\circ}\text{C}$)	UUC* Reading ($^{\circ}\text{C}$)	Average* Standard Reading ($^{\circ}\text{C}$)				
			Position				
			1	2	3	4	5 (ref.)
44.5	44.5	44.5	44.455	44.437	44.428	44.477	44.459

Calibration point ($^{\circ}\text{C}$)	Uniformity ($^{\circ}\text{C}$)	Stability ($\pm ^{\circ}\text{C}$)	Uncertainty ($\pm ^{\circ}\text{C}$)	Coverage Factor k
44.5	0.079	0.036	0.15	2

Average* : The average of 30 values in each position

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

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

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

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

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เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
3344 PATTANAKARN ROAD SOI 16, SPANGLANG, SUANLUANG BANGKOK 10150
TEL: 0-2717-2000-29 FAX: 0-2719-9484



Cert. No.: 23TM194
Page: 1 of 3

Certificate of Calibration

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 14
Serial No. : L416.0612
IO No. : UAE.MKC.003/2560
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Sol Udomauk 41, Sukhumvit Road,
Bangchak, Phraekhanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 15 February 2023
Calibration Date : 16 February 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Suvit (mjai)

Approved by :
() Pomsilpa Temeyakul
(✓) Malee Bulkrana

Issue Date : 24 February 2023

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

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2302-0285OC-3
Procedure Used :-

Cert. No.: 23TM194
Page: 2 of 3

Calibration were conducted using in-house calibration procedure CP-DT04 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	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34872A	MY66003411	22LM185	26 Nov 2023

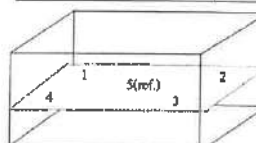
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	22	85	231
Finished of Calibration	22	83	230



Front

Position :	Ref. Std. ID No.:
1	4804539-001
2	4804539-002
3	4804539-003
4	4804539-004
5(ref.)	4804539-005



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2302-0285OC-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 23TM194
Page: 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)				
			Position				
44.5	44.5	44.5	1	2	3	4	5 (ref.)
			44.520	44.509	44.498	44.582	44.530

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor k
44.5	0.077	0.037	0.15	2

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

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

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

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

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

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เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
5941 PATTANAKARN RD. 601 18 SUKHUMVIT 18/1 BANGKOK 1056
TEL. 0-2111-3400-29 FAX. 0-2118-8844



Cert. No.: 23TM763
Page: 1 of 3

Certificate of Calibration

Equipment : Autoclave
Manufacturer : ALP
Model : CL-40L
Serial No. : 808763
ID No. : UAE MIC 0287583
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phraekhanong,
Bangkok 10260
Location : Microbiology Laboratory (301)
Received Order : 27 April 2023
Calibration Date : 27 April 2023
Ambient Temperature : $(28 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$
Calibrated by : Prascha Hahib
Approved by : [Signature]
[] Ponthipha Taneyakul
[] Maloo Burkhuas
[] Suwit Injai
Issue Date : 11 May 2023

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.

เอกสารไม่ควบคุม

A 0053944



Equipment : Autoclave
Condition As-Received : Used Item
Reference : 2304-04610C-2

Cert. No.: 23TM763
Page: 2 of 3

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT03 according to direct measurement method with Data Acquisition which connected with Thermocouple Type T

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard Instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY59003411	22LM165	28 Nov 2023

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.

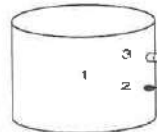
4. This result of calibration covers laboratory autoclaves for the sterilization of goods and material which could be infected with organisms categorized as Hazard Group 1, 2 and 3**

(** = Categorization of pathogens according to hazard and categories of containment, second edition, 1990)
It does not cover autoclaves for use with material infect with organisms in Hazard Group 4, for which complete containment and sterilization of infected condensate is considered to be essential.

This result of calibration does not apply to sterilizers or disinfectors used for medical, dental, pharmaceutical or veterinary purposes which are directly concerned with patient care, or those used for fabrics subjected to sterilization which are required to be dry at the end of cycle.

Result of Calibration :-

Function of UUC* : (*) Without Adjustment
Temperature Source



	Environmental		
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	27	60	220
Finished of Calibration	27	58	220

Position	Description	Ref. Std. ID No.:
1 =	Center of chamber	18-20TC-04
2 =	Temperature sensor	18-20TC-05
3 =	Exhaust port	18-20TC-08

เอกสารไม่ควบคุม

a 1159968



Equipment : Autoclave
Condition As-Received : Used Item
Reference : 2304-04610C-2
Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 23TM765
Page: 3 of 3

Operating parameter Set : Temperature = 115.0 °C
Sterilization period = 15 minute

UUC* Setting (°C)	UUC* Reading (°C)	Position	Average* Standard Reading (°C)	Stability (± °C)	Pressure Reading (MPa)	Uncertainty (± °C)	Coverage Factor k
115.0	115.0	1	115.213	0.22	0.06	0.75	2
		2	115.165				
		3	115.260				

Operating parameter Set : Temperature = 121.0 °C
Sterilization period = 30 minute

UUC* Setting (°C)	UUC* Reading (°C)	Position	Average* Standard Reading (°C)	Stability (± °C)	Pressure Reading (MPa)	Uncertainty (± °C)	Coverage Factor k
121.0	121.0	1	121.280	0.29	1.1	0.75	2
		2	121.224				
		3	121.284				

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

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

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

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

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เอกสารไม่ควบคุม

a 1159967

Calibration Certificate

Certificate No.: 2303074-001-01
Client name: UNITED ANALYT AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsak 41, Sathumvit Road,
Bangchack, Prakhong, Bangkok 10200

Page 3 of 3

Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: AB204-S/FACT
Serial No.: 1129361910
ID No.: UAE.WAS.002/2352
Order No.: 2303074
Operation No.: 2303074-001
Date of Receipt: 26 May 2023
Date of Calibration: 26 May 2023

Calibrated by: Mr. Phoraphat Tuenjit
Scientist

Appr

Vice President, Department of Laboratory Services
Responsible for the Technical Management Team

Date of Issue: 26 May 2023

The uncertainty 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 standard's laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

FCS-009 Revision: 01 Date: 20-04-05

ขอรับรองว่าผลการสอบเทียบที่ได้แสดงไว้เป็นไปตามข้อกำหนดของมาตรฐาน ISO 17025 และได้รับการรับรองจากกรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์
3000 Soi Udomsak 41, Sathumvit Road, Bangchack, Prakhong, Bangkok 10200, Thailand
โทร: 02-000-0000 โทรสาร: 02-000-0000

Calibration Report

Certificate No.: 2303074-001-01
Equipment: Electronic Balance
Model: AB204-S/FACT
Serial No.: 1129361910
Capacity: 220 g
Manufacturer: METTLER TOLEDO
Resolution: 0.0001 g
ID No.: UAE.WAS.002/2352

Page 8 of 8

Date of Calibration: 26 May 2023
Environment Condition: Ambient Temperature: 23.7 ± 0.1 °C Relative Humidity: 61 ± 2.1 %
Place of Calibration: Room 554 Balance Room, UNITED ANALYT AND ENGINEERING CONSULTANT CO.,LTD.

Condition of Equipment: Good Condition
Condition at This Report of Calibration:

1. Calibration Method: NPL Method VPM-001 3x-Value Method based on UKAS Lab 01: 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	800057572	TCS	FD2401339	6 Apr 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermohygro Meter	603441	NPL 871 014/23	Quality Reborn	Q023-0491	21 February 2024

3. This calibration is traceable to SI UNIT

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

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

Calibration Results:

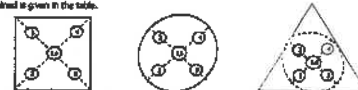
1. Reproducibility of Readings:

Normal Value (g)	Standard Deviation of Reading (g)
100	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 captured is given in the table.



1	2	3	4	5	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
99.9994	99.9995	99.9995	99.9999	99.9999	99.9997	0.0001

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

Calibration Report

Certificate No.: 2303074-001-01
Equipment: Electronic Balance
Model: AB204-S/FACT
Serial No.: 1129361910
Capacity: 220 g
Manufacturer: METTLER TOLEDO
Resolution: 0.0001 g
ID No.: UAE.WAS.002/2352

Date of Calibration: 26 May 2023

Page 3 of 4

Calibration Result: (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
Unloaded	0.00000	0.00000	0.00000	0.000003	2.00
0.01	0.01000	0.01000	0.00000	0.000003	2.00
0.05	0.05000	0.05000	0.00000	0.000008	2.00
0.1	0.10001	0.10000	0.00001	0.000008	2.00
0.2	0.20001	0.19999	0.00001	0.000008	2.00
0.5	0.50002	0.50000	0.00002	0.000008	2.00
1	1.00000	1.00000	0.00000	0.000009	2.00
2	2.00002	2.00000	0.00002	0.000009	2.00
5	5.00002	5.00000	0.00002	0.000009	2.00
10	10.00001	9.99999	0.00001	0.000009	2.00
20	20.00001	20.00000	0.00001	0.000009	2.00
50	50.00001	49.99999	0.00001	0.000011	2.00
70	70.00000	69.99999	0.00001	0.000013	2.00
100	100.00000	99.99999	0.00001	0.000016	2.00
150	150.00000	149.99999	0.00001	0.000024	2.00
200	200.00016	199.99998	0.00016		

The reported uncertainty of measurement was based on a standard uncertainty multiplied level of confidence of approximately 95 %.

End

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

ขอรับรองว่าผลการสอบเทียบที่ได้แสดงไว้เป็นไปตามข้อกำหนดของมาตรฐาน ISO 17025 และได้รับการรับรองจากกรมส่งเสริมการค้าระหว่างประเทศ กระทรวงพาณิชย์
3000 Soi Udomsak 41, Sathumvit Road, Bangchack, Prakhong, Bangkok 10200, Thailand
โทร: 02-000-0000 โทรสาร: 02-000-0000

List of Instruments Certification for Water Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Water									
1	pH Meter	pH	Horiba	LAQUA-PH210 HA0F0026	Technology Promotion Association (Thailand-Japan)	23CH98	23 Jan 23	22 Jan 24	-



TECHNOLOGY PROMOTION ASSOCIATION (THAI AND JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
354H PATTANAKARN ROAD NO. 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3060-27 FAX. 0-2719-9484



Cert.No.: 23CH96
Page: 1 of 3

Certificate of Calibration

Equipment : pH Meter
Manufacturer : Horiba
Model : LAQUA-PH210
Serial No. : HAOF0026
ID No. : UAE.EFM.0887564(EFM.PH.01/84)
Condition As-Received: Used Item
Received Date : 20 January 2023
Calibration Date : 23 January 2023
Reference : 2301-0687W8C-1
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomauk 41, Sukhumvit Road,
Bangchak, Phraekhanong, Bangkok 10250
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In-house method :
- CP-CH5 by direct measurement with standard
voltage calibrator and direct measurement with
certified reference material (CRM)
- CP-CH6 by comparison with standard thermometer

Calibrated by : Warakorn Lemgagrakul

Approved by :

(/) Miss Sutkrua
(/) Sattip Moengmal
(/) Warakorn Lemgagrakul

Issue Date : 25 January 2023

The Uncertainty is for a confidence probability of approximately 95 %

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approval of the head of Corporate Services 3 : Singapore Calibration and Testing Services.

เอกสารไม่ควบคุม
A 0050217



Cert.No.: 23CH96
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Condition of this calibration result

1. Reference Standard Instrument : -
Instrument Serial No. ID No. Cert. No. Due Date
1) Document Process Calibrator 54090042 130RC118 22E2768 24 Aug 2023
2) Ref. Standard Thermometer 4962054 110RC044 2211308 27 Oct 2023
This certification is traceable to the International System of Unit established at:
- Traceable to National Institute of Metrology (Thailand), NIMT
2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.
ANSI-ASQ National Accreditation Board, Accredited No. AN-1635

Buffer Solution Manufacturer Lot No. Exp. date
pH 4.008 CPA chem 826588 08 July 2024
pH 6.867 CPA chem 826589 08 July 2023
pH 10.008 CPA chem 826590 08 July 2023

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 Fluor 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 SN: HAOF0026	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	-177.4	10.01	0.058	2.00

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Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4.7)(7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (±)	Coverage factor k
pH Electrode SN: 991L0035	4.008	4.02	181	0.0066	2.00
	6.867	7.00	-11	0.011	2.00
	6.867	7.00	-11	0.011	2.00
	10.008	10.01	-187	0.0066	2.00

Function : Temperature Measurement

(°) Without adjustment

This equipment was connected with Temperature Probe:

- Model : 8652
- Serial No. : 991L0035
Dimension of probe:
- Length : 112 mm.
- Diameter : 18 mm.
- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
28.0	25.002	25.0	-0.002	0.13	2.00
30.0	30.003	30.0	-0.003	0.13	2.00
35.0	35.002	35.0	-0.002	0.13	2.00

Remark : - UUC* = Unit Under Calibration

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

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