



ภาคผนวก ง

เอกสารเทียบเครื่องมือ

รายการใบรับรองสอบเทียบพวนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือสำหรับวิเคราะห์คุณภาพน้ำ									
1	pH Meter	pH	Hanna Instrument	HI2020-02 / C0051107	National Food Institute, Ministry of Industry, Thailand	2103272-001-02	14 Jun 21	13 Jun 22	-
2	pH Meter		Mettler-Toledo	Seven Easy S20 / 1231155210	National Food Institute, Ministry of Industry, Thailand	2103189-002-01	14 Jun 21	28 Jun 23	-
3	BOD Incubator	Biochemical Oxygen demand (BOD)	Arco	UR-1320 / (UAE.LAB.006/2553)	Technology Promotion Association (Thailand-Japan)	22TM306	7 Apr 22	6 Apr 23	-
4	Analytical Balance (Readability 0.01 mg)	Suspended Solids Total Dissolved Solids	Mettler-Toledo	XSR205DU / C009071872	Calibration Laboratory Mettler-Toledo (Thailand) Limited	2202361-001-01	4 Apr 22	3 Apr 23	-
5	Hot Air Oven		Memmert	UF55 / B212.0411	Technology Promotion Association (Thailand-Japan)	21TM813	7 Apr 22	6 Apr 23	-
6	Digestor Unit	Total Kjeldahl Nitrogen (TKN)	FOSS TECATOR	2520auto / 91794469	Thailand Institute Of Science And Technological Research (TISTR)	PSL-T 614/64	4 Apr 22	3 Apr 23	-
7	Distillation Unit (Kjeldahl Method)		FOSS TECATOR	KT200 / 91790524	Sithiporn Associates Co.,Ltd.	M563FOT00848	30 Nov 21	29 Nov 22	-
8	Analytical Balance (Repeatability 0.1 mg)	Fat, Oil And Grease	Mettler-Toledo	XSR204 / C117635043	Mettler-Toledo (Thailand) Ltd.	TH2060-065-052721 -ACC-TH	13 May 22	12 May 23	-
9	Incubator	Fecal Coliform Bacteria Total Coliform Bacteria	Binder	K8400 / 20200000015535	SPC Calibration Center Co.,Ltd.	C31211235	22 Jun 21	21 Jun 22	-
10	Incubator		Memmert	IPP 260 / V615.0187	Technology Promotion Association (Thailand-Japan)	21TM706	21 Apr 21	20 Apr 22	-

รายการใบรับรองสอบเทียบพจนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือสำหรับวิเคราะห์คุณภาพน้ำ									
11	Incubator	Fecal Coliform Bacteria Total Coliform Bacteria	Binder	BD 53 / 13-07343	Technology Promotion Association (Thailand-Japan)	21TM421/1	17 Feb 22	16 Feb 23	-
12	Incubator	Escherichia coli Staphylococcus aureus	Memmert	IN 75 / D317.0307	Technology Promotion Association (Thailand-Japan)	21TM833	3 May 22	2 May 23	-
13	Water Bath	Pseudomonas aeruginosa	Memmert	WNE 14 / L416.0612	Technology Promotion Association (Thailand-Japan)	21TM423	17 Feb 22	16 Feb 23	-
14	Water Bath		Memmert	WNE 14 / L414.1407	Technology Promotion Association (Thailand-Japan)	21TM708	7 Apr 22	6 Apr 23	-
15	Autoclave		ALP	CL-40L / 807298	Technology Promotion Association (Thailand-Japan)	21TM831	7 May 21	6 May 22	-

Due Date of Calibration* : Schedule the program once a year at least once a year.



Calibration Certificate

Substitute for Certificate No.: 2103272-001-01
Certificate No.: 2103272-001-02
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 5

Equipment: pH Meter
Manufacturer: HANNA INSTRUMENTS

Model: HI2020-02

Serial No.: C0051107

ID No.: UAE.WAO.005/2557

Order No.: 2103272

Operation No.: 2103272-001

Date of Receipt: 11 June 2021

Date of Calibration: 14 June 2021

Calibrated by Mr.Manas Somsak
Expert
Approved by (Mr.Pheraphat Tuanjit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 2 July 2021

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 carry out 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.



Calibration Report

Certificate No.: 2103272-001-02
Equipment: pH Meter
Resolution: 0.01 pH : 0.1 mV
Manufacturer: HANNA INSTRUMENTS
Model: HI2020-02
Serial No.: C0051107
Type: Bench top
ID No.: UAE.WAO.005/2557

Date of Calibration: 14 June 2021

Page 2 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: (23.7 ± 1.5) °C
Condition of Equipment: Good Condition
Condition of this Results of Calibration

Relative Humidity: (53.5 ± 5) %

In house method : W-CC-002 based on direct measurement by using standard voltage calibrator and certified reference material (CRM)

2. Reference Standards / Certified Reference Material

Instruments	Serial / ID No.	Manufacturer	Certificate No.	Due Date
2.1 DC Voltage Calibrator	2709007	Fluke	SCL-20F-0682	17 June 2021
2.2 Digital Thermometer	2709007	Fluke	CC 630609-01	30 October 2021
2.3 Thermo-Hygro Meter	NFI.BTH003/17	PONPE	QR20-1578	21 September 2021

Certified Reference Material

Lot No.	Manufacturer	Ref N	Expiry Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)	CPAchem	PH216.L5	2 October 2022
2.5 pH buffer 6.865 (Primary pH buffer Solution)	CPAchem	PH217.L5	2 October 2022
2.6 pH buffer 10.01 (Primary pH buffer Solution)	CPAchem	PH220.L5	2 October 2021
2.7 pH buffer 7.00 (Standard pH buffer Solution)	CPAchem	PH107.L5	2 October 2021

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

3.1 Instruments No.2.1	through	NSC-TIS-17025 Laboratory Accreditation of Calibration No.0075
3.2 Instruments No.2.2	through	NSC-TIS-17025 Laboratory Accreditation of Calibration No.0061
3.3 Instruments No.2.3	through	NSC-TIS-17025 Laboratory Accreditation of Calibration No.0292
3.4 Certified Reference Material No. 2.4 to 2.6	traceable to	Primary measurement method- Hanna cell using calibrated thermometer, barometer, and nanovoltmeter.The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025
3.5 Certified Reference Material No. 2.7	traceable to	BIM ReIN HI-7 LoIN 30.04.2020; BIM ReIN HI-9 LoIN 28.05.2020; BIM ReIN HI-8 LoIN 30.04.2020; BIM ReIN HI-10 LoIN 28.05.2020. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025

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

Calibration Report

Certificate No.: 2103272-001-02
Equipment: pH Meter Resolution: 0.01 pH ; 0.1 mV
Manufacturer: HANNA INSTRUMENTS Model: H12020-02
Serial No.: C0051107 Type: Bench top
ID No.: UAE.WAO.005/2557

Date of Calibration: 14 June 2021

Page 3 of 5

Calibration Results:

1. Calibration of pH Meter (Manual Temperature Compensation at 25 °C)

Nominal pH	DC Voltage Standard (mV)	Average Indicator Reading		Uncertainty (±mV)	Coverage Factor (k)
		mV	pH		
0.00	414.118	415.7	0.00	0.063	2.00
2.00	295.611	297.3	2.00	0.063	2.00
4.00	177.461	179.0	4.00	0.063	2.00
6.00	55.160	60.7	6.00	0.063	2.00
7.00	0.000	1.5	7.00	0.063	2.00
8.00	-55.158	-57.7	8.00	0.063	2.00
10.00	-177.461	-176.0	10.00	0.063	2.00
12.00	-295.612	-294.4	12.00	0.063	2.00
14.00	-414.118	-412.4	14.00	0.063	2.00

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

Equipment: pH Electrode Type: Combined Electrode
Manufacturer: HANNA INSTRUMENTS Model: H11310
Serial No.: 078743 ID.No. N/A

Performance of Electrode system (Three-Point Calibration at pH4, pH7 and pH10)

Certified Value @25 °C (pH)	Average Indicator Reading		Relative Slope (%)	Uncertainty (± pH)	Coverage Factor (k)
	pH	mV			
4.008	4.01	162.7	99.1	0.0071	2.00
6.866	6.87	-4.9			
6.866	6.87	-4.9	95.0	0.0075	2.00
10.008	10.01	-181.3			
6.985	7.00	-13.6	-	0.0093	2.00

Certificate No.: 2103272-001-02

Equipment: Digital Thermometer with RTD (pH Meter)

Resolution: 0.1 °C Model: SevenEasy pH

Serial No.: C0051107 ID No.: UAE.WAO.005/2557

Manufacturer: HANNA INSTRUMENTS

Date of Calibration: 14 June 2021

Page 4 of 5

Location: Chemical Calibration Laboratory, National Food Institute

Environment Condition:

Ambient Temperature 24 °C ± 1 °C

Relative Humidity 54 % ± 2 %

Condition of this results of Calibration:

1. Calibration Method :
 - In house method: W-TE-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 :
 - Low Temperature Bath (ISOCAL-6), Model: Europa-6 Plus Basic, SN: 341592/2

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER Platinum Resistance Thermometer (PRT)	1521	A85987	TE 640028-01	12-Dec-21	NATIONAL FOOD INSTITUTE
	385	509201			

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.

Good

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



F-CS-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม

F-CS-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2103272-001-02
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenEasy pH
Serial No.: C0051107 ID No.: UAE.WAO.005/2557
Manufacturer: HANNA INSTRUMENTS
Date of Calibration: 14 June 2021

Page 5 of 5

Calibration point: 15.0, 25.0 and 35.0 °C**

Calibration result:

- The probe was immersed in liquid bath or dry bath to a minimum depth of 100 mm.

- Description of probe, model : HI11310 SN : 078743

Dimension of probe : Diameter 4 mm, Length 118 mm,

Sheath material : Stainless Steel

UUC* Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.1	15.001	-0.1	0.13
25.1	24.999	-0.1	0.13
35.2	34.999	-0.2	0.13

Remark: Edited Model from edge to HI2020-02.

Note

- UUC* : Unit Under Calibration

- NFI Laboratory is not accredited ISO/IEC 17025 for calibration. In the scope marked with **

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: 00 Date: 14-12-61

เอกสารไม่ควบคุม

Calibration Certificate

Certificate No.: 2103189-002-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 5

Equipment: pH Meter
Manufacturer: METTLER TOLEDO
Model: SevenEasy pH
Serial No.: 1231155210
ID No.: UAE.WAT.010/2553
Order No.: 2103189
Operation No.: 2103189-002
Date of Receipt: 9 June 2021
Date of Calibration: 14 June 2021

Calibrated by: Mr.Manas Somsak
Expert
Approved by: (Mr.Pheraphat Tuanjit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 15 June 2021

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 National Food Institute. 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: 00 Date: 14-12-61

เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2103189-002-01
Equipment: pH Meter
Resolution: 0.01 pH : 1 mV
Model: SevenEasy pH
Manufacturer: METTLER TOLEDO
Serial No.: 1231155210
Type: Bench top
ID No.: UAE.WAT.0102553
Date of Calibration: 14 June 2021

Page 2 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: (23.7 ± 1.5) °C Relative Humidity: (53.5 ± 5) %
Condition of Equipment: Good Condition

Condition of this Results of Calibration

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

Instruments	Serial / ID No.	Manufacturer	Certificate No.	Due Date
2.1 DC Voltage Calibrator	2709007	Fluke	SCL-20F-0882	17 June 2021
2.2 Digital Thermometer	2709007	Fluke	CC 630609-01	30 October 2021
2.3 Thermo-Hygro Meter	NFI.BTH00317	PONPE	QR20-1578	21 September 2021

- | Certified Reference Material | Lot. No. | Manufacturer | Ref N | Expiry Date |
|--|----------|--------------|----------|----------------|
| 2.4 pH buffer 4.008 (Primary pH buffer Solution) | 710048 | CPAchem | PH216.L5 | 2 October 2022 |
| 2.5 pH buffer 6.865 (Primary pH buffer Solution) | 710049 | CPAchem | PH217.L5 | 2 October 2022 |
| 2.6 pH buffer 10.01 (Primary pH buffer Solution) | 710050 | CPAchem | PH220.L5 | 2 October 2021 |
| 2.7 pH buffer 7.00 (Standard pH buffer Solution) | 710051 | CPAchem | PH107.L5 | 2 October 2021 |
3. This certification is traceable to The International System of Unit (SI Unit)
- | Instruments | Traceability |
|---|--|
| 3.1 Instruments No.2.1 | through |
| 3.2 Instruments No.2.2 | through |
| 3.3 Instruments No.2.3 | through |
| 3.4 Certified Reference Material No. 2.4 to 2.6 | traceable to
NSC-TIS-TIS 17025 Laboratory Accreditation of Calibration No.0075
NSC-TIS-TIS 17025 Laboratory Accreditation of Calibration No.0061
NSC-TIS-TIS 17025 Laboratory Accreditation of Calibration No.0292
Primary measurement method- Harned cell using calibrated thermometer, barometer, and nanovoltmeter. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025 |
| 3.5 Certified Reference Material No. 2.7 | traceable to
BIM ReN HI-7 LoIN 30.04.2020; BIM ReN HI-9 LoIN 28.05.2020; BIM ReN HI-3 LoIN 30.04.2020; BIM ReN HI-10 LoIN 28.05.2020. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025 |

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

Calibration Report

Certificate No.: 2103189-002-01
Equipment: pH Meter
Resolution: 0.01 pH : 1 mV
Model: SevenEasy pH
Manufacturer: METTLER TOLEDO
Serial No.: 1231155210
Type: Bench top
ID No.: UAE.WAT.0102553
Date of Calibration: 14 June 2021

Page 3 of 5

Calibration Results:
1. Calibration of pH Meter
(Manual Temperature Compensation at 25 °C)

Nominal pH	DC Voltage Standard (mV)	Average Indicator Reading		Uncertainty (±mV)	Coverage Factor (k)
		mV	pH		
0.00	414.118	414	0.00	0.58	2.00
2.00	295.811	296	2.00	0.58	2.00
4.00	177.461	178	4.00	0.58	2.00
6.00	59.160	59	6.00	0.58	2.00
7.00	0.000	0	7.00	0.58	2.00
8.00	-59.158	-59	8.00	0.58	2.00
10.00	-177.461	-177	10.00	0.58	2.00
12.00	-295.812	-296	12.00	0.58	2.00
14.00	-414.118	-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: InLab Solids
Serial No.: 115882	ID No.: N/A

Performance of Electrode system
(Three-Point Calibration at pH4, pH7 and pH10)

Certified Value @25 °C (pH)	Average Indicator Reading		Relative Slope (%)	Uncertainty (± pH)	Coverage Factor (k)
	pH	mV			
4.008	4.01	185	99.9	0.0071	2.00
6.866	6.87	16			
6.866	6.87	16	98.0	0.0075	2.00
10.008	10.01	-166			
6.985	6.99	9	-	0.0093	2.00



Calibration Report

Certificate No.: 2103189-002-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenEasy pH
Serial No.: 1231155210 ID No.: UAE.WAT.010/2553
Manufacturer: METTLER TOLEDO
Date of Calibration: 14 June 2021

Page 4 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature 24 °C ± 1 °C
Relative Humidity 54 % ± 2 %

Condition of this results of Calibration:

- Calibration Method :
 - In house method: W-TE-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).
- Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER	1521	A85997	TE 640028-01	12-Dec-21	NATIONAL FOOD INSTITUTE
Platinum Resistance Thermometer (PRT)	385	509201			

Support Equipment : - Low Temperature Bath (ISOCAL-6), Model: Europa-Q Plus Basic, S/N: 341592/2

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



Calibration Report

Certificate No.: 2103189-002-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenEasy pH
Serial No.: 1231155210 ID No.: UAE.WAT.010/2553
Manufacturer: METTLER TOLEDO
Date of Calibration: 14 June 2021

Page 5 of 5

Calibration point: 15.0, 25.0 and 35.0 °C
Calibration result: - The probe was immersed in liquid bath or dry bath to a minimum depth of 25 mm.
- Description of probe, model : InLab Solids SN : 115882
Dimension of probe : Diameter 6 mm., Length 25 mm.,
Sheath material : Glass

UUC* Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.1	15.001	-0.1	0.13
25.1	24.999	-0.1	0.13
35.1	34.999	-0.1	0.13

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 %.

----- End -----




TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



NSC-TS17025
CALIBRATION 0008

Cert. No.: 22TM306
Page.: 1 of 3

Certificate of Calibration

Equipment: BOD Incubator
Manufacturer: ARCO
Model: UR-1320
Serial No.: -
ID No.: UAE.WAO.006/2553
Submitted by: United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phra Khanong,
Bangkok 10260
Location: Lab Floor 2
Received Order: 7 April 2022
Calibration Date: 7 April 2022
Ambient Temperature: (26 ± 10) °C
Relative Humidity: (50 ± 30) %
Calibrated by: Man Pattanapongpaiboon
Approved by:  Approved Signatory

() Pornthippa Tameyakul
() Malee Bukrua
() Suwit Imjai

Issue Date: 18 April 2022

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

A 0040247



Equipment: BOD Incubator
Condition As-Received: Used Item
Reference: 2204-0015OC-3

Cert. No.: 22TM306
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).

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 34970A MY41021843 22LM4 10 Jan 2023

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

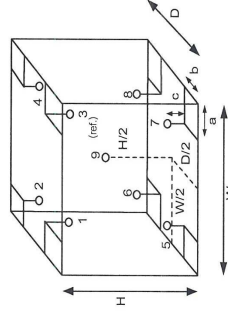
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration	
Beginning	Finished
Temp. (°C)	27
REL.Humid. (%)	59
AC Supply (Volt)	220



Probe Installation Details :

a = 10 cm
b = 10 cm
c = 10 cm
D = 0.62 m
W = 1.2 m
H = 1.2 m
Capacity = 0.89 m³

Position :	Ref. Std. ID No.:
1	18-04RTD-01
2	18-04RTD-02
3	18-04RTD-03
4	18-04RTD-04
5	18-04RTD-05
6	18-04RTD-06
7	18-04RTD-07
8	18-04RTD-08
9 (ref.)	18-04RTD-09

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

a 1104312



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2204-0015OC-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 22TM306
Page: 3 of 3

Calibration Point (°C)	Measured Temperature (°C)										Coverage Factor k
	Position						Overall Variation (°C)	Uncertainty (±°C)			
	1	2	3	4	5	6					
20.0	20.176	20.413	19.711	19.637	20.218	20.286	19.639	19.642	19.922		

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 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 %.

-o0o-



เอกสารไม่ควบคุม
a 1104311

Verification Certificate

Certificate No.: 2202361-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udonsuk 41, Sukhumvit Road,
Bangchack, 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.: 2202361

Operation No.: 2202361-001

Date of Receipt: 4 April 2022

Date of Calibration: 4-6 April 2022

Calibrated by Mr.Nuttapol Niyomchat

Specialist

Approved by

(Mr.Pheraphat Tuanjit)

Manager, Division of Calibration Laboratory

Responsible for the Technical Management Team

Date of Issue: 11 April 2022

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: 00 Date: 14-12-61

เอกสารไม่ควบคุม

Verification Report

Certificate No.: 2202361-001-01
Equipment: HEATING BLOCK DIGESTION
Serial No.: 91794469
Resolution: 1 °C ID No.: UAE.WAS.011/2560
Manufacturer: FOSS
Date of Calibration: 4-6 April 2022

Page 2 of 4

Location: Laboratory Room, NATIONAL FOOD INSTITUTE
Environment Condition:
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 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/24901A Type R	MY4045576/MY41194453 TC#101-103 / CH#101-103	TC21/0041	24-Apr-2022	N.M. Technical Center Laboratory

3. This certificate is traceable to International system of units (SI Units).

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

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

6. Condition of Calibrated item : Good

UUC* Description

Time of Record - Hour 30 Minute At 380 °C

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

Verification Report

Certificate No.: 2202361-001-01
Equipment: HEATING BLOCK DIGESTION
Serial No.: 91794469
Resolution: 1 °C ID No.: UAE.WAS.011/2560
Manufacturer: FOSS
Date of Calibration: 4-6 April 2022

Page 3 of 4

380 °C

Calibration point:

Calibration result:

Reporting of Temperature

Block No.	UUC* Setting (°C)	UUC* Reading (°C)	Stability (± °C)	Standard Thermometer (°C)	Uncertainty (± °C)
1	380	380	0.13	376.48	1.5
2	380	380	0.12	376.58	1.5
3	380	380	0.12	376.51	1.5
4	380	380	0.14	376.70	1.6
5	380	380	0.18	376.81	1.6
6	380	380	0.12	377.23	1.6
7	380	380	0.12	377.37	1.5
8	380	380	0.13	376.68	1.5
9	380	380	0.14	376.72	1.5
10	380	380	0.18	378.97	1.6
11	380	380	0.25	378.79	1.6
12	380	380	0.11	377.14	1.6
13	380	380	0.19	379.65	1.6
14	380	380	0.16	379.61	1.6
15	380	380	0.16	378.66	1.6
16	380	380	0.15	379.18	1.6
17	380	380	0.23	377.39	1.6
18	380	380	0.11	377.71	1.6
19	380	380	0.22	376.64	1.6
20	380	380	0.16	376.56	1.6

Note:

- UUC* = Unit Under Calibration

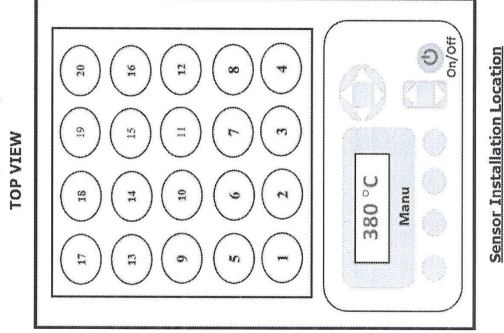
- Immersion depth of standard thermometer in tube level high of sand is equal heater plate of UUC.

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

Verification Report

Certificate No.:	2202361-001-01	Page 4 of 4
Equipment:	HEATING BLOCK DIGESTION	
	Model: 2520	Serial No.: 91794469
	Resolution: 1 °C	ID No.: UAE.WAS.011/2560
	Manufacturer: FOSS	
Date of Calibration:	4-6 April 2022	
Calibration point:	380 °C	
Calibration result:	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 factor $k=2$, providing a level of confidence of approximately 95 %.

----- End -----



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 PATTANAKARNY ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



NMIT T-1817/25
CALIBRATION 0008

Cert. No.: 22TM304
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 :	7 April 2022
Calibration Date :	7 April 2022
Ambient Temperature :	(26 ± 10) °C
Relative Humidity :	(50 ± 30) %
Calibrated by :	Man Pattanapongpaiboon

Approved by :  Approved Signatory

() Ponthippa Tameyakul
() Malee Butkruea
() Suwit Injai

Issue Date : 18 April 2022

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.



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2204-00150C-1
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	34970A	MY41021843	22LM4	10 Jan 2023

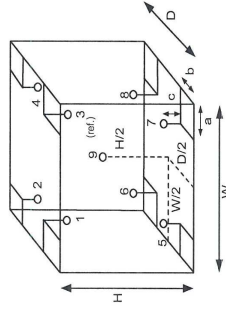
2. This certificate is valid only to the item calibrated on date and place of calibration.

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 :

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

Ref. Std. ID No.: @	
Calibration Point (°C)	
Position :	(120 ,180) (104)
1	21-04TC-01 18-04RTD-01
2	21-04TC-02 18-04RTD-02
3	21-04TC-03 18-04RTD-03
4	21-04TC-04 18-04RTD-04
5	21-04TC-05 18-04RTD-05
6	21-04TC-06 18-04RTD-06
7	21-04TC-07 18-04RTD-07
8	21-04TC-08 18-04RTD-08
9 (ref.)	21-04TC-09 18-04RTD-09



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2204-00150C-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
104.0	104.0	104.0	0.040	0.57	0.80	0.42	2
120.0	120.0	120.0	0.11	0.82	1.1	1.1	2
180.0	180.0	180.0	0.12	1.4	2.0	1.1	2

Measured Temperature (°C)								
Calibration Point (°C)	Position							
	1	2	3	4	5	6	7	8 9 (ref.)
104.0	104.403	104.220	104.517	104.474	103.778	103.859	104.292	104.319
120.0	120.183	119.878	120.238	120.355	119.476	119.455	120.046	120.199
180.0	180.502	179.929	180.655	180.797	179.012	179.044	180.043	180.340

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 %.

-o0o-

Valu .

เอกสารไม่ควบคุม
๑ 1104316

Valu .

เอกสารไม่ควบคุม
๑ 1104315

Verification Certificate

Certificate No.: 2202361-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, 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.:** 2202361**Operation No.:** 2202361-001**Date of Receipt:** 4 April 2022**Date of Calibration:** 4-6 April 2022

Calibrated by Mr.Nuttapol Niyomchat
Specialist
Approved by (Mr.Pheraphat Tuanjit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 11 April 2022

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: 00 Date: 14-12-61

เอกสารไม่ควบคุม

Verification Report

Certificate No.: 2202361-001-01
Equipment: HEATING BLOCK DIGESTION
Model: 2520 Serial No.: 91794469
Resolution: 1 °C ID No.: UAE.WAS.011/2560
Manufacturer: FOSS
Date of Calibration: 4-6 April 2022

Page 2 of 4

Location: Laboratory Room, NATIONAL FOOD INSTITUTE
Environment Condition:
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 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/34901A Type R	MY4005576/MY119453 TC#101-103 / CH#101-103	TC21/0041	24-Apr-2022	N.M. Technical Center Laboratory

3. This certificate is traceable to international system of units (SI Units).
4. This certificate was certified only for the instrument we calibrated.
5. This result of calibration was found accurate as shown on date and place of calibration only.
6. Condition of Calibrated item : Good

UUC* Description

Time of Record - Hour 30 Minute At 380 °C

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

F-CS-012 Revision: 00 Date: 14-12-61

เอกสารไม่ควบคุม

Verification Report

Certificate No.: 2202361-001-01
Equipment: HEATING BLOCK DIGESTION
Model: 2520 Serial No.: 91794469
Resolution: 1 °C ID No.: UAE.WAS.011/2560
Manufacturer: FOSS
Date of Calibration: 4-6 April 2022
Calibration point: 380 °C
Calibration result:

Page 3 of 4

Reporting of Temperature

Block No.	UUC* Setting (°C)	UUC* Reading (°C)	Stability (± °C)	Standard Thermometer (°C)	Uncertainty (± °C)
1	380	380	0.13	376.48	1.5
2	380	380	0.12	376.58	1.5
3	380	380	0.12	376.51	1.5
4	380	380	0.14	376.70	1.6
5	380	380	0.18	376.81	1.6
6	380	380	0.12	377.23	1.6
7	380	380	0.12	377.37	1.5
8	380	380	0.13	376.68	1.5
9	380	380	0.14	376.72	1.5
10	380	380	0.18	378.97	1.6
11	380	380	0.25	378.79	1.6
12	380	380	0.11	377.14	1.6
13	380	380	0.19	379.65	1.6
14	380	380	0.16	379.61	1.6
15	380	380	0.16	378.66	1.6
16	380	380	0.15	379.18	1.6
17	380	380	0.23	377.39	1.6
18	380	380	0.11	377.71	1.6
19	380	380	0.22	376.64	1.6
20	380	380	0.16	376.56	1.6

Note:

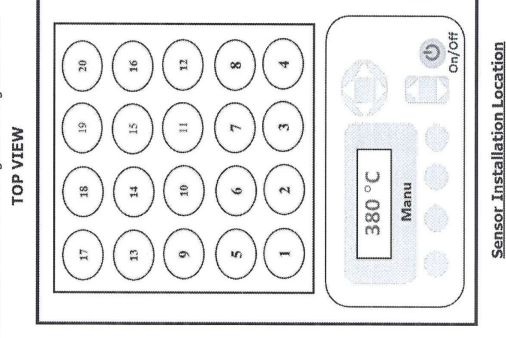
- UUC* = Unit Under Calibration
- Immersion depth of standard thermometer in tube level high of sand is equal heater plate of UUC.
- Stability = One-half of the greatest maximum difference of measured temperatures at one sensors, for at least half an hour after reaching steady state.

Verification Report

Certificate No.: 2202361-001-01
Equipment: HEATING BLOCK DIGESTION
Model: 2520 Serial No.: 91794469
Resolution: 1 °C ID No.: UAE.WAS.011/2560
Manufacturer: FOSS
Date of Calibration: 4-6 April 2022
Calibration point: 380 °C
Calibration result:

Page 4 of 4

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 factor $k=2$, providing a level of confidence of approximately 95 %.

Preventive Maintenance Protocol

Instrument: Kjeltec™ 2100	Model KT200 S/N: 91790524
Customer <small>บริษัท ปูนซีเมนต์ไทย จำกัด (มหาชน) แผนกปฏิบัติการ</small>	Job No. MSGFOT0084B
Certified performed PM interval (whichever occurs first between interval and no. of samples analysed)	12 Months No. of samples analysed (if applicable):

Introduction

A maintenance protocol provides a systematic and functional means of maintaining a specific instrument type, the certified performed PM interval depends on the operational conditions, and is based on our extensive experience and knowledge of manufacturing and maintaining analytical instruments.

Apart from sample throughput, the environmental conditions also need to be taken into account. Demanding environments, such as high ambient temperature, humidity, dirtiness etc can measurably shorten component lifetime and also the maintenance and component replacement intervals.

The content of this protocol is subject to change over time. In order to ensure you the correct parts, please make sure to indicate serial number and date of installation when contacting you FOSS representative.

Maintenance Procedure

Parts to be Exchanged

Step	Action	Part	P/N	OK
1	Replace	Adapter for dig. tube 250 ml	10000056	<input type="checkbox"/>
2	Replace	Non return valve	10003538	<input type="checkbox"/>
3	Replace valves in alkali pump	Valve kit reagent/water pump	15750093	<input type="checkbox"/>
4	Replace steam tubing	Silicone tubing 8/12 mm	15820006	<input type="checkbox"/>
5	Replace alkali tubing	Tubing reinforced for alkali	15820011	<input type="checkbox"/>
6	Replace water tubing	Tubing PVC 8/11 mm	15820004	<input type="checkbox"/>
7	Cleaning	Steam generator		<input type="checkbox"/>
8	Cleaning	Splash head		<input type="checkbox"/>

Check and Adjustment

Step	Action	Module	Measured	Limits	OK
1	Check alkali volume, 10 ml/stroke	Alkali pump	80 ml.	At 50 ml -0/+3 ml	<input checked="" type="checkbox"/>
2	Check distillation volume		110 ml.	100 - 150 ml/4min	<input checked="" type="checkbox"/>
3	Check front panel switches				<input checked="" type="checkbox"/>
4	Check cable, electrical connection and main power supply AC 220 Volts				<input checked="" type="checkbox"/>
5	Check level pins in steam generator				<input checked="" type="checkbox"/>
6	Check safety door switch				<input checked="" type="checkbox"/>

Remark

Signature

Customer's Signature

Signature

Engineer's Signature

Date 25/09/2021

Calibration Certificate

Certificate No.: 2202934-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: XSR204

Serial No.: C117635043

ID No.: UAE.WAS.012/2564

Order No.: 2202934

Operation No.: 2202934-001

Date of Receipt: 13 May 2022

Date of Calibration: 13 May 2022

Calibrated by Mr. Manas Somsak
Specialist

Approved by

(Mr. Pheraphat Tuanjit)

Manager, Division of Calibration Laboratory

Responsible for the Technical Management Team

Date of Issue: 25 May 2022

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

Calibration Report

Certificate No.: 2202934-001-01
Equipment: Electronic Balance
Model: XSR204
Serial No.: C117635043
Capacity: 220 g
Manufacturer: METTLER TOLEDO
Resolution: 0.0001 g
ID No.: UAE.WAS.012/2564

Page 2 of 4

Date of Calibration: 13 May 2022

Environment Condition: Ambient Temperature 22.3 ± 0.1 °C Relative Humidity: 47 ± 3 %

Place of Calibration: Balance room (Water Analysis Unit), UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

- Calibration Method: NFI Method W-MA-001 In-House Method based on UKAS Lab 14 : 2019
- Reference Standards:

Reference Standard	Model	Serial No	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	B505567572	TCS	M22041375	23 April 2023
- Instrument:

Instrument	Model	Serial No	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	PONPE 490	NFLBTH 010/18	Quality Reborn	QR22-0350	18 February 2023
- This certification is traceable to SI UNIT
- This certificate is certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.

Calibration Results:

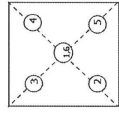
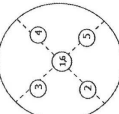
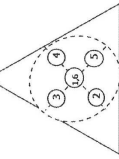
1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
100	0.000033
200	0.000032

2. Off-Center Error:

A mass of 50 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.

		
1 (g)	2 (g)	3 (g)
4 (g)	5 (g)	6 (g)
50,000	50,000	50,000
50,000	50,000	50,000
(Maximum Difference) (g)		
0.000		

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

Calibration Report

Certificate No.: 2202934-001-01
Equipment: Electronic Balance
Model: XSR204
Serial No.: C117635043
Capacity: 220 g

Manufacturer: METTLER TOLEDO
Resolution: 0.0001 g
ID No.: UAE.WAS.012/2564

Date of Calibration: 13 May 2022
Page 3 of 4

Calibration Results: (Continued)
Calibration Range: 0 - 200 g
Calibration Adjustment: Internal Calibration
3. Departure from Nominal Value:

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (± g)	Coverage Factor k
Unload	0.00000	0.0000	0.0000	0.000085	2.00
0.01	0.01000	0.0100	0.0000	0.000085	2.00
0.02	0.02000	0.0200	0.0000	0.000085	2.00
0.05	0.05000	0.0500	0.0000	0.000085	2.00
0.1	0.10001	0.1000	0.0000	0.000085	2.00
0.2	0.20001	0.2000	0.0000	0.000085	2.00
0.5	0.50002	0.5000	0.0000	0.000085	2.00
1	1.00001	1.0000	0.0000	0.000086	2.00
2	2.00003	2.0000	0.0000	0.000086	2.00
3	3.00004	3.0000	0.0000	0.000087	2.00
5	5.00002	5.0000	0.0000	0.000087	2.00
10	10.00001	10.0000	0.0000	0.000088	2.00
20	20.00004	20.0000	0.0000	0.000092	2.00
30	30.00005	30.0001	-0.0001	0.00010	2.00
40	40.00008	40.0001	0.0000	0.00011	2.00
45	45.00010	45.0001	0.0000	0.00013	2.00

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

Handwritten signature

Calibration Report

Certificate No.: 2202934-001-01
Equipment: Electronic Balance
Model: XSR204
Serial No.: C117635043
Capacity: 220 g

Manufacturer: METTLER TOLEDO
Resolution: 0.0001 g
ID No.: UAE.WAS.012/2564

Date of Calibration: 13 May 2022
Page 4 of 4

Calibration Results: (Continued)
Calibration Range: 0 - 200 g
Calibration Adjustment: Internal Calibration
3. Departure from Nominal Value:

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (± g)	Coverage Factor k
50	50.00004	50.0001	-0.0001	0.00011	2.00
55	55.00006	55.0001	0.0000	0.00012	2.00
60	60.00005	60.0001	-0.0001	0.00012	2.00
65	65.00007	65.0002	-0.0001	0.00013	2.00
70	70.00008	70.0002	-0.0001	0.00013	2.00
75	75.00010	75.0002	-0.0001	0.00013	2.00
80	80.00009	80.0002	-0.0001	0.00014	2.00
85	85.00011	85.0002	-0.0001	0.00014	2.00
90	90.00012	90.0002	-0.0001	0.00015	2.00
100	100.00008	100.0003	-0.0002	0.00016	2.00
120	120.00011	120.0003	-0.0002	0.00018	2.00
150	150.00012	150.0004	-0.0003	0.00021	2.00
200	200.00015	200.0004	-0.0003	0.00028	2.00

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

----- End -----

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

Handwritten signature



Certificate of Calibration

Equipment: Cooled Incubator
Model: KB 400
Serial No.(or ID): 20200000015535
Manufacturer: Binder
Condition: In Condition
Shelves(pc.): 5

Certificate No.: C31211235
Issued Date: 30 June 2021
Job No.: KSPR2108683
Page: 1 of 3
Ventilation Valve: None

Customer: United Analyst and Engineering Consultant Company Limited
3 Soi Udomsuk 41 Sukhumvit Road,
Bangckak, Prakanong, Bangkok 10260 Thailand

Environment Condition: Temperature: 19 °C ± 0.9 °C
Humidity: 58 %RH ± 3.2 %RH
Voltage: 233 VAC ± 2.9 VAC

Calibration Place: United Analyst and Engineering Consultant Company Limited (Control Area)
3 Soi Udomsuk 41 Sukhumvit Road,
Bangckak, Prakanong, Bangkok 10260 Thailand

Calibration By: Mr. Piypat Saidoung
Calibration Date: 22 June 2021
The Method used: In house method, SPCC-WI-16, base on TLAS-G20
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through SPC RT Co., Ltd. Certificate No. C10210004

ปวิพัต

(Mr. Piypat Saidoung)

Person in charge

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SPC RT Co., Ltd.

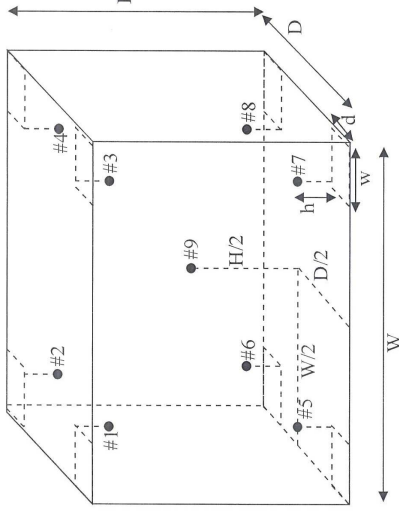
SERT

บริษัท เอสพีซี อาร์ที จำกัด
SPC RT Co., Ltd.

Udon Srichana

(Mr. Udon Srichana)

Authorized signatory



Standard Installation Locations

Volume (Calibration Zone)= 194 (Liters)

Inside chamber: W = 65 (cm) D = 48 (cm) H = 128 (cm)

Standard Locations (#1, #2, #3, #4): w = 7 (cm) d = 5 (cm) h = 14 (cm)

Standard Locations (#5, #6, #7, #8): w = 7 (cm) d = 5 (cm) h = 14 (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	1	2	3	4	5	6	7	8	9

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.**Measured Temperature:** The average reading of standards at any positions or location.**Measured Uniformity:** The maximum difference of measured temperatures between of any probes and the

measured temperature at the reference location which are observed at same time or at close observation time as

possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference

probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.**Overall Variation:** The difference of maximum and minimum measured temperatures throughout observation time.

Certificate No.: C31211235 Page: 3 of 3

Calibration Results:

Before adjustment

Setting: 35.0 Indicating: 35.0 #1: 34.69 #2: 34.98 #3: 34.82 #4: 34.90 #5: 34.96 #6: 34.94 #7: 34.91 #8: 34.92 #9: 34.92

After adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 35.0 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	34.77	-0.23	0.23
#2	35.10	0.10	0.23
#3	34.95	-0.05	0.23
#4	35.04	0.04	0.23
#5	35.09	0.09	0.23
#6	35.06	0.06	0.23
#7	35.11	0.11	0.23
#8	35.08	0.08	0.23
#9	35.06	0.06	0.23

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*	
			#1	#2	#3	#4	#5	#6	#7	#8	#9		
35.0	35.0	35.0	34.77	35.10	34.95	35.04	35.09	35.06	35.11	35.08	35.06	0.23	

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
35.0	0.32	0.04	0.38

Note: * Maximum uncertainty of the each position

The End of Certificate

Certificate No.: C31211235 Page: 1 of 1

Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, TLAS-G20. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

Decision rule : ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk < 50% PFA
☒ Choice B Non-binary statement with guard band ($w = 1$ U), Specific Risk < 2.5% PFA
☐ Choice C Customer defined, Customers may define arbitrary multiple of t to have applied as guard band ($w = r$ U).
: PFA – Probability of False Accept

After adjustment

Desired Temperature : 35°C Tolerances : 0.5 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 35.0 °C

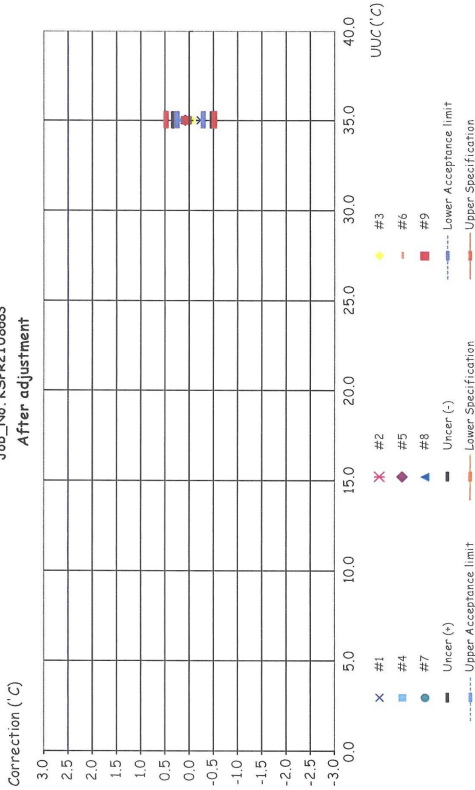
Locations	Measured (°C)	Correction of UUC. (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	34.77	-0.23	0.23	0.5	Pass
#2	35.10	0.10	0.23	0.5	Pass
#3	34.95	-0.05	0.23	0.5	Pass
#4	35.04	0.04	0.23	0.5	Pass
#5	35.09	0.09	0.23	0.5	Pass
#6	35.06	0.06	0.23	0.5	Pass
#7	35.11	0.11	0.23	0.5	Pass
#8	35.08	0.08	0.23	0.5	Pass
#9	35.06	0.06	0.23	0.5	Pass

Correction of UUC.* = Measured Temperature - Desired Temperature

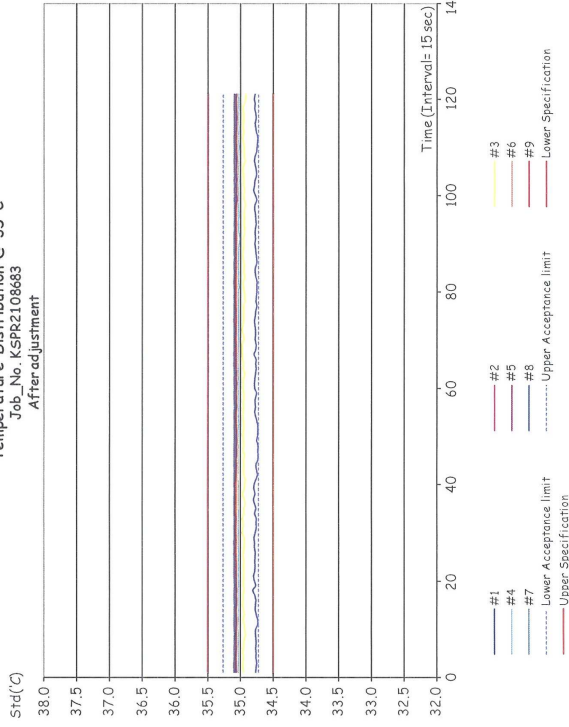
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity

Corr_Distribution & Max_Measurement Uncertainty
Job_No. KSPR2108683
After adjustment



Temperature Distribution @ 35°C
Job_No. KSPR2108683
After adjustment



ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: KSPR2108683

รุ่น: KB 400

ชนิดเครื่องมือ: Cooled Incubator

หมายเลขเครื่อง: 20200000015535

ตรวจสอบ (รับ)	รายการตรวจเช็ค		ตรวจสอบ (ส่ง)		หมายเหตุ
	22 Jun 2021		22 Jun 2021		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
General					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน ฟัดลม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. สภาวะ Lever of Ventilation Slide	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาวะ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาวะ Door seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของระบบทำความร้อน	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาวะตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	13. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ :

Mr. Piyapat Saidoung
Service Engineer

เอกสารไม่ควบคุม

บริษัท เอสพีซี อาร์ท จำกัด
SPC RT CO., LTD.
เลขที่ 00003 1194 ซอยศรีนครินทร์ 37 ถนนสุขุมวิท 101/1 เขตวัฒนา กรุงเทพมหานคร 10160
โทรศัพท์ 02-885 4333 โทรสาร 0 2885 4324 E-mail: thaispc@spc-rt.com Website: www.spc-rt.com



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



NIST
CALIBRATION 0008

Cert. No.: 22TM563
Page.: 1 of 3

Certificate of Calibration

Equipment : Incubator
Manufacturer : Memmert
Model : IPP 260
Serial No. : V615.0187
ID No. : UAE.MIC.003/2559

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

Location : Microbiology Laboratory

Received Order : 7 April 2022

Calibration Date : 7 April 2022

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Prawit Sodavitchit

Approved by :
Approved Signatory

() Pornthippa Tameyakul
(☒) Malee Butkruea
() Suwit Injai

Issue Date : 18 April 2022

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

A 0040248



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2204-0016OC-1

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).
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 34970A MY44067817 21LM10 20 Jul 2022

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

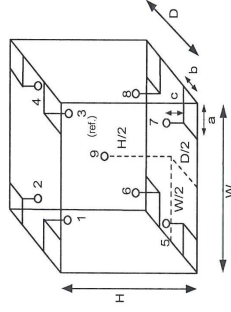
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration	
Beginning	Finished
Temp. (°C)	26
REL Humid. (%)	60
AC Supply (Volt)	220
	220



Probe Installation Details :

a = 5.0 cm D = 0.50 m
b = 5.0 cm W = 0.64 m
c = 5.0 cm H = 0.80 m
Capacity = 0.26 m³

Position :	Ref. Std. ID No.:
1	15RTD2/11
2	15RTD2/12
3	15RTD2/13
4	15RTD2/14
5	15RTD2/15
6	15RTD2/16
7	15RTD2/17
8	15RTD2/18
9 (ref.)	15RTD2/19

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

A 1104310



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2204-0016OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 22TM563
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	35.0	35.0	0.12	0.53	0.79	0.30	2

Calibration Point (°C)	Measured Temperature (°C)							
	Position							
35.0	1	2	3	4	5	6	7	8
	35.170	35.167	34.938	34.844	34.816	34.854	34.584	34.730
								9 (ref.)
								34.780

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 %.

-o0o-

Malee Butkruea

เอกสารไม่ควบคุม
a 1104309



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



NSC-TS1817025
CALIBRATION 0008

Cert. No.: 22TM335
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 Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 17 February 2022
Calibration Date : 17 February 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Suwit Imjai

Approved by : 
() Pormhippa Tameyakul
() Malee Butkruea
Approved Signatory

Issue Date : 22 February 2022

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

A 0038093

กำหนดจุดห้ามใช้งาน

References Certificate Number. : 22TM335

Equipment : Incubator

Model : BD 53

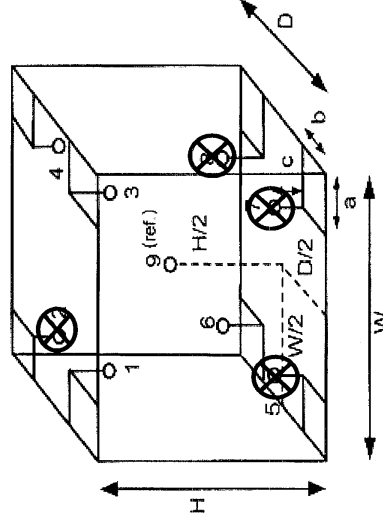
Serial No. : 13-07343

ID No. : UAE.MIC.005/2558

Manufacturer : Binder

Calibration Point : 35 °C

Unit Under Calibration Setting : 34.9 °C



รูปภาพเครื่องมือ แสดงจุดที่ได้รับการสอบเทียบ และสัญลักษณ์ ⊗ แสดงจุดห้ามใช้งาน

กำหนดจุดห้ามใช้งานตำแหน่งที่.....2,5,7,8.....

หมายเหตุ เก็บใบเพิ่ม.....

\\uae.net\app\Verapp_LAB\Lab-BK\INSTRUMENT (1-2)\6.4\Certificate\ป้ายห้ามใช้งานเครื่องมือ 2565\กำหนดจุดห้ามใช้งาน
Incubator_UAE.MIC.005_2558#22TM335.doc

เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL 0-2717-3000-27 FAX 0-2719-9484




NSC-TS17157025
CALIBRATION 0008

Cert. No.: 22TM671
Page.: 1 of 3

Certificate of Calibration

Equipment : Incubator
Manufacturer : Memmert
Model : IN 75
Serial No. : D317.0307
ID No. : UAE.MIC.023/2561
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory (302)
Received Order : 3 May 2022
Calibration Date : 3 May 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Preecha Hlahib

Approved by : 
Approved Signatory
() Pongthippa Tameyakul
(/) Maiae Butkruea
() Suwit Imjai

Issue Date : 10 May 2022

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

เอกสารไม่ควบคุม



Equipment : Incubator

Condition As-Received :

Reference : 2205-00030C-2

Procedure Used :-

Calibration were conducted using calibration procedure CP-QT02 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:-

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Data Acquisition	34970A	MY44067817	21LM10	20 Jul 2022

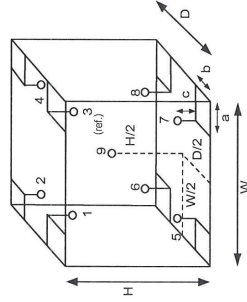
2. This certificate is valid only to the item calibrated on date and place of calibration.

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)	24	23
REL.Humid. (%)	55	59
AC Supply (Volt)	220	221

Position :	Ref. Std. ID No.:
1	19-15RTD-01
2	19-15RTD-02
3	19-15RTD-03
4	19-15RTD-04
5	19-15RTD-05
6	21-15RTD-06
7	19-15RTD-07
8	19-15RTD-08
9 (ref.)	19-15RTD-09

Probe Installation Details :

a =	5.0	cm	D =	0.32	m
b =	5.0	cm	W =	0.42	m
c =	5.0	cm	H =	0.56	m
			Capacity =	0.075	m ³

Capacity = 0.075 m³

Probe Installation Details : Dimension of Chamber :

$a =$	5.0 cm	$D =$	0.32 m
-------	------------------	-------	------------------

$b =$	$W =$	m
5.0	cm	0.42
5.0	cm	0.52

α	$c =$	$H =$	β
0.72	5.0	cm	m
0.56	5.0	cm	m

Capacity = 0.075 m³

-000-

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



NSC-TSI-TS17025
CALIBRATION 0008

Cert. No.: 22TM334
Page.: 1 of 3

Certificate of Calibration

Equipment : Water Bath

Manufacturer : Memmert

Model : WNE 14

Serial No. : L416.0612

ID No. : UAE.MIC.003/2560

Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phraekhanong,
Bangkok 10260

Location : Microbiology Laboratory

Received Order : 17 February 2022

Calibration Date : 17 February 2022

Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$

Relative Humidity : $(50 \pm 30) \%$

Calibrated by : Suwit Imjai

Approved by :
() Pornthippa Tameyakul
() Malee Butkruea
Approved Signatory

Issue Date : 22 February 2022

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

A 0038095



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2202-0444OC-4
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 (IPT).

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 34970A MY44067817 21LM10 20 Jul 2022

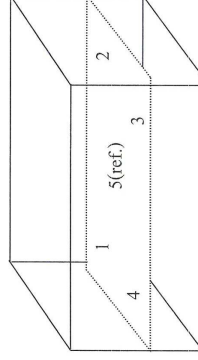
2. This certificate is valid only to the item calibrated on date and place of calibration.

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	21	65	229
Finished of Calibration	22	57	230



Front

Position :	Ref. Std. ID No.:
1	70RC143
2	70RC144
3	70RC145
4	70RC146
5(ref.)	70RC147

Cert. No.: 22TM334
Page.: 2 of 3

เอกสารไม่ควบคุม

a 1096055



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2202-0444OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 22TM334
Page.: 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)				
			Position				
			1	2	3	4	5 (ref.)
44.5	44.5	44.5	44.572	44.514	44.507	44.530	44.565

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor <i>k</i>
44.5	0.10	0.042	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 %.

-o0o-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



ISO/IEC 17025
CALIBRATION 0008

Cert. No.: 22TM565
Page.: 1 of 3

Certificate of Calibration

Equipment : Water Bath

Manufacturer : Memmert

Model : WNE 14

Serial No. : L414.1407

ID No. : UAE.MIC.006/2558

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

Location : Microbiology Laboratory

Received Order : 7 April 2022

Calibration Date : 7 April 2022

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Prawit Sodavitchit

Approved by :

Approved Signatory

() Pornthippa Tameyakul

(/) Malee Butkruea

() Suwit Imjai

Issue Date : 18 April 2022

The Uncertainties are for a confidence probability of approximately 95 %

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

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

a 1096054



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2204-0016OC-4
Cert. No.: 22TM565
Page.: 2 of 3

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

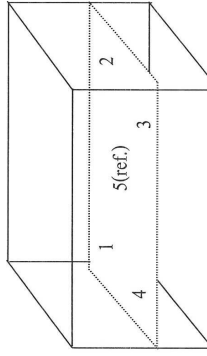
1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY44067817	21LM10	20 Jul 2022
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

	Environmental		AC Voltage Supply (Volt)
	(°C)	(%R.H.)	
Beginning of Calibration	26	62	220
Finished of Calibration	26	65	220



Front

Position :	Ref. Std. ID No.:
1	70RC143
2	70RC144
3	70RC145
4	70RC146
5(ref.)	70RC147

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2204-0016OC-4
Cert. No.: 22TM565
Page.: 3 of 3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)			
			1	2	3	5 (ref.)
44.5	44.5	44.5	44.424	44.409	44.478	44.581

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor k
44.5	0.22	0.039	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 %.

-o0o-

เอกสารไม่ควบคุม




TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 21TM831
Page.: 1 of 3

Certificate of Calibration

Equipment : Autoclave
Manufacturer : ALP
Model : CL-40L
Serial No. : 807298
ID No. : UAE.MIC.019/2560
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : 301 Room
Received Order : 7 May 2021
Calibration Date : 7 May 2021
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Khit Ruttanaprapachai

Approved by : 
() Pornthippa Tameyakul
(✓) Malee Butkruea
() Suwit Imjai

Issue Date : 18 May 2021

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 : Autoclave
Condition As-Received : Used Item
Reference : 2105-0012OC-1
Result of Calibration :- (*) Without Adjustment

Operating parameter Set : Temperature = 116 °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
116	116	1	116.744	0.12	0.08	0.90	2
		2	116.549				
		3	116.515				

Operating parameter Set : Temperature = 122 °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
122	122	1	122.672	0.076	0.12	1.1	2
		2	122.469				
		3	122.414				

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 %.

-o0o-

malee

เอกสารไม่ควบคุม



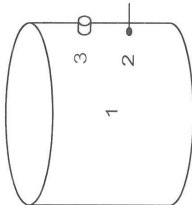
Equipment : Autoclave
Condition As-Received : Used Item
Reference : 2105-00120C-1
Procedure Used :-
Calibration were conducted using in-house calibration procedure CP-OT03 according to direct measurement method with Data Acquisition which connected with Thermocouple Type T
The temperature scale used 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	MY57013711	20LM7	18 May 2021

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



		Environmental	
		(°C)	(%R.H.) (Volt)
Beginning of Calibration	24	62	222
	Finished of Calibration	25	63 221

Position	Description	Ref. Std. ID No.:
1 =	Center of chamber	18-18TC-04
2 =	Temperature sensor	18-18TC-05
3 =	Exhaust port	18-18TC-06

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	YSI	Pro10 18C101710	Technology Promotion Association (Thailand-Japan)	21CH985	3 Aug 20	2 Aug 22	-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX 0-2719-9484



NSC-TSI-TS17025
CALIBRATION 0088

Cert.No.: 21CH985
Page.: 1 of 3

Certificate of Calibration

Equipment : pH Meter
Manufacturer : YSI
Model : Pro 10
Serial No. : 18C101710
ID No. : UAEFM.194/2561 (ENV.pH.03/61)
Condition As-Received: Used Item
Received Date : 27 July 2021
Calibration Date : 03 August 2021
Reference : 2107-0699WSC-1
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with standard
voltage calibrator and direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with standard thermometer

Calibrated by : Warakorn Lemgagrakul

Approved by : 
Approved Signatory

() Malee Butkruea
() Saithip Meangmai
() Warakorn Lemgagrakul

Issue Date : 10 August 2021

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



Cert.No.: 21CH985
Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument : -
Instrument Serial No. ID No. Cert. No. Due Date
1) Ref. Standard Thermometer 4982054 110RC044 2011233 15 Oct 2021
This certification is traceable to the International System of Unit maintained 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. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	725926	13 Jan 2023
pH 6.985	CPA chem	725927	12 Jan 2022
pH 10.015	CPA chem	761018	02 Aug 2022

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

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4.7)(7.10)

Unit Under Calibration	Standard Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (±)	Coverage factor k
pH Electrode S/N.: 200511SIA 605101 pH	4.008	4.01	171.3	0.0085	2.05
	6.985	6.99	-3.4	0.0099	2.00
	6.985	6.99	-3.7	0.011	2.00
	10.015	10.02	-179.5	0.013	2.00

Remark - pH meter does not have voltage mode.

- Can not connect the BNC because the plug does not match with the socket.

- N/A = Not Available

เอกสารไม่ควบคุม



Cert.No.: 21CH985
Page.: 3 of 3

Calibration Results

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : YSI1001

- Serial No. : 200511SIA605101 pH

Dimension of probe;

- Length : 8 mm.

- Diameter : 2 mm.

- Immersion Depth : 70 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor <i>k</i>
25.0	25.002	25.0	-0.002	0.20	2.00
30.0	30.003	30.0	-0.003	0.20	2.00
35.0	35.003	35.0	-0.003	0.20	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 %.

-o0o-

เอกสารไม่ควบคุม
Safety