

ภาคผนวก จ
เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์

ใบรับรองเครื่องมือตรวจวัดและวิเคราะห์คุณภาพ ประจำห้องปฏิบัติการ

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือวิเคราะห์คุณภาพน้ำ									
1	pH Meter	pH	Mettler-Toledo	Seven Easy S20 / 1231155210	National Food Institute, Ministry of Industry, Thailand	2103189-002-01	1 Mar 22	1 Mar 23	-
2	BOD Incubator	Biochemical Oxygen Demand	Arco	UC4-1320 / UAE.WAO.015_2561	Technology Promotion Association (Thailand-Japan)	22TM90	17 Feb 22	17 Feb 23	-
3	BOD Incubator		Arco	UR-1320 / UAE.WAO.018_2551	Technology Promotion Association (Thailand-Japan)	22TM305	7 Apr 22	6 Apr 23	-
4	Analytical Balance (Repeatability 0.01 mg)	Suspended Solid	Mettler-Toledo	XSR205DU / C009071872	Calibration Laboratory Mettler-Toledo (Thailand) Limited	22MM210	26 Apr 22	25 Apr 23	-
5	Hot Air Oven	Total Dissolved Solid	Memmert	UF55 / B212.0411	Technology Promotion Association (Thailand-Japan)	22TM304	7 Apr 22	6 Apr 23	-
6	Digestor Unit	Total Kjeldahl Nitrogen	FOSS TECATOR	2520 / 91794469	Thailand Institute Of Scientific And Technological Research (TISTR)	2202361-001-01	4 Apr 22	3 Apr 23	-
7	Distillation Unit		FOSS TECATOR	KT200 / 91790524	Sithiporn Associates Co.,Ltd.	M563FOT0084B	30 Nov 21	30 Nov 22	-
8	Analytical Balance (Repeatability 0.1 mg)	Fat, Oil and Grease	Mettler-Toledo	AB-204S/FACT / 1129361010	National Food Institute, Ministry of Industry, Thailand	2103270-001-01	1 Jun 22	31 May 23	-
9	Incubator	Coliform Bacteria Standard Plate count	Memmert	IN 75 / D317.0307	Technology Promotion Association (Thailand-Japan)	22TM671	3 May 22	2 May 23	-
10	Incubator	E.Coli Legionella sp.	Memmert	IPP 260 / V616.0066	Technology Promotion Association (Thailand-Japan)	22TM672	5 May 22	4 May 23	-

ใบรับรองเครื่องมือตรวจวัดและวิเคราะห์คุณภาพ ประจำห้องปฏิบัติการ

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือวิเคราะห์คุณภาพน้ำ									
11	Incubator	Coliform Bacteria Standard Plate count	Memmert	IPP 260 / V618.0033	Technology Promotion Association (Thailand-Japan)	22TM50	3 May 22	2 May 23	-
12	Water Bath	E.Coli Legionella sp.	Memmert	WNE 14 / L416.0606	Technology Promotion Association (Thailand-Japan)	22TM333	17 Feb 22	17 Feb 23	-
13	Water Bath		Memmert	WNE 14 / L416.0612	Technology Promotion Association (Thailand-Japan)	22TM334	17 Feb 22	17 Feb 23	-
14	Analytical Balance		Mettler-Toledo	MS603S / B0070110311	National Food Institute, Ministry of Industry, Thailand	2200705-001-01	7 Apr 22	6 Apr 23	-
15	Auto Clave		ALP	CL-40L / 802664	Technology Promotion Association (Thailand-Japan)	22TM89	17 Feb 22	16 Feb 23	-
Water									
1	pH Meter	pH Meter	YSI	pH100A JC03351	Technology Promotion Association (Thailand-Japan)	21CH632	16 May 22	15 May 23	-
2	pH Meter	pH Meter	YSI	pH100A JC03349	Technology Promotion Association (Thailand-Japan)	21CH1015	16 Aug 22	15 Aug 23	-

Calibration Certificate

Certificate No.: 2201793-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakanong, Bangkok 10260

Page 1 of 5

Equipment: pH Meter

Manufacturer: METTLER TOLEDO

Model: SevenEasy pH

Serial No.: 1231155210


ID No.: UAE.WAT.0102553

Order No.: 2201793

Operation No.: 2201793-001

Date of Receipt: 21 February 2022

Date of Calibration: 1 March 2022

Calibrated by: Mr.Pheraphat Tuanjit
Scientist
Date of issue: 1 March 2022
Approved by: 
(Mr.Nuttapol Niyomchart) (for)
Specialist, Division of Calibration Laboratory
Responsible for the Technical Management Team

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its capability to recognize national standards and to the units of measurement related 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.: 2201793-001-01
Equipment: pH Meter
Resolution: 0.01 pH ; 1 mV
Manufacturer: METTLER TOLEDO
Model: SevenEasy pH
Serial No.: 1231155210
Type: Bench top
ID No.: UAE.WAT.0102553

Page 2 of 5

Date of Calibration: 1 March 2022
Location: Chemical Calibration Laboratory, NATIONAL FOOD INSTITUTE
Environment Condition: Ambient Temperature: (23.5 ± 1.5) °C Relative Humidity: (53 ± 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-21F-0887	24 June 2022
2.2 Digital Thermometer	2709007	Fluke	CC-640595-01	30 October 2022
2.3 Thermo-Hygro Meter	NFI.BTH00418	PONPE	QR22-0195	27 January 2023

Certified Reference Material

Lot No.	Manufacturer	Ref. N	Expire Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)	CPAchem	PH216.L5	19 April 2023
2.5 pH buffer 6.865 (Primary pH buffer Solution)	CPAchem	PH217.L5	19 April 2023
2.6 pH buffer 10.01 (Primary pH buffer Solution)	CPAchem	PH220.L5	19 April 2022
2.7 pH buffer 7.00 (Standard pH buffer Solution)	CPAchem	PH107.L5	16 March 2022

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

- 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
- 3.5 Certified Reference Material No. 2.7 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- Harmed 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

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.


1 March 2022

Calibration Report

Certificate No.: 2201793-001-01
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: 1 March 2022

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	414.117	414	0.00	0.58	2.00
2.00	295.811	296	2.00	0.58	2.00
4.00	177.462	178	4.00	0.58	2.00
6.00	59.159	59	6.00	0.58	2.00
7.00	-0.001	0	7.00	0.58	2.00
8.00	-59.159	-59	8.00	0.58	2.00
10.00	-177.463	-177	10.00	0.58	2.00
12.00	-295.812	-296	12.00	0.58	2.00
14.00	-414.119	-414	14.00	0.58	2.00

2. Calibration of pH Meter with Electrode
(Manual Temperature Compensation at 25 °C)
Equipment: pH Electrode
Manufacturer: METTLER TOLEDO
Serial No.: 1156882
Type: Combined Electrode
Model: InLabSolds
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	4.00	180	96.25	0.0076	2.00
6.866	6.88	16	-	0.0079	2.00
10.012	10.01	-162	96.13	0.0094	2.00
6.985	7.00	9	-	0.0097	2.00

P. Sangkharut
1 March 2022

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Calibration Report

Certificate No.: 2201793-001-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C
Model: SevenEasy pH
Serial No.: 1231155210
ID No.: UAE.WAT.0102553
Manufacturer: METTLER TOLEDO
Date of Calibration: 1 March 2022

Page 4 of 5

Location: Chemical Calibration Laboratory, NATIONAL FOOD INSTITUTE

Environment Condition:
Ambient Temperature 24 °C ± 1 °C
Relative Humidity 53 % ± 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 :
Platinum Resistance Thermometer (PRT)

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER	1523	2118154	PSL-T 0851/64	03-Jun-22	TISTR
Platinum Resistance Thermometer (PRT)	5627A	877332			

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

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

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

P. Sangkharut
1 March 2022

เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2201793-001-01
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: 1 March 2022

Page 5 of 5

Calibration point:

Calibration result:

15.0, 25.0 and 35.0 °C

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

- Description of probe, model: N/A S/N: N/A

Dimension of probe: Diameter 4 mm, Length 100 mm.

Sheath material: Stainless Steel

UUC Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.1	15.006	-0.1	0.099
25.1	25.004	-0.1	0.099
35.1	35.003	-0.1	0.099

P. Sengphol
 1 March 2022

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 -----



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 53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
 TEL: 0-2717-3000-27 FAX: 0-2719-9484



MSC-TS17817025
 CALIBRATION 0008

Cert. No.: 22TM305
 Page: 1 of 3

Certificate of Calibration

Equipment: BOD Incubator

Manufacturer: ARCO

Model: UR-1320

Serial No.: -

ID No.: UAE.WAO.018/2551

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

() Pornthippa Tameyakul
 () Malee Butkruea
 () Suwit Imjai

Issue Date: 18 April 2022

The Uncertainties are for a confidence probability of approximately 95 %

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



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534/4 PATTANAKARN ROAD SOI 16, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



NEC-TS1717025
CALIBRATION 0008

Cert. No.: 22TM90
Page.: 1 of 3

Certificate of Calibration

Equipment : BOD Incubator

Manufacturer : Arco

Model : UC4-1320

Serial No. : 13URC4S013201

ID No. : UAE.WAO.015/2561

Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Lab Floor 2

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 : Kunchit Promprat

Approved by :

Approved Signatory

() Pornthippa Tameyakul
() Malee Butkruea
() Suwit Imjai

Issue Date : 22 February 2022

The Uncertainties are for a confidence probability of approximately 95%

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

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Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2202-0446OC-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 : MY44035217 : 21LM30 : 23 Dec 2022

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

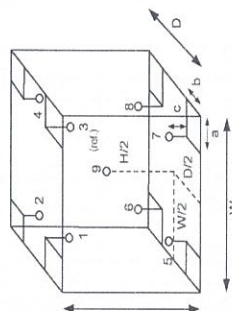
3. This certificate is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration	
Beginning	Finished
Temp. ($^\circ\text{C}$)	28
REL.Humid. (%)	68
AC Supply (Volt)	226
	226



Probe Installation Details :

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

Position :	Ref. Std. ID No.:
1	18-10RTD-01
2	18-10RTD-02
3	18-10RTD-03
4	18-10RTD-04
5	18-10RTD-05
6	22-10RTD-10
7	18-10RTD-07
8	18-10RTD-08
9 (ref.)	18-10RTD-09

หน้า

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a 1096042



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2202-0445OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 22TM90
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 <i>k</i>
20.0	19.5	19.4	0.30	0.58	1.0	0.55	2
Measured Temperature (°C)							
Position							
1	2	3	4	5	6	7	8
20.0	20.154	20.013	20.356	19.939	19.834	19.761	19.824
							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 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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Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2204-0015OC-2
Procedure Used :-

Cert. No.: 22TM305
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	34970A	MY41021843	22LM4	10 Jan 2023

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

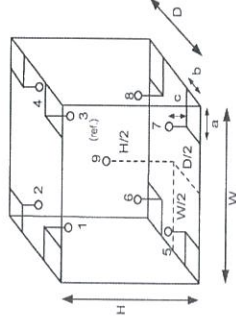
3. This certification is traceable to the International System of Unit.

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. (%)	56
AC Supply (Volt)	222
	221



Probe Installation Details :
a = 10 cm
b = 10 cm
c = 10 cm
Dimension of Chamber :
D = 0.62 m
W = 1.2 m
H = 1.2 m
Capacity = 0.89 m³

Position :	Ref. Std. ID No.:
1	18-04RTD-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

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๑ 1096041

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เอกสารไม่ควบคุม
๑ 1104314



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2204-0015OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 22TM305
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	20.0	0.50	0.44	1.1	0.64	2
Measured Temperature (°C)							
Position							
1	2	3	4	5	6	7	8
20.080	20.056	19.866	19.826	19.655	19.656	19.819	19.979
							9 (ref.)
							19.899

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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Cert.No.: 22MM210
Page.: 1 of 3

Certificate of Calibration

Equipment : Electronic Balance
Manufacturer : Mettler Toledo
Model : XSR205
Serial No. : C009071872
ID No. : UAE.WAO.012/2563
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phakhanong,
Bangkok 10260

Location : Balance Room

Received order : 26 April 2022

Calibration Date : 26 April 2022

Ambient Temperature : 15 °C to 40 °C

Relative Humidity : 30 % to 90 %

Calibrated by : Kunchit Promprat

Approved by : 
Approved Signatory

() Ponthippa Tameyakul
(/) Malee Butkruea
() Suwit Imjai

Issue Date : 29 April 2022

The Uncertainties are for a confidence probability of approximately 95%

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เอกสารไม่ควบคุม



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2204-0542OC-1

Cert.No.: 22MM210
Page: 2 of 3

Procedure used :-

Calibration were conducted using in-house calibration procedure CP-OB01 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	-	70RC138	MM-0009-21	3 Feb 2023
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This result of calibration was made on requested at the point specified by customer.
4. This certificate is not certified for any commercial transaction.
5. 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		Coverage Factor (k)
			Uncertainty (± mg)		
80	80.00004	-0.00004	0.15		2.00
200	199.9999	+0.0001	0.35		2.00

After Adjustment :

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

Applied Weight (g)	Standard Deviation of Reading (g)
80	0.000008
200	0.00005

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Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2204-0542OC-1

Cert.No.: 22MM210
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

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

3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement		Coverage Factor (k)
			Uncertainty (± mg)		
Unload	0.00000	0.00000	0.016		2.13
0.05	0.05001	-0.00001	0.016		2.13
0.1	0.10001	-0.00001	0.017		2.11
1	1.00002	-0.00002	0.019		2.05
5	5.00003	-0.00003	0.026		2.00
20	20.00008	-0.00008	0.049		2.00
50	50.00010	-0.00010	0.080		2.00
80	80.00014	-0.00014	0.15		2.00
100	100.00001	-0.00001	0.21		2.00
150	150.00001	-0.00001	0.29		2.00
200	200.00001	-0.00001	0.35		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 %.

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NIST-JVRI
CALIBRATION 0038

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

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

Calibrated by: Man Pattanapongpaiboon

Approved by:

() Pornthippa Tameyakul
(✓) Malee Butkruea
() Suwit Imjai

Issue Date:

18 April 2022

Approved Signatory

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 0040245



Equipment: Hot Air Oven
Condition As-Received: Used Item
Reference: 2204-00150C-1

Cert. No.: 22TM304
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: 34970A Serial No.: MY41021843 Cert. No.: 22LM4 Due Date: 10 Jan 2023

1) Data Acquisition

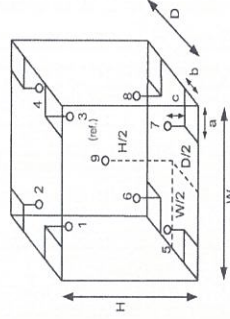
2. This certificate is valid only to the item calibrated on date and place of calibration.

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 :

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

Dimension of Chamber :

Environment during calibration		
	Beginning	Finished
Temp. (°C)	28	28
REL.Humid. (%)	56	55
AC Supply (Volt)	221	224

Ref. Std. ID No.: @		
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

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

A 1104316



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2204-0015OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 22TM304
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
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
104.0	104.403	104.220	104.517	104.474	103.778	103.859	104.292	104.357
120.0	120.183	119.878	120.238	120.355	119.476	119.455	120.046	120.173
180.0	180.502	179.929	180.655	180.797	179.012	179.044	180.043	180.305

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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Verification Certificate

Certificate No.: 2202361-001-01
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: 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

a 1104315



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	MY40405576 / 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
Model: 2520 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

Calibration point: 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	0.13	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.

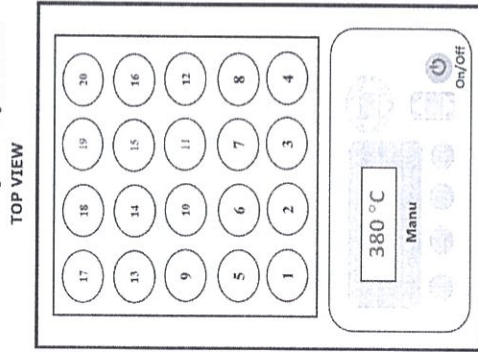
- Stability = One-half of the greatest maximum difference of measured temperatures at one sensors, for at least half an hour after reaching steady state.

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: Continued

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 %).

----- End -----

FOSS

Customer Service Report

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

Report No: 5874

Date: 30/11/21
 Customer: UAE
 Instrument: KT200
 Address: 91 ถนนวิภาวดี พุทธมณฑล 2 แขวง 10210
 Serial: 91890529

Hours Start: 8:00 Finish: 9:00
 Travel To Customer: 1
 Labour: 9:00
 Travel From Customer: 15:00

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

PO/Quote Number: 17901010

PMA Type: Foss Comp Pro Contract No. 17901010

Details of Work / Test		Condition / Status
- Check instrument for KT200		OK
- Check PM kit Value		Pass
- Check Rubber Gement		Pass
- Check Seal element		Pass
- Check Heating element		Pass
- Check New panel PCB		Pass
- Check safety door		Pass
- Check Lubricant		Pass
- Check Leaked set 30ml to 28ml		Pass

Instrument Ready for Use: OK Not OK (If not OK, Comment)

Part No:	Batch	Description	Qty
10009465	11235-983	Foss PM kit KT200	1
1575-0024	09.11.20	Safety Valve	1
1549-0024	09.11.20	Rubber Gement for Heating	2
110085-12	02.08.21	Heating element	1
100028-12	16.11.20	Seal	1
10094273	16.07.20	KT200 new panel PCB	1
10009385	22.09.21	Safety door complete	1

I confirm this report is accurate and complete
 Signed FOSS: [Signature]
 Name: [Name]
 Signed Customer: [Signature]
 Name: [Name]

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

FOSS Preventive Maintenance Protocol

Customer: UAE

Instrument	Kjeltec™ 2100 - 4,2/dec 200	
Recommended PM interval (whichever occurs first between interval and no. of samples analysed)	12 months	No. of samples analysed (if applicable):
Preventive maintenance kit (P/N)	10009965	5/N 91790524

Introduction

A maintenance protocol provides systematic and functional means of maintaining a specific instrument type. The recommended 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 considered. A demanding environment, such as high ambient temperature, humidity, dirtiness etc can measurably shorten component lifetime and also the maintenance and component replacement intervals.

NOTE!

The content of this protocol is subject to change over time. In order to safeguard that you obtain the correct parts, please make sure to indicate serial no and date of installation when contacting your FOSS representative.

Dedicated Analytical Solutions

FOSS Analytical AS
69 Slangerupgade
DK-3400 Hillerød
Denmark
Tel +45 7010 3320
Fax +45 7010 3371
E-mail support@foss.dk
Web www.foss.dk

FOSS Analytical AB
Box 70
SE-263 21 Höganäs
Sweden
Tel +46 42 361500
Fax +46 42 340349
E-mail support@foss.dk
Web www.foss.dk

Customer Support, 1001 4572 / Rev. 3

Customer Support, 1001 4572 / Rev. 3

1(2)

เอกสารไม่ควบคุม

Maintenance Procedure

Exchange of Parts and Cleaning

Step	Action	Part	P/N	OK
1	Replace	Adapter for dig. tube 250 ml	1000 0056	<input type="checkbox"/>
2	Replace	Non return valve	1000 3538	<input type="checkbox"/>
3	Replace valves in alkali pump	Valve kit reagent/water pump	1575 0093	<input type="checkbox"/>
4	Replace steam tubing	Silicone tubing 8/12 mm	1582 0006	<input type="checkbox"/>
5	Replace alkali tubing	Tubing reinforced for alkali	1582 0011	<input type="checkbox"/>
6	Replace water tubing	Tubing PVC 8/11 mm	1582 0004	<input type="checkbox"/>
7	Cleaning	Steam generator		<input type="checkbox"/>
8	Cleaning	Splash head		<input type="checkbox"/>

Check and Adjustments

Step	Action	Module	Measured	Limits	OK
1	Check alkali volume, 10 ml/stroke	Alkali pump	98	At 50 ml -0/+3 ml	<input checked="" type="checkbox"/>
2	Check distillation volume		120ml	100 – 150 ml/4 min	<input checked="" type="checkbox"/>
3	Check front panel switches				<input checked="" type="checkbox"/>
4	Check cables and electrical connections				<input checked="" type="checkbox"/>
5	Check level pins in steam generator				<input checked="" type="checkbox"/>
6	Check safety door switch				<input checked="" type="checkbox"/>

2(2)

เอกสารไม่ควบคุม

Calibration Certificate

Certificate No.: 2203120-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 3

Equipment: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: AB204-S/FACT

Serial No.: 1129361010

ID No.: UAE.WAS.002/2552

Order No.: 2203120

Operation No.: 2203120-001

Date of Receipt: 1 June 2022

Date of Calibration: 1 June 2022

Calibrated by Mr. Taveesak Seilee
Scientist

Approved by

(Mr. Pheraphat Tuanjit)

Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 7 June 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



เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2203120-001-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: AB204-S/FACT
Resolution: 0.0001 g
Serial No.: 1129361010
ID No.: UAE.WAS.002/2552
Capacity: 220 g

Date of Calibration: 1 June 2022
Environment Condition: Ambient Temperature: 19.9 ± 0.3 °C Relative Humidity: 45 ± 1.5 %

Place of Calibration: 108, Balance Room, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-M4-001 In-House Method based on UKAS Lab 14 : 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1-500mg	B308068554	TCS	M2201020S	6 January 2023
Standard Weight Class E2	1-500g	B308068128	TCS	M2201021S	6 January 2023
Thermo-Hygro Meter	PONPE 490	NFLBTH 010/18	Quality Reborn	QR22-0350	18 February 2023

3. This certification is traceable to SI UNIT

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

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

Calibration Results:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
100	0.000048
200	0.000052

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	2	3	4	5	6	(Maximum Difference)
(g)	49.9999	49.9998	49.9998	49.9999	49.9998	49.9998	(g)
	49.9999	49.9998	49.9998	49.9999	49.9998	49.9998	(g)
							0.0001

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



เอกสารไม่ควบคุม

Calibration Report

Certificate No.: 2203120-001-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: AB204-S/FACT
Resolution: 0.0001 g
Serial No.: 1129361010
ID No.: UAE.WAS.002/2552
Capacity: 220 g

Date of Calibration: 1 June 2022 Page 3 of 3

Calibration Results: (Continued)

Calibration Range: 0 - 200 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value:

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (± g)	Coverage Factor k
Unload	0.00000	0.0000	0.0000	0.000088	2.00
0.01	0.01000	0.0100	0.0000	0.000088	2.00
0.05	0.05000	0.0499	0.0001	0.000088	2.00
0.1	0.10000	0.1000	0.0000	0.000088	2.00
0.2	0.20000	0.2000	0.0000	0.000088	2.00
0.5	0.50000	0.5000	0.0000	0.000088	2.00
1	1.00000	0.9999	0.0001	0.000088	2.00
2	2.00000	1.9999	0.0001	0.000089	2.00
5	5.00000	5.0000	0.0000	0.000089	2.00
10	9.99998	9.9999	0.0001	0.000092	2.00
20	19.99999	19.9999	0.0001	0.000094	2.00
50	49.99990	49.9999	0.0000	0.00012	2.00
70	69.99989	69.9998	0.0001	0.00014	2.00
100	100.00001	99.9999	0.0001	0.00017	2.00
150	149.99991	149.9997	0.0002	0.00022	2.00
200	200.00007	199.9998	0.0003	0.00030	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



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SIUANLUANG, SIUANLUANG BANGKOK 10250
TEL: 0-2717-5000, 27 FAX: 0-2719-9434



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 : Preescha Hlahib
Approved by : พญ. . Approved Signatory
() Pornthippa Tameyakul
(/) Malee Bukruea
() Suwit Injai

Issue Date : 10 May 2022

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 : Incubator
Condition As-Received : Used Item
Reference : 2205-0003OC-2
Cert. No.: 22TM671
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	MY44067817	21LM10	20 Jul 2022

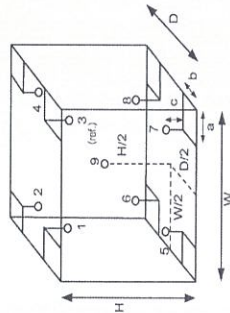
2. This certificate is valid only to the item calibrated on date and place of calibration.

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



Probe Installation Details :

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

Dimension of Chamber :

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

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2205-0003OC-2
Cert. No.: 22TM671
Page.: 3 of 3
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
36.0	36.0	36.0	0.058	0.29	0.49	0.30	2

Measured Temperature (°C)								
Position								
1	2	3	4	5	6	7	8	9 (ref.)
36.031	36.035	36.008	36.063	35.621	35.716	35.618	35.778	35.798

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 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANI LANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-5000-27 FAX 0-2719-0484



NSC-T&T-1517025
CALIBRATION 0008

Cert. No.: 22TM672
Page.: 1 of 3

Certificate of Calibration

Equipment : Incubator
Manufacturer : Memmert
Model : IPP 260
Serial No. : V616.0066
ID No. : UAE.MIC.032/2559

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 : 5 May 2022
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$

Calibrated by : Preecha Hahib

Approved by :
Approved Signatory

() Ponthippa Tameyakul
() Malee Buikrua
() Suwit Imjai

Issue Date : 11 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 Services

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2205-0003OC-3

Cert. No.: 22TM672
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 MY44067817 21LM10 20 Jul 2022

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

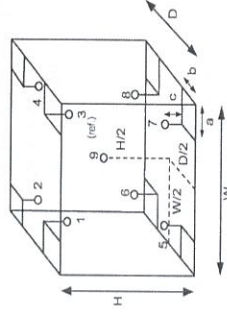
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration	
Beginning	Finished
Temp. (°C)	25
REL.Humid. (%)	62
AC Supply (Volt)	221
	221



Probe Installation Details :

Dimension of Chamber :
 $a = 5.0 \text{ cm}$ $D = 0.50 \text{ m}$
 $b = 5.0 \text{ cm}$ $W = 0.60 \text{ m}$
 $c = 5.0 \text{ cm}$ $H = 0.80 \text{ m}$
 $\text{Capacity} = 0.24 \text{ m}^3$

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

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2205-0003OC-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 22TM672
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
25.0	25.0	25.0	0.021	0.18	0.33	0.30	2
36.0	36.0	36.0	0.077	0.96	1.8	0.33	2
Measured Temperature (°C)							
Position							
1	2	3	4	5	6	7	8
25.221	25.146	25.127	25.113	24.968	24.986	24.933	25.017
35.637	35.238	36.130	36.515	36.928	36.845	36.630	36.761
36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0

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

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

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

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

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



ISO 17025
CALIBRATION 0008

Cert. No.: 22TM503
Page.: 1 of 3

Certificate of Calibration

Equipment : Incubator

Manufacturer : Memmert

Model : IPP 260

Serial No. : V618.0033

ID No. : UAE.MIC.021/2561

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 :

Krisda Malee

Approved by :

Approved Signatory

(/) Ponthippa Tameyakul

(/) Malee Butkruea

(/) Suwit Injai

Issue Date :

10 May 2022

The Uncertainties are for a confidence probability of approximately 95%

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เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2205-0003OC-4
Procedure Used :-

Cert. No.: 22TM503
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	34970A	MY49023932	21LM8	06 Jul 2022

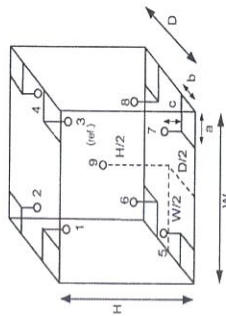
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available



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

Environment during calibration		
Temp. (°C)	Beginning	Finished
REL.Humid. (%)	23	22
AC Supply (Volt)	53	54
	221	220

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

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2205-0003OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 22TM503
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
22.0	22.0	22.0	0.051	0.095	0.19	0.30	2
44.0	44.0	44.0	0.10	0.83	1.2	0.32	2

Measured Temperature (°C)								
Position								
1	2	3	4	5	6	7	8	9 (ref.)
22.0	22.238	22.139	22.207	22.184	22.178	22.136	22.169	22.161
44.0	44.504	44.670	44.240	44.315	43.974	44.446	44.209	44.306

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



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53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 22TM333
Page.: 1 of 3

Certificate of Calibration

Equipment : Water Bath

Manufacturer : Memmert

Model : WNE 14

Serial No. : L416.0606

ID No. : UAE.MIC.002/2560

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 :

Approved Signatory

() Ponthippa Tameyakul
() Malee Butkruea

Issue Date : 22 February 2022
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 : 2202-0444OC-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 (IPT).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

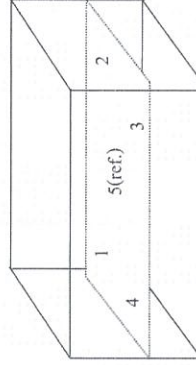
1. Reference standard instrument:-

Instrument : Model : Serial No. : Due Date :
1) Data Acquisition : 34970A : MY44067817 : 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 (Volt)
	(°C)	(%R.H.)	
Beginning of Calibration	21	65	229
Finished of Calibration	22	58	230



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 : 2202-0444OC-3
Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 22TM333
Page.: 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)				
			1	2	3	4	5 (ref.)
44.5	44.5	44.5	44.498	44.481	44.482	44.518	44.534

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor k
44.5	0.13	0.057	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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TEL. 0-2717-3000-27 FAX. 0-2719-9484



TEC-TS1-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, 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 : 
(/) Pornthippa Tameyakul
(/) Malee Buikrua
Approved Signatory

Issue Date : 22 February 2022

The Uncertainties are for a confidence probability of approximately 95 %

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

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เอกสารไม่ควบคุม

A 0038095



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2202-0444OC-4

Cert. No.: 22TM334
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.

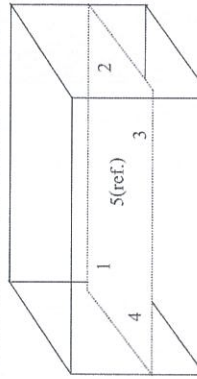
3. This certification is traceable to the International System of Unit.

Result of Calibration :-

(*) Without Adjustment

Temperature Source

	Environmental		AC Voltage Supply (Volt)
	(°C)	(%R.H.)	
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



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)				
			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 k
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 %.

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เอกสารไม่ควบคุม

a 1096055



เอกสารไม่ควบคุม

a 1096054


Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+66 2723 0382
MT-TH-ServiceSupport@mt.com



ISO 17025
CALIBRATION 0682

Accuracy Calibration Certificate

Customer

Company: United Analyst and Engineering Consultant Co., Ltd.
Address: 3 Soi Udom Suk 41, Sukhumvit Rd., Bang Chak
City: Phra Khanong
Zip / Postal: 10260
State / Province: Bangkok
Order Number: 
Contact: Suwit Chotnok

Weighing Device

Manufacturer: Mettler Toledo
Model: MS6035J01
Serial No.: B007010311
Building: N/A
Floor: 2
Room: Balance Room (206)
Instrument Type: Weighing Instrument
Asset Number: UAE.MIC.008/2553
Terminal Model: N/A
Terminal Serial No.: N/A
Terminal Asset No.: N/A

Range	Max. Capacity	Readability (g)
1	620 g	0.001 g

Procedure

Calibration Guideline:
METTLER TOLEDO Work Instruction:
EURAMET cg-18 v. 4.0 (11/2015)
CPIW00220

This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.

The sensitivity span of the weighing instrument was adjusted before calibration with a built-in weight.

In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	As Found	Temperature	Humidity
		Start: 22.8 °C End: 23.0 °C	Start: 49.9 % End: 58.3 %

As Found Calibration Date: 07-Apr-2022
As Left Calibration Date: N/A
Issue Date: 08-Apr-2022
Calibrator: Sirawit Chanchan
Approved Signatory: 
Sirawit Chanchan

☒ Kassakorn Tassanachaisakul
☐ Santi Jitriyom
☐ Surachet Sukkate

Measurement Results

Repeatability

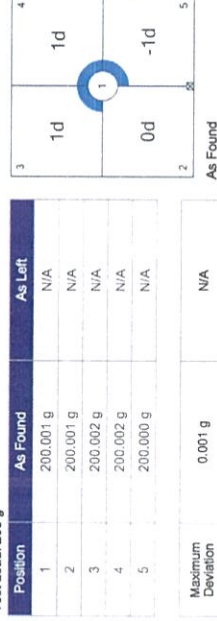
Test Load: 200 g



The "g" in the graph represents the readability of the range/interval in which the test was performed.
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

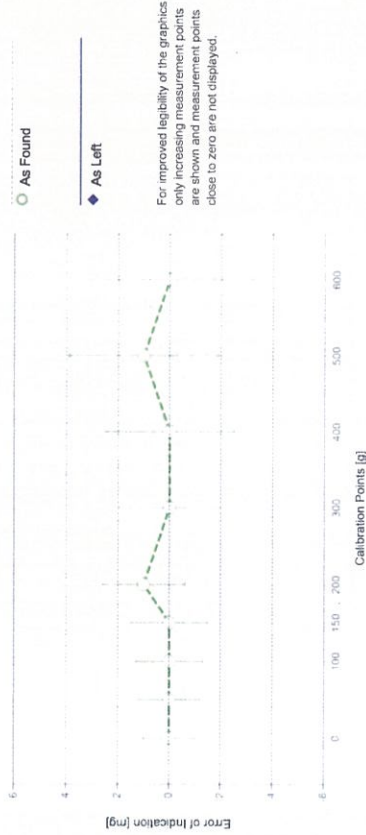
Test Load: 200 g



The "d" in the graph represents the readability of the range/interval in which the test was performed.

Error of Indication

As Found	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.000 g	0.000 g	0.000 g	1.0 mg	2
2	0.500 g	0.500 g	0.000 g	1.2 mg	2
3	1.000 g	1.000 g	0.000 g	1.2 mg	2
4	50.000 g	50.000 g	0.000 g	1.2 mg	2
5	100.000 g	100.000 g	0.000 g	1.3 mg	2
6	150.000 g	150.000 g	0.000 g	1.5 mg	2
7	200.000 g	200.001 g	0.001 g	1.6 mg	2
8	300.001 g	300.001 g	0.000 g	2.0 mg	2
9	400.001 g	400.001 g	0.000 g	2.5 mg	2
10	500.001 g	500.002 g	0.001 g	2.9 mg	2
11	600.001 g	600.001 g	0.000 g	3.4 mg	2



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML F1			
Weight Set No.:	WS55	Date of Issue:	09-Jul-2021
Certificate Number:	CCW-0137-21-C	Calibration Due Date:	07-Jul-2022
Weight Set 2: OIML E2			
Weight Set No.:	WS80	Date of Issue:	23-Feb-2022
Certificate Number:	C205581631	Calibration Due Date:	14-Aug-2023
Thermo Hygrometer			
Equipment No.:	INI161	Date of Issue:	14-Jun-2021
Certificate Number:	21H1220	Calibration Due Date:	01-Jun-2022

Remarks

FACT adjustment functionality activated
Equipment condition: Good
Next calibration according to customer's procedure
Calibration data not decide by calibration laboratory

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with $k=2$ in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $3.0 \cdot 10^{-6} / K$
Temperature range on site for the evaluation of the measurement uncertainty in use: $3 K$

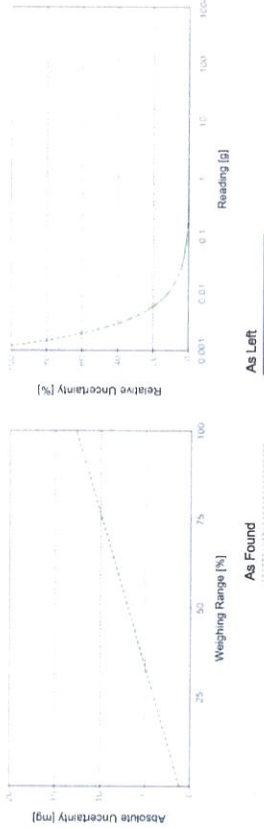
Linearization of Uncertainty Equation

Range		As Found	As Left
d	Max		
1	0.001 g	620 g	N/A

$U_1 = 1.2 \text{ mg} + 0.0186 \text{ mg/g} \cdot R$
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found		As Left	
0.062 g	1.2 mg	1.9%	N/A	N/A
0.620 g	1.2 mg	0.20%	N/A	N/A
6.200 g	1.3 mg	0.021%	N/A	N/A
62.000 g	2.4 mg	0.0038%	N/A	N/A
620.000 g	13 mg	0.0021%	N/A	N/A



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MSC-TSI-71517525
CALIBRATION 0093

Cert. No.: 22TM89
Page.: 1 of 3

Certificate of Calibration

Equipment : Autoclave
Manufacturer : ALP
Model : CL-40L
Serial No. : 802664
ID No. : UAE.MIC.014/2550
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Air Analysis Unit
Received Order : 17 February 2022
Calibration Date : 17 February 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Kunchit Promprat

Approved by : 
Approved Signatory

(/) Pornthippa Tameyakul
(/) Malee Butkruea
() Suwit Imjai

Issue Date : 22 February 2022

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Autoclave
Condition As-Received : Used Item
Reference : 2202-0444OC-1
Cert. No.: 22TM89
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

Reference standard instrument:-

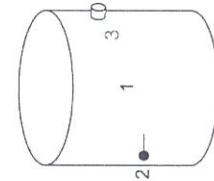
Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY44035217	21LM30	23 Dec 2022
2. This certificate is valid only to the item calibrated on date and place of calibration.				
3. This certification is traceable to the International System of Unit.				
4. This result of calibration covers laboratory autoclaves for the sterilization of goods and material which could be infected with organisms categorized as Hazard Group 1, 2 and 3**				

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	27	68	226
Finished of Calibration	27	65	226

Position	Description	Ref. Std. ID No.:
1 =	Center of chamber	22-10TC-01
2 =	Temperature sensor	22-10TC-02
3 =	Exhaust port	22-10TC-03



Equipment : Autoclave
Condition As-Received : Used Item
Reference : 2202-0444OC-1
Cert. No.: 22TM89
Page.: 3 of 3

Result of Calibration :- (*) Without Adjustment

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	122.373	0.32	0.12	1.2	2
		2	122.421				
		3	122.292				

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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANILUANG, SUANILUANG BANGKOK 10250

TEL. 0-2717-3000-27 FAX. 0-2719-9484



NSC-TISI-TS17025
CALIBRATION 8008

Cert.No.: 21CH1015
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Certificate of Calibration

Equipment : pH Meter
Manufacturer : EcoSense
Model : pH100A
Serial No. : JC03349
ID No. : UAE.EFM.065/2562(ENV.pH.05/62)
Condition As-Received:
Used Item
Received Date : 04 August 2021
Calibration Date : 17 August 2021
Reference : 2108-0109WSC-3
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong, Bangkok 10260
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM)
- CP-CH8 by comparison with standard thermometer

Calibrated by : Warakorn Lengagtrakul

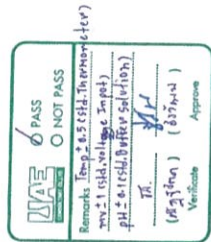
Approved by : 
Approved Signatory

(✓) Malee Butkruea
() Saithip Meangmai
() Warakorn Lengagtrakul

Issue Date : 23 August 2021

The Uncertainties are for a confidence probability of approximately 95 %

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Cert.No.: 21CH1015
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Condition of this calibration result

- Reference Standard Instrument :
Instrument Serial No. ID No. Cert. No. Due Date
1) Document Process Calibrator 43160066 130RC092 21E1223/1 27 Apr 2022
2) Ref. Standard Thermometer 2188080 130RC044 2011369 19 Nov 2021
This certification is traceable to the International System of Unit maintained at:-
- Traceable to National Institute of Metrology (Thailand), NIMT

- 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

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

Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4,7)(7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (\pm mV)	Coverage factor k
			mV	pH		
pH Meter S/N.: JC03349	4.00	177.48	177	4.01	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	10.00	-177.48	-177	10.01	0.58	2.00

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Cert.No.: 21CH1015
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Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7)(7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (\pm)	Coverage factor k
pH Electrode S/N.:200729SIA605377	4.008	4.01	146	0.0079	2.00
	6.985	7.00	-4	0.011	2.00
	10.015	10.01	-5	0.0093	2.00
			-161	0.013	2.07

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : -
- Serial No. : 200729SIA605377
- Dimension of probe;
 - Length : 115 mm.
 - Diameter : 12 mm.
 - Immersion Depth : 100 mm.

Calibration Point ($^{\circ}$ C)	Standard Temperature ($^{\circ}$ C)	UUC* Reading ($^{\circ}$ C)	Error ($^{\circ}$ C)	Uncertainty of measurement (\pm $^{\circ}$ C)	Coverage factor k
25.0	25.002	25.1	0.098	0.20	2.00
30.0	30.005	30.1	0.095	0.20	2.00
35.0	35.002	35.0	-0.002	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 %.

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JIAE-MRA
MRA CERTIFICATION
CALIBRATION 0008

Cert.No.: 21CH632
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Certificate of Calibration

Equipment : pH Meter
Manufacturer : Ecosense
Model : pH100A
Serial No. : JC03551
ID No. : UAE.EFM.072/2562(EVN.pH.06/62)
Condition As-Received: Used Item
Received Date : 14 May 2021
Calibration Date : 17 May 2021
Reference : 2105-0446WSC-1
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak,
Phrahanong, 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 reference material (RM)
- CP-CH8 by comparison with standard thermometer

Calibrated by : Warakorn Lerngagrakul
Approved by :
Approved Signatory

(/) Malee Butkruea
() Saithip Meangmai
() Warakorn Lerngagrakul

Issue Date : 20 May 2021

The Uncertainties are for a confidence probability of approximately 95%

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Cert.No.: 21CH632
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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 43160066 130RC092 21E1223/1 27 Apr 2022
2) Ref. Standard Thermometer 2188080 130RC044 2011389 19 Nov 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	722285	19 Dec 2021
pH 10.012	CPA chem	725928	12 Jan 2022

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 Fluke at pH (4,7)(7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input		Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
		pH	mV	mV	pH		
pH Meter S/N.: JC03551	4.00	177.48	177	4.01	0.58	2.00	2.00
	7.00	0.00	0	7.00	0.58	2.00	2.00
	10.00	-177.48	-177	10.01	0.58	2.00	2.00

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Cert.No.: 21CH632
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Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (\pm)	Coverage factor k
pH Electrode S/N.:200729SIA605377	4.008	4.01	157	0.0071	2.00
	6.985	6.99	-15	0.0099	2.00
	6.985	7.00	-16	0.0093	2.00
	10.012	10.01	-191	0.013	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : -

- Serial No. : 200729SIA605377

Dimension of probe;

- Length : 110 mm.

- Diameter : 12 mm.

- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (\pm °C)	Coverage factor k
25.0	25.004	24.9	-0.104	0.20	2.00
30.0	30.007	29.9	-0.107	0.20	2.00
35.0	35.002	34.9	-0.102	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 %.

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