
เอกสารสอบเทียบเครื่องมือที่ใช้ในการวิเคราะห์

List Certificate of Laboratory Instrument

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remarks
Laboratory Instrument for Water Quality Analysis									
1	pH Meter	pH	Mettler-Toledo	Seven Easy S20 / 1231155210	National Food Institute, Ministry of Industry, Thailand	2301846-001-01	24 Feb 23	23 Feb 24	-
2	pH Meter		Mettler-Toledo	Seven Easy S20 / 1230525212	National Food Institute, Ministry of Industry, Thailand	2302181-001-01	24 Mar 23	22 Mar 24	-
3	Analytical Balance (Readability 0.01 mg)	SUSPENDED SOLIDS TOTAL DISSOLVED SOLIDS	Mettler-Toledo	XSR205DU / C210685394	Technology Promotion Association (Thailand-Japan)	23MM113	26 Apr 23	24 Apr 24	-
4	Hot Air Oven		Memmert	UF55 / B216.1666	Technology Promotion Association (Thailand-Japan)	22TM1490	19 Oct 22	18 Oct 23	-
5	Analytical Balance (Readability 0.1 mg)	FAT, OIL & GREASE	Mettler-Toledo	XSR204 / C117635043	National Food Institute, Ministry of Industry, Thailand	2302827-001-01	10 May 23	8 May 24	-
6	Digester Unit	TOTAL KJELDAHL NITROGEN	FOSS TECATOR	2520auto / 91794469	National Food Institute, Ministry of Industry, Thailand	2302413-001-01	30 Mar 23	28 Mar 24	-
7	Distillation Unit (Kjeldahl Method)		FOSS TECATOR	KT8100/ 91889052	FOSS South East Asia	8411	29 May 23	27 May 24	-
8	BOD Incubator	BIOCHEMICAL OXYGEN DEMAND	Arco	UC4-1320 / (JAE.WAO.015/2561)	Technology Promotion Association (Thailand-Japan)	23TM249	15 Feb 23	14 Feb 24	-
9	BOD Incubator		Arco	UR-1320 / (JAE.WAO.018/2551)	Technology Promotion Association (Thailand-Japan)	23TM375	12 Apr 23	10 Apr 24	-
10	Incubator	FECAL COLIFORM BACTERIA COLIFORM BACTERIA (TCB)	Memmert	IPP 260 / V615.0187	Technology Promotion Association (Thailand-Japan)	23TM378	12 Apr 23	10 Apr 24	-
11	Incubator		Memmert	IPP 260 / V618.0033	Technology Promotion Association (Thailand-Japan)	23TM729	27 Apr 23	25 Apr 24	-

เอกสารไม่ควบคุม

บริษัท ชูโนเค็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด
ห้องปฏิบัติการวิเคราะห์มาตรฐาน ISO/IEC 17025

Page 1/2

List Certificate of Laboratory Instrument

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remarks
Laboratory Instrument for Water Quality Analysis									
12	Water Bath	FECAL COLIFORM BACTERIA COLIFORM BACTERIA (TCB)	Memmert	WNE 14 / L416.0606	Technology Promotion Association (Thailand-Japan)	23TM193	15 Feb 23	14 Feb 24	-
13	Water Bath		Memmert	WNE 14 / L416.0612	Technology Promotion Association (Thailand-Japan)	23TM194	15 Feb 23	14 Feb 24	-
14	Auto Clave		ALP	CL-40L / 808763	Technology Promotion Association (Thailand-Japan)	23TM763	27 Apr 23	25 Apr 24	-
15	Auto Clave		ALP	CL-40L / 810010	DKSH (Thailand) Ltd.	C11230106	9 Jun 23	7 Jun 24	-
16	Analytical Balance		OHAUS	PX623 / C236754745	DKSH (Thailand) Ltd.	C01223732	9 Dec 22	8 Dec 23	-

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

เอกสารไม่ควบคุม

บริษัท ยูโนเต็ด แอนนาลิสต์ แอนด์ เอ็นจิเนียริง คอนซัลแตนท์ จำกัด
ห้องปฏิบัติการวิเคราะห์ทางพลาสมา ISO/IEC 17025

Page 2/2

Calibration Certificate

Certificate No.: 2301846-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Sol Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: SevenEasy TM S20 pH
Serial No.: 1231155210
ID No.: UAE.WAT.0102553
Order No.: 2301846
Operation No.: 2301846-001
Date of Receipt: 17 February 2023
Date of Calibration: 24 February 2023

Calibrated by: Mr. Watsop Boonkong
Scientist
Approved by: N. Nijphad
(Mr. Nijphad Nijphad)
Specialist, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 24 February 2023

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

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

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

Calibration Report

Certificate No.: 2301846-001-01
Equipment: pH Meter
Resolution: 0.01 pH
Manufacturer: Mettler Toledo
Model: SevenEasy TM S20 pH
Serial No.: 1231155210
ID No.: UAE.WAT.0102553
Type: Bench top

Date of Calibration: 24 February 2023 Page 2 of 3

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: 25.1 ± 1.5 °C Relative Humidity: 50 ± 5 %
Condition of Equipment: Good Condition

Condition of this Results of Calibration

1 Calibration Method: 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

Instrument	Serial / ID No.	Manufacturer	Certificate No.	Due Date
2.1 DC Voltage Calibrator	2708007	Fuke	22E1909	11 June 2023
2.2 Digital Thermometer	2109007	Fuke	CC 950777-01	30 October 2023
2.3 Thermo-Hygro Meter	N/A 879180718	Hi-Meter	DA22-0485	09 April 2023
Certified Reference Material				
Lot No.	Manufacturer	Ref. No.	Expiry Date	
2.4 pH buffer 4.008 (Primary pH buffer Solution)	832608	CPAchem	PH018 L3	8 August 2023
2.5 pH buffer 6.860 (Primary pH buffer Solution)	832607	CPAchem	PH011 L3	8 August 2024
2.6 pH buffer 10.01 (Primary pH buffer Solution)	832608	CPAchem	PH020 L3	8 August 2023
2.7 pH buffer 7.00 (Standard pH buffer Solution)	832610	CPAchem	PH107 L5	8 August 2023

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

3.1 Instruments No 2.1	through	NIST-17025 Laboratory Accreditation of Calibration No 0008
3.2 Instruments No 2.2	through	NIST-17025 Laboratory Accreditation of Calibration No 0001
3.3 Instruments No 2.3	through	NIST-17025 Laboratory Accreditation of Calibration No 0292
3.4 Certified Reference Material No. 2.4 to 2.8	traceable to	Primary measurement method: Standard cell using Standard Solution Thermometer, barometer and microbalance. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17024 and ISO/IEC 17025
3.5 Certified Reference Material No 2.7	traceable to	BAM Ref: 14-27 Lot# 04 08 2021, BAM Ref: 14-28 Lot# 28 05 2021, BAM Ref: 14-27 Lot# 04 08 2021, BAM Ref: 14-28 Lot# 28 05 2021, the Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17024 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.

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

N. Nijphad

Calibration Report

Certificate No.: 2301846-001-01
Equipment: pH Meter
Resolution: 0.01 pH
Manufacturer: Mettler Toledo
Model: SevenEasy TM S20 pH
Serial No.: 1231155210
ID No.: UAE.WAT.0102553
Type: Bench top

Date of Calibration: 24 February 2023 Page 3 of 3

Calibration Results:

1 Calibration of pH Meter: Manual Temperature Compensation at 25 °C

Standard pH	DC Voltage Standard (mV)	Average Indicator Reading (mV)	Uncertainty (mV)	Coverage Factor
0	414.120	414	0.05	2.00
2	285.814	286	0.04	2.00
4	177.464	178	0.04	2.00
6	68.190	69	0.04	2.00
7	0.000	0	0.04	2.00
8	-98.158	-99	0.04	2.00
10	-177.460	-177	0.04	2.00
12	-290.811	-290	0.04	2.00
14	-414.117	-414	0.04	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 Electrode
Serial No.: 9C18311
ID No.: N/A

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

Certified Value (pH)	Average Indicator Reading (pH)	Relative Slope (%)	Uncertainty (pH)	Coverage Factor
4.008	4.01	106	0.0011	2.00
6.865	6.86	19	0.0013	2.00
10.01	10.01	100	0.0009	2.00
6.865	6.90	105	0.0002	2.00

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

เอกสารไมควบคุม

ภาคผนวก ข-2

Calibration Report

Certificate No.: 2301846-001-01
Equipment: Digital Thermometer with RTD
Resolution: 0.1 °C
Manufacturer: Mettler Toledo
Model: SevenEasy TM S20 pH
Serial No.: 1231155210
ID No.: UAE.WAT.0102553
Type: Bench top

Date of Calibration: 24 February 2023 Page 4 of 5

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

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).

2 Reference Standard Instrument:

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER	1523	2118154	PSL-T 0673/65	07-Jun-23	T1STR
Platinum Resistance Thermometer (PRT)	5627A	877332			

Support Equipment: - Low Temperature Bath (Micro Bath), Model: 7103, 5/N: A29538/AH65 A85181.

- 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
- Result of Calibration: ☒ Without adjustment ☐ After adjustment

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

เอกสารไมควบคุม

Calibration Report

Certificate No.: 2301846-001-01
Equipment: Digital Thermometer with RTD
Resolution: 0.1 °C Model: SevenEasy TM 520 pH
Serial No.: 1231155210 ID No.: UAE.WAT.010/2553
Manufacturer: Mettler Toledo

Date of Calibration: 24 February 2023 Page 5 of 5

Calibration points: 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 120 mm.
- Description of probe, model: - S/N: -
- Dimension of probe: Diameter 9 mm, Length 120 mm.
- Sheath material: Stainless Steel

UUC* Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.1	15.015	- 0.1	0.18
25.0	25.014	0.0	0.18
35.1	35.016	- 0.1	0.18

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 *****

N. Wipradat

F-CS-012 Revision: 01 Date: 30-04-65

Calibration Certificate

Certificate No.: 2302181-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Usomak 41, Sukhumvit Road,
Bangchak, Pracharong, Bangkok 10260

Page 1 of 2

Equipment: pH Meter

Manufacturer: METTLER TOLEDO

Model: SevenEasy pH

Serial No.: 1230525212

ID No.: UAE.WAS.003/2553

Order No.: 2302181

Operation No.: 2302181-001

Date of Receipt: 14 March 2023

Date of Calibration: 24 March 2023

Calibrated by Mr. Phrasaph Tanjai **Approved by** *N. Wipradat*
Scientist (Mr. Nuttapol Niyosachan)
Specialist, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 24 March 2023

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized as the corresponding national standards laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65

Calibration Report

Certificate No.: 2302181-001-01
Equipment: pH Meter Resolution: 0.01 pH ± 1 mV
Manufacturer: METTLER TOLEDO Model: SevenEasy pH
Serial No.: 1230525212 Type: Bench top
ID No.: UAE.WAS.003/2553

Date of Calibration: 24 March 2023 Page 2 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: (23.4 ± 1.5) °C Relative Humidity: (52 ± 3) %
Condition of Equipment: Good Condition

Condition of this Results of Calibration

1. Calibration Method
In house method : NAC-002 based on direct measurement by using standard voltage calibrator and certified reference material (CRM)

2. References Standards / Certified Reference Material

Instrument	Serial / ID No.	Manufacturer	Certificate No.	Exp. Date
2.1 DC Voltage Calibrator	270007	Fuke	22E1009	17 July 2023
2.2 Digital Thermometer	270007	Fuke	CC-860557-41	30 October 2023
2.3 Thermo-type Meter	NFI-BTH-08 V17	PONPE	TE 805685-01	31 September 2023
Certified Reference Material				
	Lot No.	Manufacturer	Part No.	Expiry Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)	873809	CPAchem	PH218 L3	18 February 2023
2.5 pH buffer 6.860 (Primary pH buffer Solution)	873809	CPAchem	PH217 L3	18 February 2023
2.6 pH buffer 10.01 (Primary pH buffer Solution)	873811	CPAchem	PH220 L3	18 February 2024
2.7 pH buffer 7.00 (Standard pH buffer Solution)	873812	CPAchem	PH107 L3	18 February 2024

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

3.1 Instrument No.2.1	through	NAC-T08-T15 17025 Laboratory Accreditation of Calibration No.008
3.2 Instrument No.2.2	through	NAC-T08-T15 17025 Laboratory Accreditation of Calibration No.008
3.3 Instrument No.2.3	through	NAC-T08-T15 17025 Laboratory Accreditation of Calibration No.008
3.4 Certified Reference Material No. 2.4 to 2.8	traceable to	Primary measurement method - Harned cell using calibrated potentiometer, thermometer, and temperature. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17024 and ISO/IEC 17025
3.5 Certified Reference Material No.2.7	traceable to	BMI Ref H-13 Lot 21 05.2022, BMI Ref H-16 Lot 02.06.2022, BMI Ref H-16 Lot 25.05.2022, BMI Ref H-16 Lot 02.06.2022, the Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17024 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.

F-CS-012 Revision: 01 Date: 30-04-65

N. Wipradat

Calibration Report

Certificate No.: 2302181-001-01
Equipment: pH Meter Resolution: 0.01 pH ± 1 mV
Manufacturer: METTLER TOLEDO Model: SevenEasy pH
Serial No.: 1230525212 Type: Bench top
ID No.: UAE.WAS.003/2553

Date of Calibration: 24 March 2023 Page 3 of 5

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

Measured pH	DC Voltage Standard (mV)	Average Indicator Reading		Uncertainty (mV)	Coverage Factor (k)
		mV	pH		
0	414.130	414	0.00	0.58	2.00
7	295.614	296	0.00	0.58	2.00
4	177.484	178	0.00	0.58	2.00
9	99.186	99	0.00	0.58	2.00
7	0.020	0	7.00	0.58	2.00
8	-20.138	-20	0.00	0.58	2.00
10	-177.486	-177	10.00	0.58	2.00
12	-295.611	-296	12.00	0.58	2.00
14	-414.117	-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 Seals
Serial No.: 1150483 **ID No.:** N/A
Performance of Electrode system (Three-Point Calibration at pH 4, pH 7 and pH 10)

Certified Value @25 °C (pH)	Average Indicator Reading		Relative Slope (%)	Uncertainty (± pH)	Coverage Factor (k)
	pH	mV			
4.008	4.01	987	-	0.0071	2.00
6.865	6.86	22	97.86	0.0075	2.00
10.018	10.01	-100	97.86	0.0066	2.00
6.865	6.86	14	-	0.0093	2.00

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

N. Wipradat

Calibration Report

Certificate No.: 2302181-001-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenEasy pH
Serial No.: 1230525212 ID No.: UAE.WAS.003/2553
Manufacturer: METTLER TOLEDO
Date of Calibration: 24 March 2023

Page 4 of 5

Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature 25 °C ± 1 °C
Relative Humidity 55 % ± 5 %

Condition of this result 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 :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER	1521	AS5997	TE 560039-01	10-Dec-23	NATIONAL FOOD INSTITUTE
Platinum Resistance Thermometer (PRT)	385	509202			

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

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

Calibration Report

Certificate No.: 2302181-001-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C Model: SevenEasy pH
Serial No.: 1230525212 ID No.: UAE.WAS.003/2553
Manufacturer: METTLER TOLEDO
Date of Calibration: 24 March 2023

Page 5 of 5

Calibration point: 15.0, 25.0 and 30.0 °C
Calibration result:

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

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

Note
- UUC* : Unit Under Calibration

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

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



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
514/4 PATTANAKARN ROAD 18, SUKHUMVIT 11, BANGKOK 10250
TEL. 0 2717 7000 FAX. 0 2719 9464



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

Certificate of Calibration

Equipment: Electronic Balance
Manufacturer: Mettler Toledo
Model: XSR205
Serial No.: C210885394
ID No.: UAE.WAO.0102565
Submitted by: United A&O Engineering Consultant Co.,Ltd
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phakhanong,
Bangkok 10260
Location: Balance Room
Received order: 28 April 2023
Calibration Date: 28 April 2023
Ambient Temperature: 15 °C to 40 °C
Relative Humidity: 30 % to 80 %
Calibrated by: Man Pattanapongpiroon
Approved by:
() Pongthip Tanayakul
() Maitoo Butkrua
(x) Suwit Imjai
Issue Date: 2 May 2023

The Uncertainties are for a confidence probability of approximately 95%

The results may not be reproduced unless they are full steps with the given system
Approval of the Head of Corporate Services & Equipment Calibration and Testing Services

เอกสารไม่ควบคุม



Equipment: Electronic Balance
Condition As-Received: Used Item
Reference: 2304-04590C-2
Procedure used:

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

Calibration were conducted using in-house calibration procedure CP-0801 according to direct measurement method against standard weight.

Condition of this result of calibration

1. Reference standard instruments:

Instruments	Model	Serial No.	ID No.	Test report No.	Due date
1) Standard Weight Set (E2)	15884	24053	7DR007	MM-0010-22	20 Jan 2024

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 Uncertainty (± mg)	Coverage Factor (K)
80	79.99992	+0.00008	0.15	2.00
200	199.9995	+0.0005	0.29	2.00

After Adjustment:

1. Determination of the standard deviation of weighing machine

Applied Weight (g)	Standard Deviation of Reading (g)
80	0.00007
200	0.00004

เอกสารไม่ควบคุม

Calibration Certificate

Certificate No.: 2302827-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Sol Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong, Bangkok 10260

Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: XSR204
Serial No.: C117635043
ID No.: UAE.WAS.012/2564
Order No.: 2302827
Operation No.: 2302827-001
Date of Receipt: 10 May 2023
Date of Calibration: 10 May 2023

Calibrated by Mr.Manae Somsak **Approved by** 
Specialist (Mr. Phraphet Tuangjit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 18 May 2023

The uncertainties are for a confidence probability of approximately 95%
This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of the National Food Institute.
F-CS-009 Revision: 01 Date: 20-04-65

Calibration Report

Certificate No.: 2302827-001-01
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: 10 May 2023
Environment Condition: Ambient Temperature: 21.4 ± 0.3 °C Relative Humidity: 43.4 ± 6.9 %
Place of Calibration: Balance room (Weigh Analysis Unit), UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-96-CD) 3N-Point Method based on URAS Lab 14 : 2019
2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 100g	8005587572	TCS	M33040535	8 April 2024
3. This certificate 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:

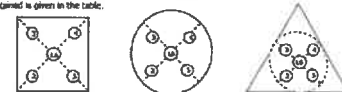
1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
100	0.000013
200	0.000012

2. Off-Center Error

A mass of 100 g was placed and moved to various position on pan.

The balance reading obtained is given in the table:



1	2	3	4	5	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
100.0002	100.0002	100.0002	100.0002	100.0003	100.0002	0.0001

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

Calibration Report

Certificate No.: 2302827-001-01
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: 10 May 2023
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	0.000005	2.00
0.01	0.01000	0.0100	0.0000	0.000005	2.00
0.02	0.02001	0.0200	0.0000	0.000005	2.00
0.05	0.05000	0.0500	0.0000	0.000005	2.00
0.1	0.10001	0.1000	0.0000	0.000005	2.00
0.2	0.20001	0.2000	0.0000	0.000005	2.00
0.5	0.50002	0.5000	0.0000	0.000005	2.00
1	1.00000	1.0000	0.0000	0.000005	2.00
2	2.00002	2.0000	0.0000	0.000005	2.00
3	3.00003	3.0000	0.0000	0.000007	2.00
5	5.00002	5.0000	0.0000	0.000007	2.00
10	10.00001	10.0000	0.0000	0.000008	2.00
20	20.00003	20.0000	0.0000	0.000009	2.00
30	30.00004	30.0000	0.0000	0.000009	2.00
40	40.00007	40.0000	0.0000	0.000011	2.00
50	50.00009	50.0001	0.0000	0.000013	2.00

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

Calibration Report

Certificate No.: 2302827-001-01
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: 10 May 2023
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	50.00003	50.0000	0.0000	0.000011	2.00
55	55.00005	55.0000	0.0000	0.000012	2.00
60	60.00004	60.0000	0.0000	0.000012	2.00
65	65.00005	65.0000	0.0000	0.000013	2.00
70	70.00006	70.0001	-0.0001	0.000013	2.00
75	75.00008	75.0002	-0.0002	0.000013	2.00
80	80.00007	80.0002	-0.0002	0.000014	2.00
85	85.00009	85.0002	-0.0002	0.000014	2.00
90	90.00010	90.0003	-0.0003	0.000015	2.00
100	100.00006	100.0003	-0.0003	0.000016	2.00
120	120.00009	120.0003	-0.0003	0.000018	2.00
150	150.00009	150.0003	-0.0003	0.000021	2.00
200	200.00016	200.0003	-0.0003	0.000028	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 %.

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

Verification Certificate

Certificate No.: 2302413-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Sol Udomsak 41, Sukhumvit Road,
Bangchack, Prathanon, 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.: 2302413
Operation No.: 2302413-001
Date of Receipt: 28 March 2023
Date of Calibration: 30-31 March 2023

Calibrated by: Mr. Nuttapol Niyomchat Specialist
Approved by: (Mr. Phraphat Tusanjit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 10 April 2023

The uncertainty is for a confidence probability of approximately 95 %.
This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.
FCS-009 Revision: 01 Date: 20-04-65

Verification Report

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

Date of Calibration: 30-31 March 2023

Page 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	349704	HYH00000000000000000000	TC22/0044	5-May-2023	N.F. Technical Center Laboratory
Type R		TCR00000000000000000000			

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

UUC* Description

Time of Record : Hour 30 Minute At 380 °C

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

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

Verification Report

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

Date of Calibration: 30-31 March 2023

Page 3 of 4

Reporting of Temperature

Block No.	UUC* Setting (°C)	UUC* Reading (°C)	Stability (±°C)	Standard Thermometer (°C)	Uncertainty (±°C)
1	380	380	0.36	377.24	2.1
2	380	380	0.40	377.28	2.1
3	380	380	1.18	377.82	2.1
4	380	380	0.44	377.19	1.6
5	380	380	0.11	377.30	1.6
6	380	380	0.14	377.90	1.6
7	380	380	1.17	373.85	2.1
8	380	380	0.33	376.96	2.1
9	380	380	0.14	374.18	2.1
10	380	380	0.96	378.56	2.0
11	380	380	1.04	378.24	2.0
12	380	380	0.35	378.06	2.0
13	380	380	0.48	377.05	1.6
14	380	380	0.38	379.19	1.6
15	380	380	0.50	377.48	1.6
16	380	380	0.48	378.33	1.7
17	380	380	0.71	377.60	1.7
18	380	380	0.35	376.77	1.7
19	380	380	0.84	377.06	1.8
20	380	380	0.41	378.58	1.8

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.

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

Verification Report

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

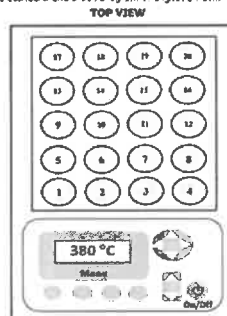
Date of Calibration: 30-31 March 2023

Page 4 of 4

Calibration point: 380 °C

Calibration result: Concluded

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 %.

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

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

Report No.: **8411**

Date: **27/05/23**

Customer: **UAE**

Address: **Bangkok, Thailand**

Instrument: **KJ8100**

Serial: **91829057**

Hours: **Travel To Customer: 07:00 - 15:00, 6 hr**

Start: **07:00**

Finish: **15:00**

Job Type: **Normal**

Application: **Normal**

Special: **Country Visit**

Standard: **Installation**

Training: **House**

Dist/Dist: **PMMA Onboarding**

Internal: **Warranty**

Digital Service: **Sales Support**

PMMA Onboarding: **PMMA Onboarding**

Contract No.: **2302-0297OC-1**

Details of Work / Test

Part No.	Batch	Description	Qty
10051807	18.0.2023	Temp PM 101 101 101 101 101	1

I confirm this report is accurate and complete

Signed FOSS: **[Signature]**

Signed Customer: **[Signature]**

Name: **[Name]**

Name: **[Name]**

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

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

A 0051476



Equipment: BOD incubator
Condition As-Received: Used item
Reference: 2302-0297OC-1

Cert. No.: 23TM249
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	34972A	MYS7013711	22LM93	02 Jul 2023

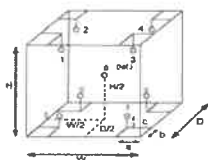
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration: () Without Adjustment

Function of UUC: Temperature Source

Fresh air setting: Not Available



Probe Installation Details:

Dimension of Chamber:

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

Environment during calibration		
	Beginning	Finished
Temp. (°C)	29	31
REL Humid. (%)	83	67
AC Supply (Volt)	220	220

Position	Ref. Std. ID No.
1	22-18RTD-2/1
2	18RTD-2/2
3	18RTD-2/3
4	18RTD-2/4
5	18RTD-2/5
6	18RTD-2/6
7	18RTD-2/7
8	18RTD-2/8
9 (ref.)	18RTD-2/9

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

a 1149512



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
54/PA-TANAKA ROAD NO. 10, BANGKANG, BANGKOK, THAILAND
TEL: 02-070-7400 FAX: 02-070-7401



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

Certificate of Calibration

Equipment: BOD incubator

Manufacturer: Atco

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,
Bangkok, Phrakhanong,
Bangkok 10260

Location: Lab Floor 2

Received Order: 15 February 2023
Calibration Date: 15 February 2023
Ambient Temperature: (26 ± 10) °C
Relative Humidity: (50 ± 30) %

Calibrated by: Preecha Hahib

Approved by: **[Signature]**
Approved Signatory

() Ponthippa Tameyakul
() Malee Sudruae
() Suwit Imjai

Issue Date: 24 February 2023

The Uncertainties are for a confidence probability of approximately 95%

By: **[Signature]**
Approved by: **[Signature]**
Approved Signatory



Equipment: BOD incubator
Condition As-Received: Used item
Reference: 2302-0297OC-1
Result of Calibration: () Without Adjustment
Function of UUC: Temperature Source
Fresh air setting: Not Available

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

Calibration Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
20.0	20.0	19.3	0.32	0.57	1.0	0.80	2

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 %.

-000-

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

a 1149512



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
334 PATTANAKARN ROAD SOI 15, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3020-29 FAX. 0-2719-9484



Cert. No.: 23TM375
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 Sol Udomsuk 41, Sukhumvit Road,
Bangchak, Phraekhanong,
Bangkok 10260
Location : Lab Floor 2
Received Order : 11 April 2023
Calibration Date : 12 April 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Krisda Malee

Approved by :
Approved Signatory

() Ponthipha Tameyakul
() Malee Butkruee
() Sunvit Imjai

Issue Date : 24 April 2023

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

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

เอกสารไม่ควบคุม

A 0053360



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2304-0156OC-2

Cert. No.: 23TM375
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	34972A	MY56003411	22LM165	26 Nov 2023

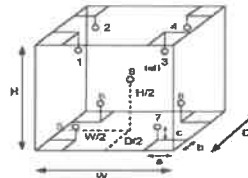
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	28	27
REL.Humid. (%)	42	45
AC Supply (Volt)	219	220



Probe Installation Details :

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

Dimension of Chamber :

D = 0.62 m
W = 1.2 m
H = 1.2 m
Capacity = 0.69 m³

Position :	Ref. Std. ID No.:
1	20RTD-2/1
2	20RTD-2/2
3	20RTD-2/3
4	20RTD-2/4
5	20RTD-2/5
6	20RTD-2/6
7	20RTD-2/7
8	20RTD-2/8
9 (ref.)	20RTD-2/9

เอกสารไม่ควบคุม

a 1158259



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2304-0156OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

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

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor
20.0	20.0	20.0	0.48	0.42	1.2	2

Measured Temperature (°C)										Uncertainty (± °C)
Calibration Point (°C)	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.040	20.170	20.263	20.093	19.749	19.704	19.920	20.191	20.020	0.66

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

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

Temperature uniformity : The maximum difference of measured temperatures at any 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 %.

-000-

เอกสารไม่ควบคุม

a 1158258

ภาคผนวก ข-9



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
334 PATTANAKARN ROAD SOI 15, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3020-29 FAX. 0-2719-9484



Cert. No.: 23TM375
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 Sol Udomsuk 41, Sukhumvit Road,
Bangchak, Phraekhanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 11 April 2023
Calibration Date : 12 April 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Prascha Hlatib

Approved by :
Approved Signatory

() Ponthipha Tameyakul
() Malee Butkruee
() Sunvit Imjai

Issue Date : 24 April 2023

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

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

เอกสารไม่ควบคุม



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

Cert. No.: 23TM378
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 34972A MY49001451 23LM27 25 Feb 2024

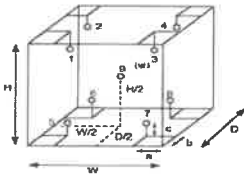
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available



Probe Installation Details :

Dimension of Chamber :
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

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

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

เอกสารไม่ควบลืม



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

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

Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor
35.0	35.0	35.0	0.062	0.53	0.60	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty ± °C
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
35.0	35.092	35.148	34.817	35.149	34.894	35.323	34.773	35.058	34.802	0.30

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

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

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

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

UUC* : Unit Under Calibration

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

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

-000-

เอกสารไม่ควบลืม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
5M-4 PATTANAKARN ROAD SOI 11, SEACON ANG, BANGKOK 10260
TEL : 02-25110001 FAX : 02-25110002



Cert. No.: 23TM729
Page : 1 of 3

Certificate of Calibration

Equipment : Incubator
Manufacturer : Memmert
Model : IPP 280
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 : 27 April 2023
Calibration Date : 27 April 2023
Ambient Temperature : (28 ± 10) °C
Relative Humidity : (50 ± 30) %

Calibrated by : Tawatchai Pama

Approved by :
Approved Signatory

(/) Ponthipha Tameyskul
(/) Matee Butkrusa
(/) Suwit Injai

Issue Date : 11 May 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced either in full, except with the prior written
Approval of the head of Corporate Services J. Equipment Calibration and Testing Services

เอกสารไม่ควบลืม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2304-0481OC-7

Cert. No.: 23TM729
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 34972A MY57013711 22LM93 02 Jul 2023

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

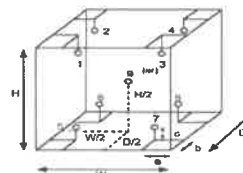
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	20	21
REL.Humid. (%)	72	77
AC Supply (Volt)	230	231



Probe Installation Details :

Dimension of Chamber :
a = 10 cm D = 0.50 m
b = 10 cm W = 0.64 m
c = 10 cm H = 0.80 m
Capacity = 0.26 m³

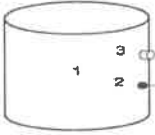
Position :	Ref. Std. ID No.:
1	18-18RTD-01
2	18-18RTD-02
3	18-18RTD-03
4	18-18RTD-04
5	18-18RTD-05
6	18-18RTD-06
7	18-18RTD-07
8	22-18RTD-08
9 (ref.)	18-18RTD-09

เอกสารไม่ควบลืม

Equipment: Autoclave
Condition As-Received: Used Item
Reference: 2304-0461OC-2
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 MY58003411 22LM105 28 Nov 2023
 2. This certificate is valid only to the item calibrated on date and place of calibration.
 3. This certification is traceable to the International System of Unit.
 4. This result of calibration covers laboratory autoclaves for the sterilization of goods and material which could be infected with organisms categorized as Hazard Group 1, 2 and 3**
 (** = Categorization of pathogens according to hazard and categories of containment, second edition, 1990)
 It does not cover autoclaves for use with material infect with organisms in Hazard Group 4, for which complete containment and sterilization of infectious 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	60	220
Finished of Calibration		27	58	220

Position	Description	Ref. Std. ID No.:
1 =	Center of chamber	18-20TC-04
2 =	Temperature sensor	18-20TC-05
3 =	Exhaust port	18-20TC-06

เอกสารไม่ควบคุม
a 1159968

Equipment: Autoclave
Condition As-Received: Used Item
Reference: 2304-0461OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

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

UUC* Setting (°C)	UUC* Reading (°C)	Position	Average* Standard Reading (°C)	Stability (± °C)	Pressure Reading (MPa)	Uncertainty (± °C)	Coverage Factor k
115.0	115.0	1	115.213	0.22	0.08	0.75	2
		2	115.186				
		3	115.260				

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

UUC* Setting (°C)	UUC* Reading (°C)	Position	Average* Standard Reading (°C)	Stability (± °C)	Pressure Reading (MPa)	Uncertainty (± °C)	Coverage Factor k
121.0	121.0	1	121.260	0.29	1.1	0.75	2
		2	121.224				
		3	121.284				

Average* : The average of 30 values in each position.
Stability : One-half of the greatest maximum difference of measured temperature at any one probe.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and excluded uniformity .
 The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

เอกสารไม่ควบคุม
a 1159967



Certificate of Calibration

Equipment: Autoclave
Model: CL-40L
Serial No. (or ID.): 810010
Manufacturer: ALP
Condition: In Condition

Certificate No.: C11230108
Issued Date: 11 June 2023
Job No.: KSPR2308770
Page: 1 of 4

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

Environment Condition: Temperature: 22 °C ± 0.5 °C
 Humidity: 58 %RH ± 4.0 %RH
 Voltage: 229 VAC ± 1.3 VAC

Calibration Place: United Analyst and Engineering Consultant Company Limited. (301 Room)
 3 Soi Udomsuk 41 Sukhumvit Road,
 Bangkok, Prakanong, Bangkok 10260 Thailand.

Calibration By: Mr. Anomthep Phumpho
Calibration Date: 09 June 2023
The Method used: In house method, CAL-WI-18, base on BS 2646 : Part 5
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through Quality reborn Co., Ltd.
 Certificate No. QR23-0086

(Mr. Anomthep Phumpho)
 Person in charge

(Mr. Udon Sricharns)
 Authorized signatory

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

บริษัท เทคโนโลยี จำกัด
 DKSH Technology Limited
 2323 สุขุมวิท กรุงเทพมหานคร 10260
 2323 Sukhumvit Road, Bangkok, Prakanong, Bangkok 10260
 Phone: +66 2023 7700 Email: info@dksh.com Website: www.dksh.com

Delivering Growth - In Asia and Beyond.

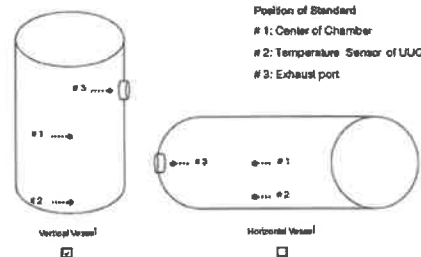
เอกสารไม่ควบคุม
 CAL-FM-C1-1: 12 Sep 2022

ภาคผนวก ข-13



Certificate No.: C11230108

Page: 2 of 4



Standard Installation Locations

Standard Locations (#1): Geometric center of the chamber
Standard Locations (#2): Distance from temperature sensor of UUC 2 (cm.)
Standard Locations (#3): Distance from the wall 5 (cm.)

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

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 Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

บริษัท เทคโนโลยี จำกัด
 DKSH Technology Limited
 2323 สุขุมวิท กรุงเทพมหานคร 10260
 2323 Sukhumvit Road, Bangkok, Prakanong, Bangkok 10260
 Phone: +66 2023 7700 Email: info@dksh.com Website: www.dksh.com

Delivering Growth - In Asia and Beyond.

เอกสารไม่ควบคุม
 CAL-FM-C1-1: 12 Sep 2022

Calibration Results:
Without adjustment

Certificate No.: C11230106

Page: 3 of 4

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 115.0 °C

Locations	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
#1	115.34	0.34	0.35
#2	115.43	0.43	0.35
#3	115.43	0.43	0.35

Temperature Distribution

Temperature			Pressure	Measured Temperature at Spread Locations			Uncertainty
Desired (°C)	Setting (°C)	Indicating (°C)	Indicating Mpa	#1 (°C)	#2 (°C)	#3 (°C)	
115	115	115.0	0.08	115.34	115.43	115.43	0.35

Chamber Characterization

Indicating Temperature (°C)	Indicating Pressure Mpa	Measured Stability (± °C)
115.0	0.08	0.15

Note: * Maximum uncertainty of the each position

Record every 10 seconds after reaching steady state or after one achieved complete cycle.

Without adjustment

Certificate No.: C11230106

Page: 4 of 4

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 121.0 °C

Locations	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
#1	121.34	0.34	0.35
#2	121.40	0.40	0.35
#3	121.26	0.26	0.35

Temperature Distribution

Temperature			Pressure	Measured Temperature at Spread Locations			Uncertainty (± °C)*
Desired (°C)	Setting (°C)	Indicating (°C)	Indicating Mpa	#1 (°C)	#2 (°C)	#3 (°C)	
121	121	121.0	0.12	121.34	121.40	121.26	

Chamber Characterization

Indicating Temperature (°C)	Indicating Pressure Mpa	Measured Stability (± °C)
121.0	0.12	0.07

Note: * Maximum uncertainty of the each position

Record every 10 seconds after reaching steady state or after one achieved complete cycle.

The End of Certificate

DKSH Technology Limited
3535 Sukhumvit Road, Bangkok, Thailand 10260
Phone: +66 2638 7000 Email: info.dksh@dksh.com Website: www.dksh.com/thailand

Delivering Growth - In Asia and Beyond.

เอกสารไม่ควบคุม

CAL-FM-C11-18: 12 Sep 2022

DKSH Technology Limited
3535 Sukhumvit Road, Bangkok, Thailand 10260
Phone: +66 2638 7000 Email: info.dksh@dksh.com Website: www.dksh.com/thailand

Delivering Growth - In Asia and Beyond.

เอกสารไม่ควบคุม

CAL-FM-C11-18: 12 Sep 2022



Certificate of Calibration

Equipment: Balance
Model: PX823
Serial No. (or ID.): CZ38754745
Manufacturer: Ohaus
Condition: New

Certificate No.: C01223732
Issued Date: 09 December 2022
Job No.: KSPR2215578
Page: 1 of 2

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

Environment Condition: Temperature 26 °C ± 0.5 °C
Humidity 53 %RH ± 3.9 %RH

Calibration Place: United Analyst and Engineering Consultant Co., Ltd. (301 Microbiology Room)
3 Sol Udomsuk 41, Sukhumvit Road, Bangkok Sub-District,
Phrakhanong District, Bangkok, THAILAND 10260

Calibration By: Mr. Adisai Maknoi
Calibration Date: 09 December 2022

The Method used: In-house method, CAL-WI-47, based on UKAS Lab 14

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Co., Ltd. Certificate No. C02221765

(Mr. Adisai Maknoi)
Person in charge

(Mr. Runrod Jenkittrachulchai)
Authorized signatory

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

DKSH Technology Limited
3535 Sukhumvit Road, Bangkok, Thailand 10260
Phone: +66 2638 7000 Email: info.dksh@dksh.com Website: www.dksh.com/thailand

Delivering Growth - In Asia and Beyond.

เอกสารไม่ควบคุม

CAL-FM-C01-14: 12 Sep 2022

ภาคผนวก ข-14

Calibration Results:

Certificate No.: C01223732

Page: 2 of 2

Without Adjustment

Eccentric Error: Weight to be 1/3 or 1/2 of Maximum capacity, taken from the center of the pan as a zero reference.

Nominal Test Value		Reference Points (g)				
		A	B	C	D	E
200		-	0.000	0.000	0.000	0.000

Repeatability: Determination of the standard deviation of weighing balance., Readability 0.001 (g)

Nominal test value (g)	Standard Deviation
50	0.0004
500	0.0005

Error of Indication from nominal or conventional mass value., Readability 0.001 (g)

Nominal Value (g)	Conventional Mass (g)	Displayed Value (g)	Error of Indication (g)	Uncertainty (g)	k
1	1.0000	1.000	0.000	0.0010	2.03
5	5.0001	5.000	0.000	0.0010	2.03
10	10.0001	10.000	0.000	0.0010	2.03
20	20.0001	20.000	0.000	0.0010	2.03
50	50.0001	50.000	0.000	0.0010	2.03
100	100.0001	100.000	0.000	0.0011	2.03
200	200.0004	200.000	0.000	0.0011	2.02
300	300.0005	300.000	-0.001	0.0013	2.01
400	400.0008	400.001	0.000	0.0014	2.01
500	500.0003	500.000	0.000	0.0017	2.00
600	600.0004	600.000	0.000	0.0018	2.00

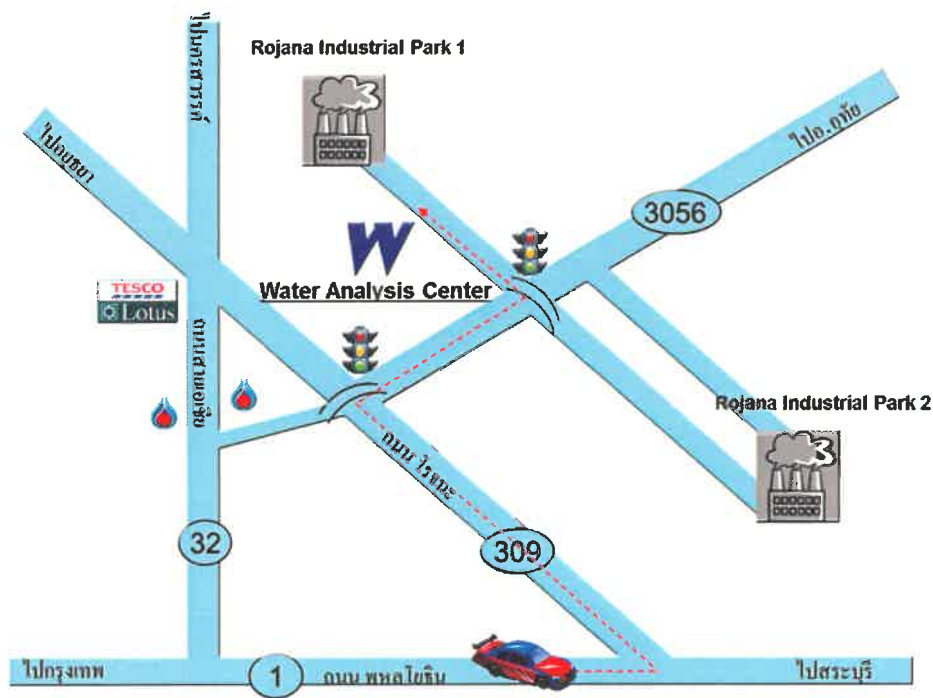
The End of Certificate

DKSH Technology Limited
3535 Sukhumvit Road, Bangkok, Thailand 10260
Phone: +66 2638 7000 Email: info.dksh@dksh.com Website: www.dksh.com/thailand

Delivering Growth - In Asia and Beyond.

เอกสารไม่ควบคุม

CAL-FM-C01-14: 12 Sep 2022



บริษัท ศูนย์วิเคราะห์น้ำ จำกัด

1/94 หมู่ที่ 5 ต.คานหาม อ.อุทัย จ.พระนครศรีอยุธยา 13210

โทรศัพท์ 035-800593, 081-9917119 โทรสาร 035-800594

Email : wac@wacthai.com Website : www.wacthai.com