
เอกสารสอบเทียบเครื่องมือที่ใช้ในการวิเคราะห์

List Certificate of Laboratory Instrument

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
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	2520auto / 91794469	National Food Institute, Ministry of Industry, Thailand	2302413-001-01	30 Mar 23	28 Mar 24	-
7	Distillation Unit (Kjeldahl Method)		FOSS	KT8100/ 91889052	FOSS South East Asia	8411	29 May 23	27 May 24	-
8	BOD Incubator	BIOCHEMICAL OXYGEN DEMAND	Arco	UC4-1320 / (UAE.WAO.015/2561)	Technology Promotion Association (Thailand-Japan)	23TM249	15 Feb 23	14 Feb 24	-
9	BOD Incubator		Arco	UR-1320 / (UAE.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 ยูนิค แอนบาสิส แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด
ห้องปฏิบัติการวิเคราะห์มาตรฐาน ISO/IEC 17025

List Certificate of Laboratory Instrument

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
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

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ห้องปฏิบัติการวิเคราะห์มาตรฐาน ISO/IEC 17025

Calibration Certificate

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

Page 1 of 8

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: SevenEasy TM S20 pH
Serial No.: 1231155210
ID No.: UAE.WAT.010/2553
Order No.: 2301848
Operation No.: 2301848-001
Date of Receipt: 17 February 2023
Date of Calibration: 24 February 2023

Calibrated by Mr. Worapob Sookkong
Scientist
Approved by N. Nigudat
(Mr. Nustaporn Nymcharn)
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 compliance to recognized national standards and to the units of measurement indicated 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.: 2301846-001-01
Equipment: pH Meter
Resolution: 0.01 pH
Manufacturer: Mettler Toledo
Model: SevenEasy TM S20 pH
Serial No.: 1231155210
Type: Bench top
ID No.: UAE.WAT.010/2553

Page 2 of 5

Date of Calibration: 24 February 2023
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 Standard: 1. Certified Reference Material

Instrument	Serial / ID No.	Manufacturer	Certificate No.	Due Date
2.1 DC Voltage Calibrator	270507	Fuke	225 1999	17 June 2023
2.2 Digital Thermometer	270507	Fuke	CC 950577-01	30 October 2023
2.3 Thermocouple Meter	WAT 010/2553	QANPE 490	CR22-000A	26 April 2023
Certified Reference Material				
Lot No.	Manufacturer	Ref. No.	Expiry Date	
2.4 pH buffer 4.008 (Primary pH buffer Solution)	832808	CPAchem	PH218.LS	8 August 2024
2.5 pH buffer 8.865 (Primary pH buffer Solution)	832807	CPAchem	PH217.LS	8 August 2024
2.6 pH buffer 10.01 (Primary pH buffer Solution)	832809	CPAchem	PH220.LS	8 August 2024
2.7 pH buffer 7.00 (Standard pH buffer Solution)	832810	CPAchem	PH207.LS	8 August 2024

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

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.0061
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: Formed soil using calibrated thermometer, sensor and reagent. The Standard Solution preparation and certified by CPAchem Ltd. is accredited to ISO 17034 and ISO 17025.
3.5 Certified Reference Material No. 2.7	traceable to	ISO 17025:2017 (L01) 04.08.2021, ISO 17025:2017 (L02) 28.08.2021, ISO 17025:2017 (L03) 04.08.2021, ISO 17025:2017 (L04) 28.08.2021, ISO 17025:2017 (L05) 04.08.2021, ISO 17025:2017 (L06) 28.08.2021, ISO 17025:2017 (L07) 04.08.2021, ISO 17025:2017 (L08) 28.08.2021, ISO 17025:2017 (L09) 04.08.2021, ISO 17025:2017 (L10) 28.08.2021, ISO 17025:2017 (L11) 04.08.2021, ISO 17025:2017 (L12) 28.08.2021, ISO 17025:2017 (L13) 04.08.2021, ISO 17025:2017 (L14) 28.08.2021, ISO 17025:2017 (L15) 04.08.2021, ISO 17025:2017 (L16) 28.08.2021, ISO 17025:2017 (L17) 04.08.2021, ISO 17025:2017 (L18) 28.08.2021, ISO 17025:2017 (L19) 04.08.2021, ISO 17025:2017 (L20) 28.08.2021, ISO 17025:2017 (L21) 04.08.2021, ISO 17025:2017 (L22) 28.08.2021, ISO 17025:2017 (L23) 04.08.2021, ISO 17025:2017 (L24) 28.08.2021, ISO 17025:2017 (L25) 04.08.2021, ISO 17025:2017 (L26) 28.08.2021, ISO 17025:2017 (L27) 04.08.2021, ISO 17025:2017 (L28) 28.08.2021, ISO 17025:2017 (L29) 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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 3 of 5

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

- The probe was immersed in liquid bath or dry bath to a minimum depth of 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	0.11
25.0	25.014	0.0	0.11
35.1	35.016	- 0.1	0.11

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 -----

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

Calibration Certificate

Certificate No.: 2302181-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Set Udomsak 41, Sukhumvit Road,
Bangchek, Prakhong, Bangkok 10290

Page 1 of 3

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.Pharaphat Tungth
Scientist
Approved by: N. Niyomchait
(Mr.Nutapong Niyomchait)
Specialist, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 24 March 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 capability to recognized national standards and to the units of measurement related to 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 3

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 Calibration of Reference

1. Calibration Method
In house method : WCC-062 based on direct measurement by using standard voltage calibrator and certified reference material (CRM)
2. Reference Standards / Certified Reference Material

Serial No.	Lot No.	Manufacturer	Certificate No.	Exp. Date
2.1 DC Voltage Calibrator	2108007	Fyha	21E1899	17 June 2023
2.2 Digital Thermometer	2108007	Fyha	CO-865567-01	30 October 2023
2.3 Thermo-Hygro Meter	NFI.BTH-00317	PCMPZ	TE-855655-01	21 September 2023

Lot No.	Manufacturer	Exp. Date
2.4 pH buffer 4.000 (Primary pH buffer Solution)	CPAchem	PH418 L5 18 February 2025
2.5 pH buffer 6.863 (Primary pH buffer Solution)	CPAchem	PH617 L5 18 February 2025
2.6 pH buffer 10.01 (Primary pH buffer Solution)	CPAchem	PH620 L5 18 February 2024
2.7 pH buffer 7.00 (Standard pH buffer Solution)	CPAchem	PH107 L5 18 February 2024
3. This calibration is traceable to The International System of Unit (SI Unit)
 - 3.1 Instrument No.3.1 through NISC-TB178 17025 Laboratory Accreditation of Calibration No.006
 - 3.2 Instrument No.2.2 through NISC-TB178 17025 Laboratory Accreditation of Calibration No.0061
 - 3.3 Instrument No.2.3 through NISC-TB178 17025 Laboratory Accreditation of Calibration No.0061
 - 3.4 Certified Reference Material No. 2.4 to 2.6 traceable to Primary measurement method: Method not using calibrated thermometer, burette, and nanopipette. The Standard Solution preparation and certified by CPAchem Ltd is according to ISO 17034 and ISO/IEC 17025
 - 3.5 Certified Reference Material No.2.7 traceable to BHM Ref: H-15 Lot# 28.06.2022, BHM Ref: H-16 Lot# 02.06.2022, BHM Ref: H-15 Lot# 25.06.2022, BHM Ref: H-16 Lot# 02.06.2022, the Standard Solution preparation and certified by CPAchem Ltd is according to ISO 17034 and ISO/IEC 17025
4. This certificate was certified only for the instrument was calibrated.
5. This result of calibration was found accurate as shown on date and place of calibration only.

F-CS-012 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 3 of 3

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		
6	414.120	414	6.00	0.58	2.00
2	289.614	290	2.00	0.58	2.00
4	177.454	178	4.00	0.58	2.00
8	58.180	59	8.00	0.58	2.00
7	0.000	0	7.00	0.58	2.00
8	-50.156	-50	8.00	0.58	2.00
10	-177.480	-177	10.00	0.58	2.00
12	-295.615	-296	12.00	0.58	2.00
14	-414.137	-414	14.00	0.58	2.00

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

Equipment: pH Electrode **Type:** Combined Electrode
Manufacturer: METTLER TOLEDO **Model:** InLab Solids
Serial No.: 1158883 **Lot 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	187	-	0.0071	2.00
6.865	6.88	23	97.88	0.0073	2.00
10.010	10.01	-190	97.66	0.0066	2.00
6.865	6.90	14		0.0063	2.00

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



FOUNDATION FOR INDUSTRIAL DEVELOPMENT
Food Institute Laboratory Service Center



MAC
CALIBRATION 0001

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 Conditions: Ambient Temperature 25 °C ± 1 °C
Relative Humidity 55 % ± 5 %

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 :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER	1521	A85997	TE 660039-01	10-Dec-23	NATIONAL FOOD INSTITUTE
Platinum Resistance Thermometer (PRT)	385	509201			

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

N. Nipon



FOUNDATION FOR INDUSTRIAL DEVELOPMENT
Food Institute Laboratory Service Center



MAC
CALIBRATION 0001

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 %.

End

N. Nipon

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



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICE CENTER EQUIPMENT CALIBRATION AND TESTING SERVICES
54-4 PATTANAKARN ROAD SOI 18, SUKHUMVIT, SUKHUMVIT BANGKOK 10110
TEL: 0-2717-3888/9 FAX: 0-2718-4444



MAC
CALIBRATION 0001

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

Certificate of Calibration

Equipment: Electronic Balance
Manufacturer: Mettler Toledo
Model: XSR205
Serial No.: C210685394
ID No.: UAE.WAO.01012585
Submitted by: United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phakthanong,
Bangkok 10260
Location: Balance Room
Received order: 26 April 2023
Calibration Date: 26 April 2023
Ambient Temperature: 15 °C to 40 °C
Relative Humidity: 30 % to 90 %
Calibrated by: Man Pattanapongpaiboon
Approved by:
() Poomthippa Tamayakul
() Maloo Buikruas
(x) Suwit Imjai
Issue Date: 2 May 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written

Approval of the head of Corporate Services : Equipment Calibration and Testing Service

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	70RC007	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 229 g Resolution 0.0001 g

Before Adjustment :

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
80	78.99992	+0.00008	0.15	2.00
200	199.9995	+0.0005	0.29	2.00

After Adjustment :

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

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

เอกสารไม่ควบคุม

Calibration Certificate

Certificate No.: 2302827-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udonsuk 41, Sukhumvit Road,
Bangchak, Phra Khanong, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: XSR204

Serial No.: C117635043

ID No.: UAE.WAS.012/2564

Order No.: 2302827

Operation No.: 2302827-001

Date of Receipt: 10 May 2023

Date of Calibration: 10 May 2023

Calibrated by: Mr. Manee Somsak
Specialist

Approved by: 
(Mr. Phraphat Tuntit)
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-079 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

Page 2 of 4

Date of Calibration: 10 May 2023

Environment Condition: Ambient Temperature: 23.4 ± 0.2 °C Relative Humidity: 43.4 ± 0.9 %

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

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-04-001 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 1mg to 100g 8505587572 TCS M230405315 8 April 2024

Instrument **Model** **Serial No.** **Calibrated By** **Certificate No.** **Due Date**

Thermo-Hygro Meter 500-413 NPL8TH 016423 Quality Accrom Q023-0469 21 February 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:

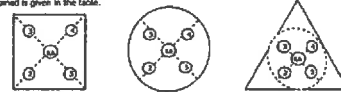
1. Repeatability of Reading:

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

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	100.0001	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

Page 3 of 4

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	Standard Value	Average Reading	Correction	Uncertainty	Coverage Factor
(g)	(g)	(g)	(g)	(g)	k
0.0001	0.00005	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	0.000006	2.00
2	2.00002	2.0000	0.0000	0.000006	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	0.00001	2.00
45	45.00009	45.0000	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

Page 4 of 4

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	Standard Value	Average Reading	Correction	Uncertainty	Coverage Factor
(g)	(g)	(g)	(g)	(g)	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	70.0000	0.0000	0.000013	2.00
75	75.00008	75.0000	0.0000	0.000013	2.00
80	80.00007	80.0000	0.0000	0.000014	2.00
85	85.00009	85.0000	0.0000	0.000014	2.00
90	90.00010	90.0000	0.0000	0.000015	2.00
100	100.00006	100.0000	0.0000	0.000016	2.00
120	120.00009	120.0000	0.0000	0.000018	2.00
150	150.00009	150.0000	0.0000	0.000021	2.00
200	200.00016	200.0000	0.0000	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 Soi Udomauk 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.: 2302413
Operation No.: 2302413-001
Date of Receipt: 28 March 2023
Date of Calibration: 30-31 March 2023

Calibrated by Mr. Nuttapol Niyemchat
Specialist

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

Date of Issue: 10 April 2023

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

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

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

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:

- 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	8744806526/79741194463	TC22/0044	5-May-2023	N.F.I. Technical Center Laboratory
	Type R	TC2191-160 / CCF191-160			

- 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

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	0.96	377.74	2.1
2	380	380	0.49	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	376.56	2.0
11	380	380	1.04	378.34	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:

Continued

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



Sensor Installation Location

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



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
334/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2117-0001-29 FAX. 0-2117-0454



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 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phra Khanong,
Bangkok 10260
Location : Lab Floor 2
Received Order : 11 April 2023
Calibration Date : 12 April 2023
Ambient Temperature : $(28 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$
Calibrated by : Krisda Malee
Approved by :
() Pornthippa Tameyakul
(x) Malee Butkrusee
() Suwit Imjai
Issue Date : 24 April 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced without prior written consent of the provider.
Approval of the head of the provider: T. Engineering, 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	MY99003411	22LM165	26 Nov 2023

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

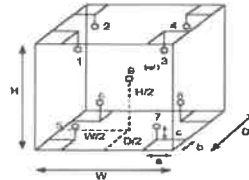
3. This certification is traceable to the International System of Unit.

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 = 0.88 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	
20.0	20.040	20.170	20.263	20.093	19.749	19.704	19.620	20.191	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%.

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เอกสารไม่ควบคุม

A 1158258

ภาคผนวก ข-9



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
334/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2117-0001-29 FAX. 0-2117-0454



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 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phra Khanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 11 April 2023
Calibration Date : 12 April 2023
Ambient Temperature : $(28 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$
Calibrated by : Preecha Hahib
Approved by :
() Pornthippa Tameyakul
(x) Malee Butkrusee
() Suwit Imjai
Issue Date : 24 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of the provider: T. Engineering, 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 MY99001451 23LM27 25 Feb 2024

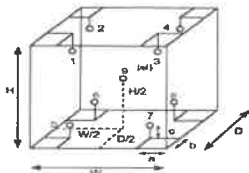
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available



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

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

Probe Installation Details : Dimension of Chamber :
a = 50 cm D = 0.50 m
b = 50 cm W = 0.84 m
c = 50 cm H = 0.80 m
Capacity = 0.26 m³

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2304-0155OC-1
Cert. No.: 23TM378
Page : 3 of 3

Result of Calibration :-
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 k
35.0	35.0	35.0	0.052	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 %

-080-

เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
504 PATTANAKARN ROAD SOI 11, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2517-9100 FAX 0-2519-4444



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 : Unilab Analyst and Engineering Consultant Co.,Ltd
3 Soi Udorn Suk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory (302)
Received Order : 27 April 2023
Calibration Date : 27 April 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Tewatchai Pema

Approved by :
Approved Signatory

() Ponnthipha Temeyakul
() Mahee Butkruea
() Suwit Injai

Issue Date : 11 May 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced more 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 : 2304-0461OC-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.

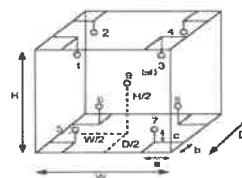
3. This certification is traceable to the International System of Unit.

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 = 0.84 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

เอกสารไม่ควบคุม

Equipment: Incubator
Condition As-Received: Used Item
Reference: 2304-0461OC-7
Result of Calibration: (") Without Adjustment
Function of UUC: Temperature Source
Fresh air setting: Close

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

Calibration Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor
22.0	22.0	22.0	0.058	0.11	0.19	2
44.0	44.0	44.0	0.066	0.50	0.87	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
22.0	22.009	22.038	21.971	22.005	22.004	22.009	21.941	21.959	22.022	0.30
44.0	44.393	44.447	44.028	44.204	43.899	43.895	43.837	43.923	44.085	0.30

Average: The average of 30 values in each position.
Temperature stability: One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity: The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation: The Difference of the maximum and minimum measured temperatures throughout observation.
UUC: Unit Under Calibration
Note: The reported uncertainty of measurement was included stability and excluded uniformity.
 The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k , providing a level of confidence of approximately 95 %.

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เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
 CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000



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

Certificate of Calibration

Equipment: Water Bath
Manufacturer: Memmert
Model: WNE 14
Serial No.: L416 0606
ID No.: UAE-MC-002/2560
Submitted by: United Analyst and Engineering Consultant Co., Ltd.
 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangkok, Phrakhanong,
 Bangkok 10260
Location: Microbiology Laboratory
Received Order: 15 February 2023
Calibration Date: 15 February 2023
Ambient Temperature: (28 ± 10) °C
Relative Humidity: (50 ± 30) %
Calibrated by: Suwit Injai

Approved by:
 () Pomsipha Temeyakul
 (/) Malee Bulkras
Approved Signatory

Issue Date: 24 February 2023

The Uncertainties are for a confidence probability of approximately 95 %

This document was prepared by the Calibration and Testing Services
 of the Technology Promotion Association (Thailand-Japan)

เอกสารไม่ควบคุม

Equipment: Water Bath
Condition As-Received: Used Item
Reference: 2302-0285OC-2
Procedure Used: Calibration were conducted using in-house calibration procedure CP-OT04 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).
 The temperature scale used was based on ITS-90.
Condition of this result of calibration:
 1. Reference standard Instrument:-
 Instrument Model Serial No. Cert. No. Due Date
 1) Data Acquisition 34972A MY59003411 22LM165 28 Nov 2023
 2. This certificate is valid only to the item calibrated on date and place of calibration.
 3. This certification is traceable to the International System of Unit.
Result of Calibration: (") Without Adjustment
Function of UUC: Temperature Source

Cert. No.: 23TM193
Page: 2 of 3

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	22	65	231
Finished of Calibration	23	61	231

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

Front

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เอกสารไม่ควบคุม



Equipment: Water Bath
Condition As-Received: Used Item
Reference: 2302-0285OC-2
Result of Calibration: (") Without Adjustment
Function of UUC: Temperature Source

Cert. No.: 23TM193
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	44.453	44.437	44.428	44.477	44.459

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor
44.5	0.078	0.038	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

เอกสารไม่ควบคุม



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

Certificate of Calibration

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 14
Serial No. : L416 0612
ID No. : UAE.MIC.003/2560
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phraekhanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 15 February 2023
Calibration Date : 15 February 2023
Ambient Temperature : (28 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Sunvit Imjai
Approved by :
() Ponthippa Tamoyakul
(✓) Malee Bulkrusa
Issue Date : 24 February 2023

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2302-0295OC-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 34872A MY59003411 22LM165 28 Nov 2023
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.
Result of Calibration :- () Without Adjustment
Function of UUC* : Temperature Source

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

Equipment: Autoclave
Condition As-Received: Used Item
Reference: 2304-04810C-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 NY59003411 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.

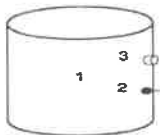
4. This result of calibration covers laboratory autoclaves for the sterilization of goods and material which could be infected with organisms categorized as Hazard Group 1, 2 and 3**

** = Categorization of pathogens according to hazard and categories of containment, second edition, 1990

It does not cover autoclaves for use with material infected 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	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

เอกสารไมควคุม
a 1159968

Equipment: Autoclave
Condition As-Received: Used Item
Reference: 2304-04810C-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	115.166				
		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 %.

เอกสารไมควคุม
a 1159967



Certificate of Calibration

Certificate No.: C11230106

Page: 2 of 4

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

Certificate No.: C11230106
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 ± 0.8 °C
 Humidity: 68 %RH ± 4.0 %RH
 Voltage: 228 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. Amornthep Phumtho
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. Amornthep Phumtho)
 Person in charge

(Mr. Udon Srichana)
 Authorized signatory

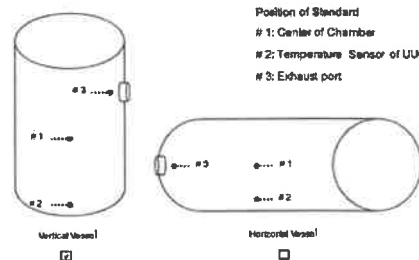
This certificate is issued to the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
 The measurement uncertainty stated in the expected uncertainty 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 อสมท จำกัด (มหาชน)
 DKSH Technology Limited
 2323 สุขุมวิท 41 ถนนสุขุมวิท กรุงเทพมหานคร 10260
 2323 Sukhumvit Road, Bangkok, Prakanong, Bangkok 10260
 Phone: +66 209 7100 Email: info@dksh.com Website: www.dksh.com

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ภาคผนวก ข-13



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.

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Calibration Results:

Without adjustment

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 (± °C)
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

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	0.35

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

บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 สุขุมวิท ถนนสุขุมวิท แขวงคลองตัน เขตคลองเตย กรุงเทพมหานคร 10110
Phone: +66 2638 7000 Email: info.asia@dksh.com Website: www.dksh.com/asia-thailand

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บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 สุขุมวิท ถนนสุขุมวิท แขวงคลองตัน เขตคลองเตย กรุงเทพมหานคร 10110
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CAL-FM-C11-15: 12 Sep 2022



Certificate of Calibration

Equipment: Balance
Model: PX623
Serial No. (or ID.): C236754745
Manufacturer: Ohaus
Condition: New

Certificate No.: C01223732
Issued Date: 09 December 2022
Job No.: KSPR2216576
Page: 1 of 2

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

Calibration By: Mr. Adisai Malnoi
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

Adi

(Mr. Adisai Malnoi)
Person in charge

Runrod

(Mr. Runrod Jenkittrakulchai)
Authorized signatory

This certificate is issued in the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated in this report 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 values may be affected by variations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

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DKSH Technology Limited
2533 สุขุมวิท ถนนสุขุมวิท แขวงคลองตัน เขตคลองเตย กรุงเทพมหานคร 10110
Phone: +66 2638 7000 Email: info.asia@dksh.com Website: www.dksh.com/asia-thailand

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ภาคผนวก ข-14

Calibration Results:

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	0.0019	2.00

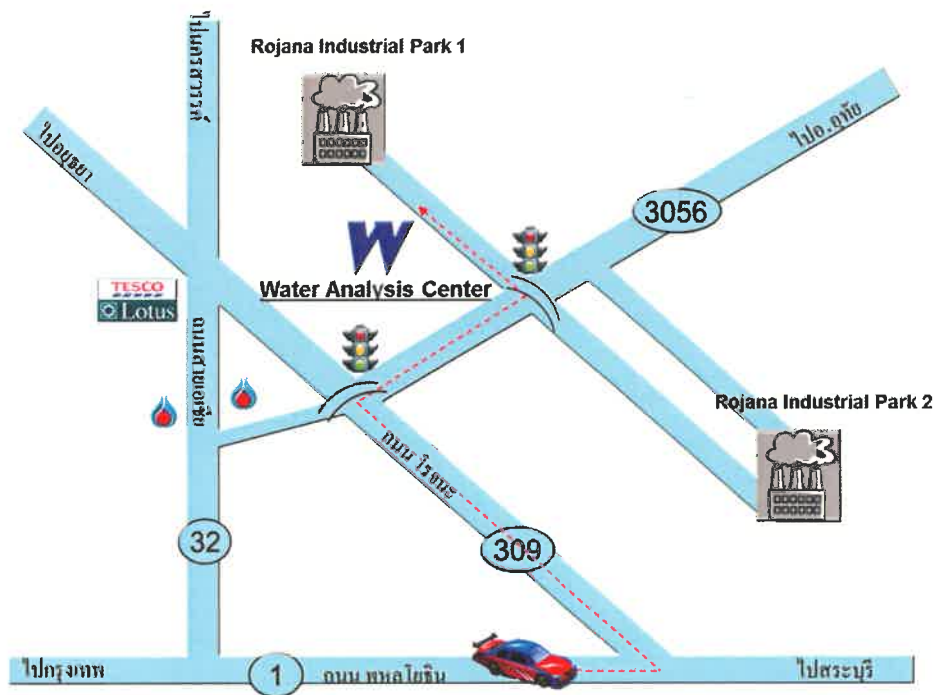
The End of Certificate

บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 สุขุมวิท ถนนสุขุมวิท แขวงคลองตัน เขตคลองเตย กรุงเทพมหานคร 10110
Phone: +66 2638 7000 Email: info.asia@dksh.com Website: www.dksh.com/asia-thailand

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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