

ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือ

Certificate of Calibration

Certificate No. : 68-400473-3

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatesukhakhon 25, Pracha-Utid Rd., Thungkru Bangkok 10140 Thailand

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : Biobase

Model : Biochemistry Incubator

Range : 0 °C to 65 °C

Resolution : 0.1 °C

Serial No. : KYP1502202003

ID No. : N/A

Environment : On site calibration was carried out at the Laboratory, M Green Group Co., Ltd.

Ambient Temperature : (27.0 to 28.0) °C

Relative Humidity : (40 to 50) %

Line Voltage : (226.0 to 230.0) V

Date of Received : 28 August 2025

Date of Calibration : 28 August 2025

Date of Issue : 30 August 2025

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Digital Thermometer with RTD Probe

ID No. Cert.No. Due Date Traceability

400046 & 400047 68-400410-2 26 Jan 2026 National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400473-3

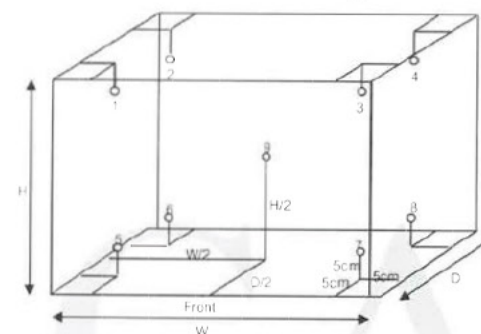
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.45 m

D = 0.41 m

H = 0.85 m

Capacity = 0.16 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
20.0	20.4	20.4	20.39	20.30	20.03	20.12	20.05	20.07	19.68	19.95	20.07	0.88

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.4	20.4	0.86	0.48	1.46

Remark The uncertainty is not combine uniformity of the air chamber

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

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

- o0o -

(Permpon Chanpu)
Supervisor



Certificate of Calibration

Certificate No. : 68-420073-1

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatesukhakhen 25, Pracha Utid Rd., Thungkru Bangkok 10140 Thailand

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A

pH

Resolution : 0.01 pH

Serial No. : 2884323

ID No. : N/A

Electrode

Model : ECFC7252101B

Serial No. : 01X099320

Environment : On site calibration was carried out at the Laboratory, M Green Group Co., Ltd.

Ambient Temperature : (24.0 to 25.0) °C

Relative Humidity : (40 to 45) %

Date of Received : 28 August 2025

Date of Calibration : 28 August 2025

Date of Issue : 30 August 2025

Calibrated by : Pempon Chanpu

Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00231/68	20 Aug 2027	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.007	61314276	1081108	28 Feb 2027	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.965	61318175	1081110	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61325043	1081109	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

(Pempon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-420073-1

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Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (± mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	177.4	0.1	0.12
	0.0000	7	7.00	0.0	0.0	0.086
	-177.4800	10	10.00	-177.5	0.0	0.12

Function : pH meter with electrode

Performing a three - buffer standard curve using buffer nominal pH (4,7,10)

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.007	4.01	0.00	0.0097
	6.965	7.00	-0.03	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%

- o0o -



Certificate of Calibration

Certificate No. : 68-400416-1

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.
188/46 Wisatsukhakhon 25, Pracha-Uttd Rd., Thungkru Bangkok 10140 Thailand

Equipment : Temperature Indicator with Thermistor Probe

Temperature Indicator

Manufacturer : Eutech Model : pH 700

Range : N/A °C Resolution : 0.1 °C

Serial No. : 2884323 ID No. : N/A

Thermistor probe

Model : N/A Sheath Material : Stainless

Diameter : 3 mm. Length : 115 mm.

Serial No. : PHSTEMB01P 279 ID No. : N/A

Environment : On site calibration was carried out at the Laboratory, M Green Group Co., Ltd.

Ambient Temperature : (24.5 to 25.0) °C

Relative Humidity : (40 to 45) %

Line Voltage : (220.0 to 223.0) VAC

Date of Received : 28 August 2025

Date of Calibration : 28 August 2025

Date of Issue : 30 August 2025

Calibrated by : Permpon Chanpu

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4003
by compared with PRT in the liquid bath at the constant controlled temperature.

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400016	TT-1019-25	13 May 2027	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400033	24E633	21 Feb 2026	National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400416-1

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Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
115	25.002	24.9	0.1	0.19

Remark

UUC : Unit Under Calibration

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$,
providing a level of confidence of approximately 95%

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CERTIFICATE No : 25T0975
REFERENCE No : 76012-7

Certificate of Calibration

EQUIPMENT : AUTOCLAVE
MANUFACTURER : HIRAYAMA
MODEL : HVE-50
SERIAL No : 30612085166
No : EQL-155
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO.,LTD.
30,32 RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 04-Feb-25

APPROVED BY :
PONGSAK J.

ISSUED DATE : 12-Feb-25

RECEIVED DATE : 04-Feb-25

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.



Calibration Report

EQUIPMENT : AUTOCLAVE
MANUFACTURER : HIRAYAMA
ID NUMBER : EQL-155
RECEIVED DATE : 04-Feb-25
AMBIENT TEMPERATURE : 29° C ± 1° C
MODEL : HVE 50
SERIAL NUMBER : 30612085166
CALIBRATION DATE : 04-Feb-25
RELATIVE HUMIDITY : 53 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

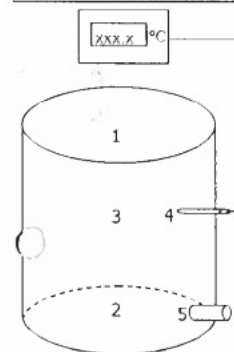
1. THIS INSTRUMENT WAS CALIBRATED BASED ON BS 2646-1 2021 BY COMPARISON WITH CALIBRATED RTD DATA LOGGERS UNDER NO LOAD CONDITION. THE SENSORS WERE PLACED ON FIVE LOCATIONS AS SHOWN IN THE PICTURE. THE SENSOR ON LOCATION 1 AND 2 WERE PLACED IN THE UPPER HALF AND LOWER HALF OF CHAMBER FREE SPACE RESPECTIVELY. THE THIRD SENSOR WAS PLACED WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE INSTRUMENT CHAMBER. SENSOR NUMBER 4 WAS ATTACHED TO THE LOAD TEMPERATURE PROBE, IF FITTED, WITHIN 15 mm OF ITS TIP. SENSOR NUMBER 5 WAS PLACED IN THE CHAMBER DRAIN OR VENT WITHIN 100 mm OF ITS CONNECTION TO THE CHAMBER.

REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER	VALPROBE	5350,5367,DV35,DN94	25T0777	24-Jan-26

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



FRONT

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber variation : 1.2 °C
Autoclave Condition : Normal
Chamber Size (Diameter*H) : 30 * 71 cm

CHAMBER PERFORMANCE

Controller Temperature (°C)	Average All Position (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)	Pressure (MPa)	Holding time (min)	Operating Cycle time (min)
115	115.71	0.10	0.20	0.20	0.090	15	60
121	121.65	0.10	0.20	0.20	0.125	15	60

TEMPERATURE MEASUREMENT ACCURACY TEST(° C)

Calibration Point	Controller Temp.	Indicating Temp.	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
			#1	#2	#3	#4	#5	
115	115	115	115.66	115.65	115.76	115.76	115.70	0.63
121	121	121	121.59	121.60	121.71	121.71	121.66	0.64

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT OF TEMPERATURE MEASUREMENT ACCURACY TEST EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : THE STABILITY TERM IN THE UNCERTAINTY BUDGET WAS REPLACED BY THE STANDARD REPEATABILITY.

NOTE 3 : LOCATION 3 WAS REFERENCE LOCATION.

NOTE 4 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT





CERTIFICATE No : 25T8232
REFERENCE No : 78147-2

PAGE : 1 OF 3

Certificate of Calibration

EQUIPMENT : BOD INCUBATOR
MANUFACTURER : N/A
MODEL : N/A
SERIAL No : N/A
ID No : EQL-166
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30.32 RAMA II SOI 63, RAMA II RD., SAMAEEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 11-Aug-25

APPROVED BY : PONGSAK J.
ISSUED DATE : 14-Aug-25
RECEIVED DATE : 11-Aug-25

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
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F-G010 REV : 03



CERTIFICATE No : 25T8232

PAGE : 2 OF 3

Calibration Report

EQUIPMENT : BOD INCUBATOR
MANUFACTURER : N/A
ID NUMBER : EQL-166
RECEIVED DATE : 11-Aug-25
AMBIENT TEMPERATURE : 27° C ± 1° C
MODEL : N/A
SERIAL NUMBER : N/A
CALIBRATION DATE : 11-Aug-25
RELATIVE HUMIDITY : 45 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED THERMOCOUPLE TYPE K UNDER NO LOAD CONDITION. THE THERMOCOUPLES WERE PLACED ON 19 POINTS AND LOCATED AS THE PICTURE BELOW AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND PLACED THE TENTH THERMOCOUPLE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE CHAMBER. THE UNIFORMITY WAS MEASURED BETWEEN REFERENCE PROBE AND OTHER PROBES AT THE SAME TIME.

2. REFERENCE STANDARD INSTRUMENTS :-

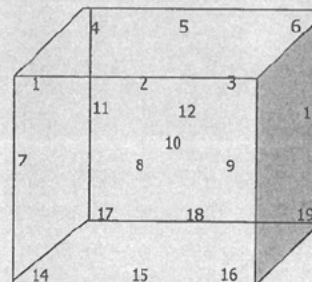
INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH TC TYPE K	HYDRA 2635A	7286308	25T5347	11-Jun-26

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 0
Overall Line Voltage (V) variation : 2
Instrument Condition : Normal
Chamber Size (W*L*H): 190*70*174 cm



FRONT

CHAMBER PERFORMANCE

Calibration Point (°C)	Average All Located (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
20.0	20.12	0.06	0.46	0.51

END OF CALIBRATION REPORT PAGE 2 OF 3



F-G010 REV : 03



Calibration Report

RESULT OF CALIBRATION (CONTINUE):-

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller temperature (°C)		20.0
Indicating Temperature		20.0
Measured Temperature (°C) at Spread Locations	1	20.30
	2	20.29
	3	20.25
	4	20.38
	5	20.22
	6	20.23
	7	20.12
	8	20.06
	9	20.05
	10 Ref.	19.97
	11	20.21
	12	20.14
	13	20.12
	14	20.11
	15	20.06
	16	19.94
	17	20.01
	18	19.89
	19	19.89
Uncertainty of Measurement(± °C)		0.40

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : LOCATION 10 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT





CERTIFICATE No : 25T0970
REFERENCE No : 76012-2

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF 160
SERIAL No : D518.0082
ID No : EQL-205
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 04-Feb-25

APPROVED BY : PONGSAK J.
ISSUED DATE : 12-Feb-25
RECEIVED DATE : 04-Feb-25

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QUALITY CALIBRATION CO., LTD.

F-G010 REV : 03



CERTIFICATE No : 25T0970

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Calibration Report

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF 160
ID No : EQL-205
RECEIVED DATE : 04-Feb-25
AMBIENT TEMPERATURE : 25 °C ± 1 °C
S/N : D518.0082
CALIBRATION DATE : 04-Feb-25
RELATIVE HUMIDITY : 50 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

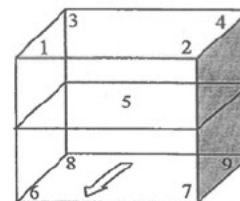
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD Pt100 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND PLACED THE NINTH THERMOMETER PROBE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE CHAMBER. THE UNIFORMITY WAS MEASURED BETWEEN REFERENCE PROBE AND OTHER PROBES AT THE SAME TIME.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	HYDRA 2635A	7301307	24T6467	26-Jun-25

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



FRONT

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 2
Overall Line Voltage (V) variation : 11
Instrument Condition : Normal
Chamber Size (W*L*H): 56*40*72 cm

CHAMBER PERFORMANCE

Calibration Point (°C)	Controller Temperature (°C)	Average All Position (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	35.0	34.98	0.03	0.08	0.12
36.0	36.0	35.99	0.02	0.16	0.16
41.5	41.6	41.51	0.03	0.19	0.23

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	#6	#7	#8	#9	
35.0	35.0	34.96	35.01	34.94	35.00	35.01	34.99	34.98	34.97	35.01	0.25
36.0	36.0	35.98	36.03	35.95	36.01	36.04	36.01	35.91	35.99	36.04	0.25
41.6	41.6	41.49	41.53	41.43	41.52	41.59	41.53	41.42	41.53	41.58	0.36

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : LOCATION 5 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



F-G010 REV : 03

**QUALITY CALIBRATION CO., LTD.**235 Petchkasem 63/2 Road, Laksong, Bangkac, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584CERTIFICATE No : 25E10773
REFERENCE No : 78947-2

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : pH METER
MANUFACTURER : TOA DKK
MODEL : HM-41X
SERIAL No : 858942
ID No : EQL-225
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : PRASERT D.
CALIBRATION DATE : 28-Oct-25

APPROVED BY :
PONGSAK J.

ISSUED DATE : 28-Oct-25

RECEIVED DATE : 28-Oct-25

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.

F-G010 REV03

**QUALITY CALIBRATION CO., LTD.**235 Petchkasem 63/2 Road, Laksong, Bangkac, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 25E10773

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : pH METER
MANUFACTURER : TOA DKK
ID No : EQL-225
RECEIVED DATE : 28-Oct-25
AMBIENT TEMPERATURE : 25°C ± 1°C
MODEL : HM-41X
SERIAL NUMBER : 858942
CALIBRATION DATE : 28-Oct-25
RELATIVE HUMIDITY : 50%RH ± 10% RH

CONDITION OF THIS RESULTS OF CALIBRATION

- THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASUREMENT METHOD BASED ON WI-TQ-062. THE DISPLAY UNIT WAS TESTED BY GENERATING STANDARD VOLTAGE TO THE UNIT AND READ THE VALUE COMPARED WITH CALCULATED VALUE. THE DISPLAY AND ELECTRODE WAS CALIBRATED BY USING STANDARD pH BUFFER SOLUTION.
- REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No/ LOT No	CERTIFICATE No	DUE DATE
1) pH STANDARD SOLUTION	00651-36	CC813268	4956-15549758	19-Nov-26
2) pH STANDARD SOLUTION	00651-38	CC815135	4957-15619979	31-Dec-26
3) pH STANDARD SOLUTION	00651-40	CC814522	4958-15587041	12-Dec-26
4) PROCESS CALIBRATOR	CA150	91S679	25E110	02-Apr-26
5) BATH	260014	1247 48074	25T9431	12-Sep-26
6) THERMOMETER WITH PROBE	421504	55000379	25T9466	12-Sep-26

- THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
- THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

- THIS CERTIFICATE IS TRACEABLE TO SI UNIT MAINTAINED AT :-
 - NATIONAL INSTITUTE OF STANDARD AND TECHNOLOGY, USA
 - NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION : WITHOUT ADJUSTMENT**1. DISPLAY UNIT ONLY**SLOPE FACTOR $k = 2.303 RT/F = 59 \text{ mV/pH}$

mV APPLIED	UUC READING (mV)	CORRECTION (mV)	UNCERTAINTY OF MEASUREMENT (± mV)	COVERAGE FACTOR k
177.48	177.0	0.48	0.50	2.0
0.00	0.0	0.00	0.50	2.0
-177.48	-178.0	0.52	0.50	2.0

2. DISPLAY UNIT WITH pH ELECTRODE S/N: 903F0008K

STANDARD pH BUFFER SOLUTION (pH)	UUC READING (pH)	CORRECTION (pH)	UNCERTAINTY OF MEASUREMENT (± pH)	COVERAGE FACTOR k
4.011	4.01	0.001	0.013	2.0
7.006	7.00	0.006	0.013	2.0
10.005	10.01	-0.005	0.014	2.0

3. PERCENT SLOPE 98%**4. DISPLAY UNIT MEASUREMENT TEMPERATURE WITH PROBE**

STANDARD READING (°C)	UUC* READING (°C)	IMMERSION DEPTH (mm)	CORRECTION (°C)	UNCERTAINTY OF MEASUREMENT (± °C)
25.013	25.0	80	0.013	0.21

UUC : UNIT UNDER CALIBRATION

THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



F-G010 REV 01



บริษัท ซีจี ไซแอนติฟิค จำกัด
CG SCIENTIFIC CO., LTD.

การดูแลบำรุงรักษาเชิงป้องกัน

Preventive Maintenance

Customer Name: บริษัท เทสท์ เทค จำกัด
Product : Distillation Unit
Brand : GERHARDT
Model : Vapodest 30
Serial number : GER003718



บริษัท ซีจี ไซแอนติฟิค จำกัด
CG SCIENTIFIC CO., LTD.

- Part 1: สัญญาการให้บริการ (Service Contact)
- Part 2: ข้อมูลพื้นฐานของเครื่องมือ (Details of Instrument)
- Part 3: ตรวจเช็คสภาพเครื่อง
- Part 4: รายละเอียดและรายงานผลการให้บริการ Preventive Maintenance
 - 4.1 ขั้นตอนการบริการ
 - 4.2 รายงานผลการให้บริการ
- Part 5: ข้อมูลสนับสนุนด้านเทคนิค (General Technical Support)
 - 5.1 Care and Maintenance
 - 5.1.1 การบำรุงรักษาทั่วไป (Basic maintenance)
 - 5.1.2 General error message



บริษัท ซีจี ไซแอนติฟิค จำกัด
CG SCIENTIFIC CO., LTD.

1. สัญญาการให้บริการ (Service Contact)

หน่วยงานลูกค้า : บริษัท เทสท์ เทคโนโลยี จำกัด
ที่อยู่ : 30,32 ซอยพหลโยธิน 2 ซอย 63 แขวงสามยุค เขตบางซื่อ กรุงเทพมหานคร 10150
โทรศัพท์ :
อีเมล :
บุคคลติดต่อ :
ชื่อ-นามสกุล : คุณ กรรณ กุญชรวิทย์
ตำแหน่ง :
โทรศัพท์ : 02-893-4211-17
อีเมล : lab_center@testtech.co.th

สัญญาการบริการจำนวน 1 ครั้ง ต่อ ปี

ครั้งที่ 1 วันที่ : 19 มีนาคม 2568

ครั้งที่ 2 วันที่ :

ครั้งที่ 3 วันที่ :

2. ข้อมูลพื้นฐานของเครื่องมือ (Details of Instrument)

2.1 รายละเอียดเครื่องมือ (Instrument Description)

ประเภทเครื่องมือ : Distillation Unit
ผลิตภัณฑ์ : GERHARDT
รุ่น : Vapodest 30
หมายเลขเครื่อง : GER003718
หมายเลขซีเรียล : EQL-062

2.2 ผู้ดำเนินการ

ดำเนินการทำ PM โดย

ชื่อ-นามสกุล : คุณกรรณ กุญชรวิทย์
ตำแหน่ง : วิศวกร
แผนก : บริการหลังการขาย
ฝ่าย : บริการหลังการขาย

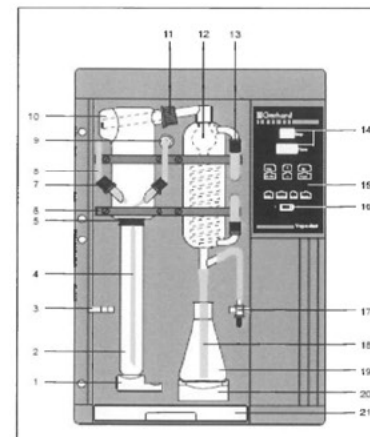


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Part 3: Operational Qualification (OQ)

3.1 ตรวจสอบสภาพเครื่อง

FRONT

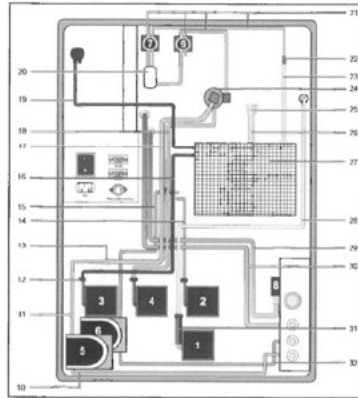


No	Description	PASS	FAIL	N/A
1.	Quick clamping device with wedge	☒	☐	☐
2.	Kjeldatherm digestion tube	☒	☐	☐
3.	Holder for steam inlet tubing	☒	☐	☐
4.	PTFP-Inlet tubing, steam	☒	☐	☐
5.	Viton-cone	☒	☐	☐
6.	Clamping for glassware	☒	☐	☐
7.	Screw cap GL18 with silicone seal	☒	☐	☐
8.	PTFP-Inlet tubing, NaOH	☒	☐	☐
9.	PP-Distributor with PP-threaded joint	☒	☐	☐
10.	Distribution head, PP	☒	☐	☐
11.	Screw cap GL32 with silicone seal	☒	☐	☐
12.	Distillation condenser	☒	☐	☐
13.	Screw cap GL14 with plastic screw connection	☒	☐	☐
14.	Display	☒	☐	☐
15.	Keyboard, chemical-resistant	☒	☐	☐
16.	Main switch, green	☒	☐	☐
17.	Ventilation valve	☒	☐	☐
18.	Distillate outlet tubing	☒	☐	☐
19.	Erlenmeyer flask	☒	☐	☐
20.	Platform	☒	☐	☐
21.	Drip tray	☒	☐	☐



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REAR



No	Description	PASS	FAIL	N/A
1.	Diaphragm pump NaOH	☒	☐	☐
2.	Diaphragm pump H ₃ BO ₃	☒	☐	☒ *Vap40
3.	Diaphragm pump H ₂ O for steam generator	☒	☐	☐
4.	Diaphragm pump H ₂ O for sample	☒	☐	☐ *Vap30,40
5.	Peristaltic pump for suction sample	☒	☐	☐ *Vap30, 40
6.	Peristaltic pump for suction receiver	☒	☐	☒ Option
7.	Pinch-solenoid valve, steam	☒	☐	☐
8.	Magnetic valve with pressure control	☒	☐	☐
9.	Pinch-solenoid valve, shut-off	☒	☐	☐
10.	Verprene-tubing 4x8 mm.	☒	☐	☐
11.	Verprene-tubing 4x8 mm.	☒	☐	☐ *Vap30,40
12.	Non-return valve for diaphragm pumps	☒	☐	☐
13.	Tubing reduction PP 51x10x5 mm.	☒	☐	☐ *Vap30,40
14.	Silicone tubing 4x7 mm.	☐	☐	☐ *Vap40
15.	Silicone tubing 4x7 mm.	☐	☐	☒ Option
16.	Silicone tubing 4x7 mm.	☒	☐	☐
17.	Verprene-tubing 8x12 mm.	☒	☐	☐ *Vap30,40
18.	Verprene tubing 4x7 mm.	☒	☐	☐ *Vap30,40
19.	Silicone tubing 4x7 mm.	☒	☐	☐
20.	Ventilation glass	☒	☐	☐
21.	Novoprene-tubing 4.8x8 mm.	☒	☐	☐
22.	Tubing reduction	☒	☐	☐
23.	Silicone tubing 6x10 mm.	☒	☐	☐
24.	PP-distributor with PP-thread	☒	☐	☐
25.	SKT-valve (built in with brass fitting)	☒	☐	☐
26.	Silicone tubing 8x16x80 mm.	☒	☐	☐
27.	Steam generator	☒	☐	☐
28.	PTFE-inlet tubing NaOH	☒	☐	☐
29.	Silicone tubing 8x16 for cooling water inlet	☒	☐	☐
30.	Silicone tubing 8x16 for cooling water outlet	☒	☐	☐
31.	Viton-tubing 6x12*50 mm.	☒	☐	☐
32.	Silicone tubing 4x7 mm.	☐	☐	☒ Option



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CG SCIENTIFIC CO., LTD.

Part 4: รายละเอียดการตรวจสอบ

4.1 ขั้นตอนการบริการ

ตรวจสอบระบบไฟฟ้า (Electrical Test)

- ความต้านทานทางไฟฟ้าของเครื่องกับกราวด์
- กระแสไฟฟ้าที่ใช้งาน

PASS	FAIL	Remark
☒	☐	
☒	☐	

ตรวจสอบสภาพเครื่อง (Optical Test)

- Main cable
- Electric wiring
- Pumps
- Distribution Head
- Condensor
- Steam generator
- Tubing
- Viton cone

PASS	FAIL	Remark
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	

ตรวจสอบ Function การทำงาน (The Function Test)

- ระบบสร้างและควบคุมความดันของ Steam
- ระบบการเติมน้ำเข้า Sample Tube
- ระบบการเติม NaOH
- ระบบการ Suction ตั้ง Sample Tube และ Receiver

PASS	FAIL	Remark
☒	☐	
☒	☐	
☒	☐	
☒	☐	

4.2 รายงานผลการให้บริการ

1. TECHNICAL DATA

Main Supply 220 volt + 10% 50 Hz
Normal current

PASS	FAIL	Remark
☒	☐	
☒	☐	

1.1 COOLING WATER BATH

Temperature 15-20 °C
Cooling Water Outlet
Control Temperature

PASS	FAIL	Remark
☒	☐	
☒	☐	
☒	☐	

1.2 OPTICAL TEST VAP 30

Screw cap GL14
Screw cap GL18
Screw cap GL32
Distillation Head
Condensor
Viton Cone
Ventilation Valve
Micro Switch Sample

PASS	FAIL	Remark
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	

2. SYSTEM COOLING WATER INLET

Cooling Water Inlet
Cooling Water Outlet
Flow control valve

PASS	FAIL	Remark
☒	☐	
☒	☐	
☒	☐	



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3. SYSTEM CONTROL

	PASS	FAIL	Remark
Key Board	☒	☐	
Display	☒	☐	
Program	☒	☐	
Adding H ₂ O	☒	☐	*Vap30,40
Adding NaOH	☒	☐	
Adding H ₃ BO ₃	☐	☐	*Vap40
Suction Sample	☒	☐	*Vap30,40

4. SYSTEM DISTILLATION

	PASS	FAIL	Remark
Boiler	☒	☐	
Level Sensor	☒	☐	
Neoprene-Tubing	☒	☐	
Solenoid Valve Shut-Off	☒	☐	
Solenoid Valve Steam	☒	☐	
Excess Pressure Detector	☒	☐	
Ventilation Valve	☒	☐	
Heater	☒	☐	

5. PUMP

	PASS	FAIL	Remark
Pump H ₂ O Steam			
- Non-Return Valve	☒	☐	
Pump H ₂ O Sample			
- Non-Return Valve	☒	☐	
Pump NaOH			
- Non-Return Valve	☒	☐	
Pump H ₃ BO ₃			
- Non-Return Valve	☐	☐	N/A
Pump suction	☒	☐	

6. THE FOLLOWING PROGRAM RUN

	PASS	FAIL	Remark
Addition H ₂ O 0-99 sec.	☒	☐	
Addition NaOH 0-99 sec.	☒	☐	
Addition H ₃ BO ₃ 0-99 sec.	☐	☐	N/A
Reaction Time 0-99 min	☒	☐	
Distillation Time 0-99 min	☒	☐	
Steam Capacity 30%-100%	☒	☐	
Suction Time 0-99 sec.	☒	☐	
The Instrument is in perfect technical shape	☒	☐	

Remark: _____



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CG SCIENTIFIC CO., LTD.

4.2 Error Code

The micro-processor continually surveys all the functions of the distillation system. As soon as an error arises it is shown on the display and accompanied by an acoustic signal.

Error message	Measures
No tap water	Check cooling water inlet for blockages. Ensure the tap is turned on → Enter
No sample tube	Insert tube → Enter
Check chemicals	Check set of tanks → Enter
Low water Press Enter	Check the water inlet distilled H ₂ O → Enter
Filling Steam generator	This message disappears as soon as steam generator is filled

After the above mentioned errors are corrected, the following message is displayed.

Error message	Measures
Stop Prog.No. x Continue=Enter	Enter = continue of interrupted program Reset = Standby-mode

Error message	Measures
Wait for steam	Message disappears as soon as stand-by is reached
Add sol. > 1min Continue=Enter	Check programming Enter=continue of interrupted program Reset=Standby-mode
Program undefined	Check programming → Reset
Excess steam pressure	Switch the system off and call service
Sensor error	Switch the system off and call service



CERTIFICATE No : 25T6062
REFERENCE No : 77516-2

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
MODEL : WPE 45
SERIAL No : L711.0024
ID No : EQL-147
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : ATSAWIN Y.
CALIBRATION DATE : 23-Jun-25

APPROVED BY :
PONGSAK J.
ISSUED DATE : 24-Jun-25
RECEIVED DATE : 23-Jun-25

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.



CERTIFICATE No : 25T6062

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
ID NUMBER : EQL-147
RECEIVED DATE : 23-Jun-25
AMBIENT TEMPERATURE : 27 °C ± 1 °C
MODEL : WPE 45
SERIAL NUMBER : L711.0024
CALIBRATION DATE : 23-Jun-25
RELATIVE HUMIDITY : 51 %RH ± 10 % RH

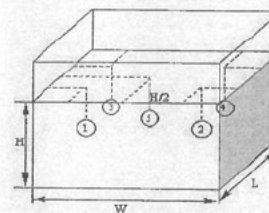
CONDITION OF THIS RESULTS OF CALIBRATION

- THIS INSTRUMENT WAS CALIBRATED ACCORDING TO ASTM E715-80 (REAPPROVED 2001) BY COMPARISON WITH CALIBRATED RTD. THE PROBES WERE PLACED ON FIVE POINTS AND LOCATED ONE PROBE IN EACH OF THE FOUR CORNERS OF THE BATH AND PLACED THE FIFTH RTD WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE WATER VOLUME (REFERENCE LOCATION) UNDER NO LOAD CONDITION.
- REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	2625A	6603614	25T5341	04-Jun-26

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



PROBE INSTALLATION
POSITION IN THE BATH

GENERAL INFORMATION

Overall Variation of Ambient Temperature around the Bath (°C) : 1.1
Overall Variation of Line Voltage (V) : 4
Instrument Condition : Normal
Bath Inner Size (W*L*H) : 59*35*22 cm

BATH PERFORMANCE

Calibration Point (°C)	Average All Position (°C)	Temperature Stability (±°C)	Radius Uniformity (°C)	Axial Uniformity (°C)	Overall Variation (°C)
41.5	41.50	0.05	0.04	0.07	0.12
44.5	44.48	0.03	0.04	0.10	0.08

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	
41.5	41.5	41.51	41.47	41.52	41.48	41.50	0.14
44.5	44.5	44.48	44.46	44.50	44.47	44.49	0.14

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE BATH.

NOTE 2 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT





Page 1 of 2

Certificate No. : S2025070410-0004

Date Issued : 24-Jul-25

Customer : S.P.S. CONSULTING SERVICE CO., LTD.
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment : Block Digestion (Gerhardt, TR)

Manufacturer : Gerhardt

Model : -

Serial No. : 4061832

ID No./Tag No. : KJ 01/43

Date Received : 22-Jul-25

Date Calibrated : 22-Jul-25

Calibrated by : Auttapol Kunaumpal

Calibration Method or Calibration Procedure Used

In-house method : CP-49 base on TLAS G-20 by comparing against Standard Thermometer.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by:

K. Nathong
(Nathapong Krudaum)



Certificate No. : S2025070410-0004

Environment : Ambient Temperature : Start record 25.5 °C, Stop record 25.5 °C
Relative Humidity : Start record 50.4 %RH, Stop record 50.1 %RH

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
380	380	380	1.03	1.73	2.57

Calibration Temperature (°C)	Standard Reading (°C), Probe No. 10 is Reference Probe					Uncertainty ⁴ (±°C)
380	No. 1	No. 2	No. 3	No. 4	No. 5	1.9
	380.49	380.79	380.68	380.85	380.56	
	No. 6	No. 7	No. 8	No. 9	No. 10	
	380.60	379.85	380.28	379.65	380.55	
	No. 11	No. 12	No. 13	No. 14	No. 15	
	380.38	380.54	380.49	380.75	380.37	
	No. 16	No. 17	No. 18	No. 19	No. 20	
	380.25	379.64	379.73	380.52	380.79	

Without adjustment

No.1	No.2	No.3	No.4
No.5	No.6	No.7	No.8
No.9	<u>No.10</u>	No.11	No.12
No.13	No.14	No.15	No.16
No.17	No.18	No.19	No.20

Top view position

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202502406-0002 for Digital Thermometer with Probe (Agilent) Module 2 (172) Type K Serial No. US37011
Due 10-Oct-25

Notes : 1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.

2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.
3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
4. The uncertainty of measurement is included temperature stability.

End of Certificate



บริษัท เอ.ไอ.เอ็ม. โปรเจ็ค จำกัด

80 ซอยตติยวิทย์ 2 ซอย 29 แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพมหานคร 10230

Tel. 0-2935-9370-1

Fax 0-2935-9372

ORIGINAL

TEST AND VERIFICATION CERTIFICATE

Report No : 68-05-038-1 Date : May 8, 2025 Time : 10.30 pm. Hour counter : 1,203.1 hrs.

Customer Name : บริษัท เอส.ที.เอส.คอนซัลติง เซอร์วิส จำกัด (สำนักงานใหญ่)

Address : เลขที่ 7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล

เขตจตุจักร กรุงเทพมหานคร

Post code : 10900

Operator : คุณอรุณี, คุณณัฏกมล Tel : 083-994-8073 Fax : -

Room (Location) : Microbiology Room Department : Quality Control

Laminar air Flow Type : Biohazard Laminar Airflow Working Area Dimension: W123 x D64 x H65cm.

Model : Clean 120 BS Pre-filter Size : W123 x D28 cm. Producer Serial No. : 1195

Producer / Seller Name : Lab service ltd.,part. Owner Serial No. : LA01/51

Results and Decision

DESCRIPTION	STD.	TEST RESULTS	PASS	FAIL
SCAN TEST for HEPA FILTER on 0.3 micron (P/R ³ -min.)	≤ 300	0	⊙	
LEAK TEST CABINET	Not Allow	No Leakage	⊙	
PARTICLE COUNTING on 0.3 / 0.5 micron (P/R ³ -min.)	≤ 100	0 / 0	⊙	
HEPA FILTER PRESSURE (Inch.-W.G.)	< 1.00	0.5	⊙	
AIR VELOCITY (m/s) - Downflow	0.4 - 0.5	0.49	⊙	
AIR VOLUME (m/s) - Inflow (20 cm.H.)	≥ 0.38	0.56	⊙	
FLUORESCENT LIGHTING (Lux.) (Background 110 ± 50 Lux.)	≥ 650	1,300.3 / 63.7	⊙	
UV CONCENTRATION (mw./m ²) on Conditions.	≥ 400	2,136.7	⊙	
MOTOR NOISE LEVEL dB (A) (Background 57dB (A))	≤ 67	66.7	⊙	
TEMPERATURE RISE TEST AND %RH (compare with ambient °C)	≤ 8.5 / 50-55	4 / 41	⊙	
VIBRATION TEST (m/s ² rms amplitude at 10Hz - 10 kHz.)	0.5 / 0.1	0.4 / 0.0	⊙	
Electrical Leakage and Ground Circuit Resistance Tests. (ma / ohms.)	≤ 500 / ≤ 0.15	< 100	⊙	

Note : Showed all measurement table in attached documents.

Final Decision : ☒ PASS ☐ PASS with Condition ☐ Not PASS

Comment :

FM-MS-15 REV.No.05



Reported by

(Mr. Tanichai, A.)

Date 8 / May / 2025



Maintenance Record

DEVOCE TYPE : MICROSCOPE		Serial No. 6011030990	
BRAND : ACCU-SCOPE		No. of PM	
MODEL : EXC-190			
PM Date : 9/4/19			
PM Duc : 9/4/19			
Summary : ☒ Pass ☐ Fail			
Engineer : Tanichai		Acknowledge by Tanichai	
Date : 9/4/19		Date : 9/4/19	
Remark :			

No.	Checklist	Result		Remark
		Yes	No	
1	Preventative Maintenance			
	1.1 Clean : Exterior, interior	✓		
	1.2 Lubricate : Mechanical Components	✓		
	1.3 Replance : Filter, Tubin, brushes , Spare Fuse, O-Ring	✓		
2	Qualitative Optical Test	Pass	Fail	
	2.1 Trinocular Microscope Head			
	2.1.1 Prism Housing	✓		
	2.1.2 Eyepiece	✓		
	2.1.3 Eyepiece Micrometer	✓		
	2.1.4 Objective Leans 4X	✓		
	2.1.5 Objective Leans 10X	✓		
	2.1.6 Objective Leans 20X	✓		
	2.1.7 Objective Leans 40X	✓		
	2.1.8 Objective Leans 100X	-		
	2.1.9 Abbe Condenser	✓		
	2.1.10 Collector Leans	✓		
	2.2 Mechanical			
	2.2.1 Eyepiece Diopter Adjustment	✓		
	2.2.2 Rotatable Head	✓		
	2.2.3 Rotatable Nosepiece	✓		
	2.2.4 Mechanical Stage X-Y Control	✓		
	2.2.5 Coarse Focusing	✓		
	2.2.6 Fine Focusing	✓		
	2.2.7 Limit Stopper	✓		
	2.2.8 Condenser Iris Diaphragm	✓		
	2.3 Illumination System			
	2.3.1 transmitted Illumination			
	2.3.2 On-Off switch	✓		
	2.3.3 Circuit Board	✓		
	2.3.4 Cord and plug to Power Supply	✓		
	2.3.5 Fuse	✓		
	2.4 Digital Camera			
	2.4.1 Optical Lens			
	2.4.2 12 V adaptor for Camera			
	2.4.3 USB 2.00 Camera			
	2.4.4 Software			



CERTIFICATE No : 26E3363
REFERENCE No : 80514-1

Certificate of Calibration

EQUIPMENT : pH METER
MANUFACTURER : HANNA
MODEL : HI3512
SERIAL No : TH118035
ID No : PH 04/56
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : ATSAWIN Y.
CALIBRATION DATE : 02-Apr-26

APPROVED BY : PONGSAK J.

ISSUED DATE : 02-Apr-26

RECEIVED DATE : 01-Apr-26

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.



CERTIFICATE No : 26E3363

Calibration Report

EQUIPMENT : pH METER
MANUFACTURER : HANNA
ID No : PH 04/56
RECEIVED DATE : 01-Apr-26
AMBIENT TEMPERATURE : 23 °C ± 3 °C
MODEL : HI3512
SERIAL NUMBER : TH118035
CALIBRATION DATE : 02-Apr-26
RELATIVE HUMIDITY : 50 % RH ± 10% RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASUREMENT METHOD BASED ON WI-TQ-062 AND WI-TQ-063. THE DISPLAY UNIT WAS TESTED BY GENERATING STANDARD VOLTAGE TO THE UNIT AND READING THE VALUE COMPARED WITH THE CALCULATED VALUE. THE DISPLAY AND ELECTRODE WAS CALIBRATED BY USING STANDARD pH BUFFER
2. REFERENCE STANDARD INSTRUMENTS :

INSTRUMENT	MODEL	SERIAL No/ LOT No	CERTIFICATE No	DUE DATE
1) pH STANDARD SOLUTION	00651-36	CC829914	4956-16178366	11-Sep-27
2) pH STANDARD SOLUTION	00651-38	CC831093	4957-16224157	01-Oct-27
3) pH STANDARD SOLUTION	00651-40	CC826321	4958-16046326	10-Jul-27
4) PROCESS CALIBRATOR	CA150	9156079	26E936	17-Mar-27
5) BATH	260014	1247 48074	25T9431	12-Sep-26
6) THERMOMETER WITH PROBE	421504	55000379	25T9466	12-Sep-26

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO SI UNIT MAINTAINED AT :-
 - NATIONAL INSTITUTE OF STANDARD AND TECHNOLOGY, USA.
 - NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION : ADJUSTMENT

1. DISPLAY UNIT ONLY

SLOPE FACTOR $k = 2.303 RT/F = 59 \text{ mV/pH}$

mV APPLIED	UUC READING (mV)	CORRECTION (mV)	UUC READING (pH)	UNCERTAINTY OF MEASUREMENT (± mV)	COVERAGE FACTOR k
414.11	414.3	-0.19	-0.256	0.15	2.00
354.95	355.1	-0.15	0.759	0.15	2.00
295.80	296.0	-0.20	1.773	0.15	2.00
236.64	236.8	-0.16	2.787	0.15	2.00
177.48	177.7	-0.22	3.801	0.15	2.00
118.32	118.5	-0.18	4.816	0.15	2.00
59.16	59.4	-0.24	5.831	0.15	2.00
0.00	0.2	-0.20	6.845	0.15	2.00
-59.16	-58.9	-0.26	7.878	0.15	2.00
-118.32	-118.1	-0.22	8.915	0.15	2.00
-177.48	-177.2	-0.28	9.952	0.15	2.00
-236.64	-236.4	-0.24	10.990	0.15	2.00
-295.80	-295.5	-0.30	12.027	0.15	2.00
-354.95	-354.7	-0.25	13.064	0.15	2.00
-414.11	-413.8	-0.31	14.101	0.15	2.00

END OF CALIBRATION REPORT PAGE 2 OF 3



**QUALITY CALIBRATION CO., LTD.**

235 Petchkasem 63/2 Road, Laksong, Bangkok, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4534

CERTIFICATE No : 26E3363

PAGE : 3 OF 3

Calibration Report**RESULT OF CALIBRATION (CONTINUE):****1. DISPLAY UNIT WITH pH ELECTRODE S/N: 11340D0M**

STANDARD pH BUFFER SOLUTION (pH)	UUC READING (pH)	CORRECTION (pH)	VALUE BEFORE ADJUSTMENT	UNCERTAINTY OF MEASUREMENT (± pH)	COVERAGE FACTOR k
4.008	4.008	0.000	4.142	0.012	2.00
6.998	7.000	-0.002	7.068	0.012	2.00
10.007	10.009	-0.002	10.226	0.014	2.00

3. DISPLAY UNIT WITH TEMPERATURE

STANDARD READING (°C)	UUC READING (°C)	CORRECTION (°C)	VALUE BEFORE ADJUSTMENT	UNCERTAINTY OF MEASUREMENT (± °C)	COVERAGE FACTOR k
25.004	25.0	0.004	---	0.0085	2.00

4. PERCENT SLOPE 91%

UUC : UNIT UNDER CALIBRATION

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR 1, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

**Lambda UV Preventive Maintenance (PM)**

Company Name:	S.P.S. CONSULTING SERVICE CO., LTD.		
Address:	7, Soi Phaholyothin24, Ladyao, Jatujak, Bangkok		
User Name:	K. Benjawan	WO Number:	WO-11802762
Telephone Number:	086-141-2523	Certificate Number:	UV2039-2026
Customer Support Engineer:	K. Anon	PM Number:	1 of 1
Date PM Performed: (DD-MMM-YYYY)	10-Mar-2026	Next PM Due Date: (DD-MMM-YYYY)	10-Mar-2027

Part Number	Release	Publication Date	
09370504	B	March 2013	

Scope

The purpose of this PM is to ensure the continued functionality of the PerkinElmer Lambda UV/Vis Spectrophotometer by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. The customer should save their method before the PM begins.

General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM. Always check with the customer before making any changes that may affect the customer's analysis. Should be signed by an authorized PerkinElmer and customer representative and left with the customer. Update the PM sticker and instrument logbook as required.

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Lambda UV Preventive Maintenance (PM)

Page 1



F-G010 REV 03

Component List

Component Specific Model	Serial #	Software Version	Configuration Notes
Lambda 25	501S14123010	6.2.0.0741	STD 1.27
NA	NA	NA	NA

Parts Lists

Parts Included with the PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot/SN #	Expiration Date (MM/YY)
B250 0999	Stray Light standard			
	Nal cell	1	1943	Mar-26
	NaNO2 cell	1	2963	
	KCl cell	1	31030	
	H2O	1	71497	
B050 7805	Secondary Standards for calibration of wavelength and photometric accuracy or use NBS/NIST 390 standards			
	Gray Glass G1	1	2926	Mar-26
	Gray Glass G2	1	3501	
	Gray Glass G3	1	2552	
	Holmium Glass	1	1085	

Additional Tools Required for PM					
Part Number (if applicable)	Description	Quantity	Serial #		Remark
-	Visible Lamp	1	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
Additional Reagents and Standards Required for PM					
Part Number (if applicable)	Description	Quantity	Batch/Lot #		Expiration Date (MM/YY)
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.
- ☒ Inspect the customer log book and make any appropriate PM entries.
- ☒ Perform general inspection of system for cleanliness.

2. Optical checks:

- ☒ Lamp Alignment/Energy
- ☒ Sample Compartment Windows/Monochromator
- ☒ Mirror and Grating Alignment
- ☒ Cell Holder Alignment

3. Mechanical:

- ☒ Physical inspection — Please write any comments in the additional comments section.
- ☒ Grating Drive Mechanism.
- ☒ Lamp Change Mechanism.
- ☐ Slit Drive Manual Servo.

4. Test:

Refer to Appendix A for the specifications of the instrument being tested.

- ☒ D2 Wavelength accuracy

	Actual Value	Specification
Accuracy at 656.1 nm	656.11	± 0.1

- ☒ Holmium Oxide wavelength accuracy

Filter ID #		1085		
Test	Calibration Value	Actual Value	Deviation	Specification
279.3 nm	279.3	279.35	-0.05	± 0.5
360.8 nm	360.9	360.94	-0.04	± 0.5
459.9 nm	459.9	459.92	-0.02	± 0.5
536.4 nm	536.3	536.33	-0.03	± 0.5

- ☒ Scattered Light.

Test	Filter ID #	Result	Specification
NaI @ 220 nm	1943	0.0149	< 0.02 %T
NaNO ₂ @ 340 nm	2963	1.4991	< 0.02 %T
NaNO ₂ @ 370 nm	2963	0.1006	< 0.02 %T
KCl @ 200 nm	31030	2.5668	≥ 2 A

- ☒ Baseline Flatness.

Corrected Baseline	Specification
0.000765	± 0.001 A

- ☒ Noise Test @ 500 nm.

Actual Value	Specification
0.0000490	± 0.00008 A

☒ Photometric Accuracy.

Filter 1 ID #		2926		
Test	Calibrated Value	Actual Value	Deviation	Specification
440.0 nm	0.3496	0.3488	0.0008	± 0.006 A
546.1 nm	0.3046	0.3043	0.0003	± 0.006 A
635.0 nm	0.3238	0.3245	-0.0007	± 0.006 A
Filter 2 ID #		3501		
Test	Calibrated Value	Actual Value	Deviation	Specification
440.0 nm	1.0037	1.0038	-0.0001	± 0.006 A
546.1 nm	0.9806	0.9799	0.0007	± 0.006 A
635.0 nm	1.0324	1.0320	0.0004	± 0.006 A
Filter 3 ID #		2552		
Test	Calibrated Value	Actual Value	Deviation	Specification
440.0 nm	0.4943	0.4953	-0.0010	± 0.006 A
546.1 nm	0.4595	0.4576	0.0019	± 0.006 A
635.0 nm	0.5080	0.5057	0.0023	± 0.006 A

5. Accessory (where applicable):

- ☐ Integrating Sphere
- ☐ Reflecting Attachment
- ☐ Cell Changer
- ☐ Sipper
- ☐ Auto Sampler

6. Review:

- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer-supplied materials to have on hand
- ☒ Attach PM sticker.
- ☐ Update Logbook.

Additional Comments

Additional Comments Regarding the PM
- Straylight ไม่ผ่านเนื่องจาก Filter Wheel เสื่อมสภาพ

Review

The preventive maintenance checks and if applicable performance tests for Lambda UV have been completed.

This Lambda UV Passes ☐ **Fails** ☐ **the preventive maintenance.**

Review of Preventive Maintenance:	
Authorized PerkinElmer Representative:  Anon Leenthawonkit	Date: 10-Mar-26 (DD-MM-YYYY)
Authorized Customer Representative:	Date: 10-Mar-26 (DD-MM-YYYY)



CERTIFICATE No : 26T2273
REFERENCE No : 80204-8

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : WATER BATH

MANUFACTURER : MEMMERT

MODEL : WPE45

SERIAL No : L715.0400

ID No : WB6/58

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMFOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : CHARUKIT L.

CALIBRATION DATE : 05-Mar-26

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 09-Mar-26

RECEIVED DATE : 05-Mar-26





QUALITY CALIBRATION CO., LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkoe, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 409-4584

www.qcalibration.com

CERTIFICATE No : 25T2273

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
ID NUMBER : WB6/58
RECEIVED DATE : 05-Mar-26
AMBIENT TEMPERATURE : 26 °C ± 1 °C
MODEL : WPE-5
SERIAL NUMBER : L7150400
CALIBRATION DATE : 05-Mar-26
RELATIVE HUMIDITY : 53 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO ASTM E715-80 (REAPPROVED 2001) BY COMPARISON WITH CALIBRATED RTD. THE PROBES WERE PLACED ON FIVE POINTS AND LOCATED ONE PROBE IN EACH OF THE FOUR CORNERS OF THE BATH AND PLACED THE FIFTH RTD WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE WATER VOLUME (REFERENCE LOCATION) UNDER NO LOAD CONDITION.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT

MODEL

SERIAL No

CERTIFICATE No

DUE DATE

1) DATA LOGGER WITH RTD

2635A

7286308

25T5347

11-Jun-26

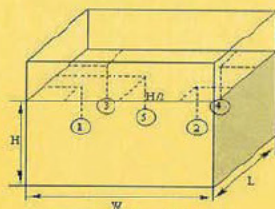
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



PROBE INSTALLATION
POSITION IN THE BATH

GENERAL INFORMATION

Overall Variation of Ambient Temperature around the Bath (°C) : 1.7

Overall Variation of Line Voltage (V) : 6

Instrument Condition : Normal

Bath Inner Size (W*L*H) : 60*40*17 cm

BATH PERFORMANCE

Calibration Point (°C)	Controller Temperature (°C)	Temperature Stability (±°C)	Radius Uniformity (°C)	Axial Uniformity (°C)	Overall Variation (°C)
44.4	44.4	0.03	0.01	0.00	0.05

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	
44.4	44.4	44.49	44.49	44.49	44.49	44.49	0.14

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE BATH.

NOTE 2 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMERS PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpoed, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



Certificate of Calibration

Certificate No. : 68-420062-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

Range : N/A pH

Resolution : 0.01 pH

Serial No. : 2841305

ID No. : LAB-PH-002

Electrode

Model : N/A

Serial No. : 3172493

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd.

Ambient Temperature : (23.5 to 25.0)°C

Relative Humidity : (50 to 55) %

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00307/66	23 Aug 2025	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.007	61314276	1081108	28 Feb 2027	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.965	61318175	1081110	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61325043	1081109	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpoed, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 68-420062-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (± mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	177.5	0.0	0.12
	0.0000	7	7.00	0.1	-0.1	0.086
	-177.4800	10	10.00	-177.4	-0.1	0.12

Function : pH meter with electrode

Performing a three - buffer standard curve using buffer nominal pH (4,7,10)

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.007	4.01	0.00	0.0097
	6.965	7.00	-0.03	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%

- o O o -



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120

Tel.(02) 964 6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



Certificate of Calibration

Certificate No. : 68-420062-2

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech Model : pH 700

Range : N/A pH Resolution : 0.01 pH

Serial No. : 2841305 ID No. : LAB-PH-002

Electrode

Model : N/A Serial No. : 3052953

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd.

Ambient Temperature : (23.5 to 25.0)°C

Relative Humidity : (50 to 55) %

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00307/66	23 Aug 2025	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.007	61314276	1081108	28 Feb 2027	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.965	61318175	1081110	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61325043	1081109	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Tel.(02) 964 6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 68-420062-2

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (± mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	177.5	0.0	0.12
	0.0000	7	7.00	0.1	-0.1	0.086
	-177.4800	10	10.00	-177.4	-0.1	0.12

Function : pH meter with electrode

Performing a three - buffer standard curve using buffer nominal pH (4,7,10)

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.007	4.01	0.00	0.0097
	6.965	7.00	-0.03	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%

- o0o -



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



Certificate of Calibration

Certificate No. : 68-400421-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Temperature Indicator with Thermistor Probe

Temperature Indicator

Manufacturer : Eutech

Model : pH 700

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 2841305

ID No. : LAB-PH-002

Thermistor probe

Model : N/A

Sheath Material : Stainless

Diameter : 3 mm.

Length : 115 mm.

Serial No. : PHSTEMB01P 049

ID No. : LAB-PH-002

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd.

Ambient Temperature : (23.5 to 25.0) °C

Relative Humidity : (50 to 55) %

Line Voltage : (220.0 to 221.0) VAC

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4003 by compared with PRT in the liquid bath at the constant controlled temperature.

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400016	TT-1019-25	13 May 2027	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400033	24E633	21 Feb 2026	National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 68-400421-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersior Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
115	25.002	24.9	0.1	0.19

Remark

UUC : Unit Under Calibration

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%

- oDo -



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



Certificate of Calibration

Certificate No. : 68-200468-1

Page : 1 of 2

Submitted by : Pacific Laboratory Co.,Ltd.

14/5358 Moo 14, T.Bang Bua Thong, A.Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Electronic Balance

Manufacturer : SHIMADZU

Model : AP225WD

Serial No. : D316301828

ID No. : LAB-BL-003

Capacity : 220000 mg

Resolution : 0.01mg/102000mg, 0.1mg/220000mg

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co.,Ltd.

Ambient Temperature : (27.3 to 27.4) °C

Relative Humidity : (53.6 to 53.7) %

Air Pressure : 1003.0 mbar

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 25 July 2025

Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14

Edition 7 - November 2022

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
E261-E2624	C02242009	07 Nov 2025	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Sajja Sungkhum)

Supervisor

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 68-200468-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

Nominal Value (mg)	Correction (mg)	Uncertainty ± (mg)
1	0.01	0.012
10	0.00	0.012
50	0.01	0.012
100	0.01	0.014
1000	0.00	0.026
2000	0.01	0.034
5000	0.00	0.043
20000	0.00	0.071
50000	0.01	0.11
100000	0.00	0.20
150000	0.0	0.38
200000	0.0	0.38

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.06$, providing a level of confidence of approximately 95%

Eccentric error Load test : 50000 mg

A	B	C	D	E
0.01	0.01	0.02	0.02	0.00

mg



Repeatability Load test : 200000 mg

S.dev. : 0.053 mg

- o0o -

The Uncertainties are for a confidence probability of approximately 95%

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Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964 6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



Certificate of Calibration

Certificate No. : 68-400420-3

Page : 1 of 2

Submitted by : Pacific Laboratory Co., Ltd.

14/5358 Moo 14, T. Bang Bua Thong, A. Bang Bua Thong, Nonthaburi 11110 Thailand

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : Aqua Lytic

Model : TC 135S

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 0614/000033

ID No. : LAB-IB-001

Environment : On site calibration was carried out at the Laboratory, Pacific Laboratory Co., Ltd.

Ambient Temperature : (23.0 to 24.5) °C

Relative Humidity : (40 to 45) %

Line Voltage : (220.0 to 222.0) V

Date of Received : 21 July 2025

Date of Calibration : 21 July 2025

Date of Issue : 24 July 2025

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Digital Thermometer with RTD Probe

ID No. Cert. No. Due Date Traceability

400029 & 400048 68-400063-1

01 Aug 2025

National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964 6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 68-400420-3

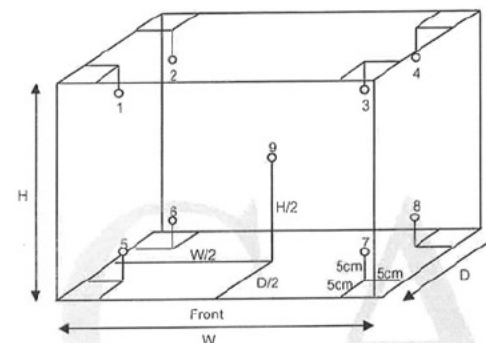
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.51 m

D = 0.04 m

H = 0.70 m

Capacity = 0.02 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
20.0	20.5	20.5	20.10	19.94	19.99	19.96	19.92	19.90	20.02	19.99	19.87	0.69

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.5	20.5	0.43	0.36	0.78

Remark The uncertainty is not combine uniformity of the air chamber

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

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

- o0o -



Calibration Certificate

Certificate No.: 2601956-001-01
Page: 1 of 2

Equipment: pH Meter
Manufacturer: METTLER TOLEDO
Model: SevenEasy pH
Serial No.: 1231/55210
ID No.: UAE.WAT.010/2553
Order No.: 2601956
Operation No.: 2601956-001
Date of Receipt: 20 February 2026
Date of Calibration: 23 February 2026

Customer name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhnang, Bangkok 10250

Metrological traceability:

1. Calibration Method W-CC-012 : In house method based on direct measurement by using standard voltage calibrator and certified reference material (CRM)

2. Reference Standards / Certified Reference Material

Instruments	Serial / ID No.	Manufacturer	Certificate No.	Due Date
2.1 DC Voltage Calibrator	2709007	Fuke	25E1753	22 May 2026
2.2 Digital Thermometer	2709007	Fuke	260032F-002-01	25 October 2026
2.3 Thermo-hygro Meter	NFIBTH 014/23	Iesto	250323F-014-01	10 June 2026
Certified Reference Material	Lot No.	Manufacturer	Ref N	Expire Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)	1015435	CPAchem	PH216.15	25 July 2026
2.5 pH buffer 6.865 (Primary pH buffer Solution)	1015432	CPAchem	PH217.15	25 July 2026
2.6 pH buffer 10.01 (Primary pH buffer Solution)	1089003	CPAchem	PH220.15	18 March 2026
2.7 pH buffer 7.00 (Standard pH buffer Solution)	C03282	HACH LANGE GmbH	S11M004	11 June 2027

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

3.1 Instruments No.2.1 through NSC-ONSC Laboratory Accreditation of Calibration No.0008 (TPA)

3.2 Instruments No.2.2 and 2.3 through NSC-ONSC Laboratory Accreditation of Calibration No.0061 (NFI)

3.3 Certified Reference Material No.2.4 to 2.6 traceable to CPAchem Ltd is accredited to ISO 17034 (ANSI accredited No. AR-1835)

3.4 Certified Reference Material No.2.7 traceable to Hach Lange GmbH is accredited to DIN EN ISO 17034 (DAkkS accredited No. D-RM-15184-01-00)

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

Calibrated by **Mr.Manas Somsak**
Specialist

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

Date of issue: 2 March 2026

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: 02 Date: 01-10-68



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Calibration Certificate

Certificate No.: 2601956-001-01
Page: 2 of 2

Calibration Condition:

Place of Calibration: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature (24.0 ± 0.2) °C Relative Humidity: (49.8 ± 2) %
Calibration Item Condition: Used Item Type: Bench top
Range: 0 - 14 pH Resolution: 0.01 pH, 1 mV

Calibration results:

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

Nominal pH	DC Voltage Standard (mV)	Average Indicator Reading mV	pH	Uncertainty (± mV)	Coverage Factor (k)
0	414.119	414	-0.01	0.58	2.00
2	295.813	296	1.99	0.58	2.00
4	177.463	178	4.00	0.58	2.00
6	59.159	59	6.00	0.58	2.00
7	0.000	0	7.00	0.58	2.00
8	-59.159	-59	8.00	0.58	2.00
10	-177.462	-177	10.00	0.58	2.00
12	-295.813	-296	12.00	0.58	2.00
14	-414.119	-414	14.00	0.58	2.00

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

Equipment: pH Electrode **Manufacturer:** METTLER TOLEDO **Model:** InLab Solids
Serial No.: C507554932 **ID No.:** NA **Type:** Combined Electrode

Performance of Electrode system (Three-Point Calibration at pH 4, 7 and 9)

Certified Value @25 °C (pH)	Average Indicator Reading pH	mV	Relative Slope (%)	Uncertainty (± pH)	Coverage Factor (k)
4.008	4.01	184	-	0.0071	2.00
7.000	7.00	8	99.5	0.0086	2.00
10.010	10.01	-66	97.7	0.0085	2.00
6.876	6.88	15	-	0.0071	2.00

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

----- End of Report -----

F-CS-009 Revision: 02 Date: 01-10-68



nfi.or.th

Calibration Certificate

Certificate No.: 2601956-002-01

Page : 1 of 2

Equipment: Digital Thermometer with RTD (pH Meter)
Manufacturer: METTLER TOLEDO Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Model: SevenEasy pH Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Serial No.: 1231155210 Bangkok, Prakhonng, Bangkok 10260
ID No.: UAE.WAT.010/2563
Order No.: 2601956
Operation No.: 2601956-002
Date of Receipt: 20 February 2026
Date of Calibration: 23 February 2026

Metrological traceability:

- Calibration Method:
 - NFI Method W-TE-025 : based on comparison with a standard thermometer.
 - TM-CG01-TT01-V04: CALIBRATION OF DIGITAL THERMOMETER WITH TEMPERATURE SENSORS
 - The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).

Reference Standard Instrument:

Instrument	Model / Type	Serial No. / ID No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER	1523	2118154	PSL-T 0926/58	26-Jun-26	TISTR
Platinum Resistance Thermometer (PRT)	5627A	877332			

Support Equipment: - Low Temperature Bath (AMETEK RTC-187), Model: RTC-187C, SN: 670930-00018

- This certificate is traceable to the international system of units (SI).
- This certificate is valid only for the instrument that was calibrated.
- The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by Mr.Manas Somsak
Specialist

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

Date of Issue: 2 March 2026

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: 02 Date: 01-10-66



Calibration Certificate

Certificate No.: 2601956-002-01

Page : 2 of 2

Calibration Condition : Place of Calibration: Chemical Calibration Laboratory
Equipment: Digital Thermometer with RTD National Food Institute
UUC* Resolution: 0.1 °C Environment Conditions: Ambient Temperature (23.1 ± 0.3) °C
Condition of the item: Normal & Good Relative Humidity (49.8 ± 2) %
Without adjustment / AS FOUND Line Voltage (220 ± 10) V.

Calibration results:

- Temperature Measurement Results

Calibration Point (°C)	Standard Thermometer Value (°C)	UUC* Reading Value (°C)	UUC* Correction Value (°C)	Measurement Uncertainty (± °C)
20	20.002	20.1	-0.1	0.098
25	25.001	25.1	-0.1	0.098
30	30.003	30.1	-0.1	0.098

Note

- UUC* : Unit Under Calibration
- The probe was immersed in a liquid bath or a dry bath to a minimum depth of 120 mm.
- Description of probe, model : N/A SN : N/A
- Dimension of probe : Diameter 4 mm Length 120 mm Sheath material: Plastic

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 of Report -----

F-CS-009 Revision: 02 Date: 01-10-66





Hanna Instruments (Thailand) Ltd.

410/67-68 Soi Ratchadapisek 24, Ratchadapisek Rd., Samsen-nok,
Huaykwang, Bangkok 10310 Tel: 0-2541-4199 Fax: 0-2541-4198

Certificate No. : C26030162

Page : 1 of 2

CERTIFICATE OF ANALYSIS

Equipment : Cyanuric Acid Portable Photometer
Meter Model : HI97722C **Serial No.** : 905060058111
Manufacturer : Hanna Instruments
Made in : Romania
Condition As-Received : Used Product
Reference : RE260497
Customer name : United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Rd., Bangchak
Phrakhanong, Bangkok 10260
Received date : 12 March 2026
Calibrate date : 17 March 2026
Issue date : 18 March 2026
Ambient Temperature : (25 ± 2)°C
Relative Humidity : (50 ± 15)%RH
Calibrated Location : Hanna Instruments (Thailand) Ltd.

Calibrated by : Mr. Pichit Petthong

Approved by :

(Mr. Anan Suwanchaisakul)

Authorized Signatory



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

This certificate may not be reproduced other than in full, except with the prior written approval of the head of Hanna Instruments (Thailand) Ltd.

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Form EIT 6/1/2026



Certificate No. : C26030162

Page : 2 of 2

Condition of this result :

Product name : Cyanuric Acid

Product code : HI97722-11

Lot number : SC0221/26

Best used before : May 2028

Standard Cuvettes specifications @ 25°C :

Standard cuvette code	Lot number	Standard value (mg/L)	Lot standard deviation (mg/L)
A ZERO	9661	0	0.002
HI97722B	9432	20	0.104

Specifications for validation procedure :

Standard cuvette	Lot number	Validation standard value (mg/L)	Lot acceptable reading (mg/L)
HI97722B	9432	20 ± 1	19 to 21

Method : Adaptation of the turbidimetric method

Result :

Cyanuric Acid Standard (mg/L)	Reading (mg/L)	Error (mg/L)
0	0	0
20 ± 1	20	0

** End of certificate **

เอกสารไม่ควบคุม

Form EIT 6/1/2026

FOSS

Customer Service Report

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

Report No.: 15257

Date: Feb 12, 2026
Job No.: 14590
Instrument: DT2520

Customer: UAE
Address: Bangkok
Serial: 91905060

Start Finish
Travel To Customer (Hrs) Labour (Hrs) Travel From Customer (Hrs)
13.30 1.5 15.00

Job Type					
Application	Special	Standard			
Distributor	Courtesy Visit	Installation	In House		
Digital Service	PMA Approval Check	Quote	PN		
Internal	Warranty -	Repair	HC Visit		
Training	Sales Support	Investigate	Others		

PMA Type	Smartcare	Smartcare Pro	Fosscare	
	Smartcare Advance	Fosscare Pro	N/A	

Details of Work / Test	
- PM	
- Visual Check	
+ No leak	-ok
+ No damage	-ok
- change PM kit x 1 set	-ok
- Function Check	
+ Quick mode	
+ Set Temp / timer	-ok
+ Run	-ok
- heating	-ok
- Lift UP / down	-ok
- Clean x20 holes with grind head	
Instrument Ready for Use	OK

Part No:	Batch	Description	Q'ty
60079730	27.09.2025	Fold PM kit, Digestor 20 per, 12 units	1

I confirm this report is accurate and complete			
Signed FOSS		Signed Customer	
Name:	Annie Patchan / Jakhar	Name	ปัทมา
Tel:		Tel:	
Email:		Email:	

*Remark:

เอกสารไม่ควบคุม

Please scan QR code



FOSS

Customer Service Report

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

Report No.: 15256

Date: Feb 12, 2026
Job No.: 14589
Instrument: K19 Distillator

Customer: UAE
Address: Bangkok
Serial: 91905393

Start Finish
Travel To Customer (Hrs) Labour (Hrs) Travel From Customer (Hrs)
08.00 1.5 09.30 4

Job Type					
Application	Special	Standard			
Distributor	Courtesy Visit	Installation	In House		
Digital Service	PMA Approval Check	Quote	PM		
Internal	Warranty -	Repair	HC Visit		
Training	Sales Support	Investigate	Others		

PMA Type	Smartcare	Smartcare Pro	Fosscare	
	Smartcare Advance	Fosscare Pro	N/A	

Details of Work / Test	
- PM	
- Visual Check	
+ No leak	-ok
+ No damage	-ok
- change PM kit x 1 set	-ok
- Function Check	
+ Diffusion	-ok
+ Alkali	-ok
+ Receiver	-Not Use
+ Steam / Drain	-ok
Instrument Ready for Use	OK

Part No:	Batch	Description	Q'ty
60100196	11-03-2025	PM kit kjeltec 9 Distillator	1

I confirm this report is accurate and complete			
Signed FOSS		Signed Customer	
Name:	Annie Patchan / Jakhar	Name	ปัทมา
Tel:		Tel:	0619504097
Email:		Email:	pitiya.gukwan.14@gmail.com

*Remark:

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Please scan QR code



CERTIFICATE OF CALIBRATION

Certificate No. : SP26-013

Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Instrument room (207)

Equipment : UV-Vis Spectrophotometer

Manufacturer : Agilent Technologies

Model : Cary 60

Serial No. : MY15410009

ID No. : UAE.WAT.020/2558

Received Date : 18 May 2026

Calibration Date : 18 May 2026

Issue Date : 21 May 2026

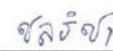
Condition Instrument : Good

Calibrated by :


(Mr.Pacit Mathavorn)

Calibration Engineer

Approved by :


(Ms.Chonticha Sangngern)

Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 DQE Services Co., Ltd.

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

REPORT OF CALIBRATION

Certificate No. : SP26-013

Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 0.5 °C

Relative humidity 55 ± 2 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	136858	5 November 2027
Absorbance Standard set	25757	136848	5 November 2027
Wavelength Standard set	25806	136824	5 November 2027
Wavelength Standard set	25758	136827	5 November 2027

Traceability : This certification is traceable to the International System of Unit maintained at National -

Institute of Standards and Technology (NIST) through Sarna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 60 nm/min

Scan Interval of UUC : 0.15 nm.

Resolution of UUC : Photometric 0.000 Abs.

Wavelength 0.1 nm.

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

REPORT OF CALIBRATION

Certificate No. : SP26-013

Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
420	0.0000	0.0001	-0.0001	0.0028	2.00
	0.5772	0.5731	0.0041	0.0031	2.00
	1.0478	1.0427	0.0051	0.0029	2.00
	2.1879	2.1782	0.0097	0.0075	2.00
440	0.0000	0.0000	0.0000	0.0028	2.00
	0.5581	0.5574	0.0007	0.0034	2.00
	1.0224	1.0210	0.0014	0.0035	2.00
	2.1227	2.1159	0.0068	0.0083	2.00
465	0.0000	0.0000	0.0000	0.0028	2.00
	0.5225	0.5184	0.0041	0.0029	2.00
	0.9628	0.9603	0.0025	0.0028	2.00
	1.9744	1.9698	0.0046	0.0073	2.00
546.1	0.0000	0.0000	0.0000	0.0028	2.00
	0.5174	0.5150	0.0024	0.0031	2.00
	0.9990	0.9964	0.0026	0.0033	2.00
	1.9953	1.9884	0.0069	0.0085	2.00
590	0.0000	0.0000	0.0000	0.0028	2.00
	0.5508	0.5491	0.0017	0.0030	2.00
	1.0801	1.0781	0.0020	0.0029	2.00
	2.0356	2.0274	0.0082	0.0078	2.00
635	0.0000	0.0000	0.0000	0.0028	2.00
	0.5579	0.5570	0.0009	0.0031	2.00
	1.0512	1.0491	0.0021	0.0029	2.00
	1.9257	1.9201	0.0056	0.0079	2.00

เอกสารไม่ควบคุม

REPORT OF CALIBRATION

Certificate No. : SP26-013

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Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
235	0.0000	0.0000	0.0000	0.0050	2.00
	0.7455	0.7457	-0.0002	0.0056	2.00
257	0.0000	0.0000	0.0000	0.0050	2.00
	0.8656	0.8669	-0.0013	0.0059	2.00
313	0.0000	0.0000	0.0000	0.0050	2.00
	0.2910	0.2907	0.0003	0.0051	2.00
350	0.0000	0.0000	0.0000	0.0050	2.00
	0.6414	0.6414	0.0000	0.0055	2.00

เอกสารไม่ควบคุม

REPORT OF CALIBRATION

Certificate No. : SP26-013

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Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor <i>k</i>
241.70	241.6	0.10	0.18	2.00
279.44	279.2	0.24	0.18	2.00
287.71	287.6	0.11	0.18	2.00
334.02	333.5	0.52	0.18	2.00
360.89	360.2	0.69	0.18	2.00
418.53	417.8	0.73	0.18	2.00
445.82	445.2	0.62	0.18	2.00
453.67	453.0	0.67	0.18	2.00
459.99	459.6	0.39	0.18	2.00
536.52	536.4	0.12	0.18	2.00
638.00	638.2	-0.20	0.18	2.00
431.22	430.5	0.72	0.18	2.00
472.66	472.2	0.46	0.18	2.00
513.39	513.3	0.09	0.18	2.00
528.90	528.7	0.20	0.18	2.00
572.99	573.6	-0.61	0.18	2.00
585.19	585.7	-0.51	0.20	2.00
684.50	684.5	0.00	0.18	2.00
741.02	741.2	-0.18	0.20	2.00
748.56	749.0	-0.44	0.18	2.00
807.02	806.8	0.22	0.18	2.00
879.41	879.4	0.01	0.18	2.00

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement *U* is stated as the standard uncertainty of measurement multiplied by the coverage factor *k*, which for a normal distribution corresponds to a coverage probability of approximately 95%

- * Indicates non TISI accredited

- End of Certificate -

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

CERTIFICATE OF CALIBRATION

Certificate No. : SP26-014

Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Instrument room (207)

Equipment : UV-Vis Spectrophotometer

Manufacturer : HITACHI

Model : U-5100

Serial No. : 23A4-008

ID No. : UAE.WAS.010/2567

Received Date : 18 May 2026

Calibration Date : 18 May 2026

Issue Date : 21 May 2026

Condition Instrument : Good

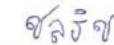
Calibrated by :



(Mr.Pacit Mathavom)

Calibration Engineer

Approved by :



(Ms.Chonticha Sangngern)

Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 DQE Services Co., Ltd.

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

REPORT OF CALIBRATION

Certificate No. : SP26-014

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Environment Condition : Ambient Temperature 25 ± 5 °CRelative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	136858	5 November 2027
Absorbance Standard set	25757	136848	5 November 2027
Wavelength Standard set	25806	136824	5 November 2027
Wavelength Standard set	25758	136827	5 November 2027

Traceability : This certification is traceable to the International System of Unit maintained at National -

Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 5.0 nm.

Scan Speed of UUC : 40

Scan Interval of UUC : 0.1 nm.

Resolution of UUC : Photometric 0.001 Abs.

Wavelength 0.1 nm.

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

REPORT OF CALIBRATION

Certificate No. : SP26-014

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Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5772	0.574	0.0032	0.0031	2.00
	1.0478	1.043	0.0048	0.0029	2.00
	2.1879	2.182	0.0059	0.0082	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5581	0.556	0.0021	0.0034	2.00
	1.0224	1.020	0.0024	0.0035	2.00
	2.1227	2.121	0.0017	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5225	0.518	0.0045	0.0029	2.00
	0.9628	0.961	0.0018	0.0028	2.00
	1.9744	1.974	0.0004	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5174	0.514	0.0034	0.0031	2.00
	0.9990	0.996	0.0030	0.0033	2.00
	1.9953	1.995	0.0003	0.0087	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5508	0.549	0.0018	0.0030	2.00
	1.0801	1.078	0.0021	0.0029	2.00
	2.0356	2.028	0.0076	0.0079	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5579	0.558	-0.0001	0.0031	2.00
	1.0512	1.050	0.0012	0.0029	2.00
	1.9257	1.923	0.0027	0.0083	2.00

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

REPORT OF CALIBRATION

Certificate No. : SP26-014

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Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7455	0.744	0.0015	0.0056	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8656	0.863	0.0026	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2910	0.290	0.0010	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6414	0.640	0.0014	0.0055	2.00

REPORT OF CALIBRATION

Certificate No. : SP26-014

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Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor <i>k</i>
241.00	240.3	0.70	0.18	2.00
279.30	278.9	0.40	0.18	2.00
288.90	288.2	0.70	0.18	2.00
334.50	333.8	0.70	0.18	2.00
361.40	360.7	0.70	0.18	2.00
418.40	417.9	0.50	0.18	2.00
447.20	446.6	0.60	0.18	2.00
459.30	459.4	-0.10	0.18	2.00
537.00	536.5	0.50	0.18	2.00
638.00	637.3	0.70	0.18	2.00
441.29	440.6	0.69	0.18	2.00
479.88	479.2	0.68	0.18	2.00
513.75	513.0	0.75	0.18	2.00
528.59	528.1	0.49	0.18	2.00
575.10	574.5	0.60	0.18	2.00
585.56	585.0	0.56	0.20	2.00
684.70	684.2	0.50	0.18	2.00
740.51	739.9	0.61	0.20	2.00
747.61	747.0	0.61	0.18	2.00
807.04	806.5	0.54	0.18	2.00
879.68	879.0	0.68	0.18	2.00

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement *U* is stated as the standard uncertainty of measurement multiplied by the coverage factor *k*, which for a normal distribution corresponds to a coverage probability of approximately 95%

- * indicates non TISI accredited

- End of Certificate -

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

เอกสารไม่ควบคุม

FM-708-02 R01 1/11/2021

Calibration Certificate

Certificate No.: 2602303-001-01

Page : 1 of 2

Equipment: CHAMBER (Incubator)
Manufacturer: MEMMERT
Model: IPP260
Serial No.: V615.0187
ID No.: UAE.MIC.003/2559
Order No.: 2602303
Operation No.: 2602303-001
Date of Receipt: 11 March 2026
Date of Calibration: 11 March 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Address: 3 Soi Udomsuk 41, Sukhumvit Road,

Bangchack, Prakhlang, Bangkok 10260

Metrological traceability:

1. Calibration Method:

- This instrument was calibrated by inserting 9 standard thermometers into its chamber, in accordance with WI-TE-014, based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).
- All data shown below are final values, and the initial data may be obtained upon request.

2. Reference Standard Instrument:

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	DAQ973A RTD	MY59008964 CHW101-109/ RTD#101-109	2502244-001-01	29 March 2026	NATIONAL FOOD INSTITUTE

3. This certificate is traceable to the International System of Units (SI).

4. This certificate is valid only for the instrument that was calibrated.

5. The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by Mr.Nuttapol Niyomchat
Specialist

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

Date of Issue: 10 March 2026

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: 02 Date: 01-10-68

2008 ๒๕๕๑-๒๕๕๒ ๓๕ ๒๕๕๓-๒๕๕๔ ๓๖ ๒๕๕๕-๒๕๕๖ ๓๗ ๒๕๕๗-๒๕๕๘ ๓๘ ๒๕๕๙-๒๕๖๐ ๓๙ ๒๕๖๑-๒๕๖๒ ๔๐ ๒๕๖๓-๒๕๖๔ ๔๒ ๒๕๖๕-๒๕๖๖ ๔๓ ๒๕๖๗-๒๕๖๘ ๔๔ ๒๕๖๙-๒๕๗๐ ๔๕ ๒๕๗๑-๒๕๗๒ ๔๖ ๒๕๗๓-๒๕๗๔ ๔๗ ๒๕๗๕-๒๕๗๖ ๔๘ ๒๕๗๗-๒๕๗๘ ๔๙ ๒๕๗๙-๒๕๘๐ ๕๐ ๒๕๘๑-๒๕๘๒ ๕๑ ๒๕๘๓-๒๕๘๔ ๕๒ ๒๕๘๕-๒๕๘๖ ๕๓ ๒๕๘๗-๒๕๘๘ ๕๔ ๒๕๘๙-๒๕๙๐ ๕๕ ๒๕๙๑-๒๕๙๒ ๕๖ ๒๕๙๓-๒๕๙๔ ๕๗ ๒๕๙๕-๒๕๙๖ ๕๘ ๒๕๙๗-๒๕๙๘ ๕๙ ๒๕๙๙-๒๕๖๐ ๖๐ ๒๕๖๑-๒๕๖๒ ๖๑ ๒๕๖๓-๒๕๖๔ ๖๒ ๒๕๖๕-๒๕๖๖ ๖๓ ๒๕๖๗-๒๕๖๘ ๖๔ ๒๕๖๙-๒๕๗๐ ๖๕ ๒๕๗๑-๒๕๗๒ ๖๖ ๒๕๗๓-๒๕๗๔ ๖๗ ๒๕๗๕-๒๕๗๖ ๖๘ ๒๕๗๗-๒๕๗๘ ๖๙ ๒๕๗๙-๒๕๘๐ ๗๐ ๒๕๘๑-๒๕๘๒ ๗๑ ๒๕๘๓-๒๕๘๔ ๗๒ ๒๕๘๕-๒๕๘๖ ๗๓ ๒๕๘๗-๒๕๘๘ ๗๔ ๒๕๘๙-๒๕๙๐ ๗๕ ๒๕๙๑-๒๕๙๒ ๗๖ ๒๕๙๓-๒๕๙๔ ๗๗ ๒๕๙๕-๒๕๙๖ ๗๘ ๒๕๙๗-๒๕๙๘ ๗๙ ๒๕๙๙-๒๕๖๐ ๘๐ ๒๕๖๑-๒๕๖๒ ๘๑ ๒๕๖๓-๒๕๖๔ ๘๒ ๒๕๖๕-๒๕๖๖ ๘๓ ๒๕๖๗-๒๕๖๘ ๘๔ ๒๕๖๙-๒๕๗๐ ๘๕ ๒๕๗๑-๒๕๗๒ ๘๖ ๒๕๗๓-๒๕๗๔ ๘๗ ๒๕๗๕-๒๕๗๖ ๘๘ ๒๕๗๗-๒๕๗๘ ๘๙ ๒๕๗๙-๒๕๘๐ ๙๐ ๒๕๘๑-๒๕๘๒ ๙๑ ๒๕๘๓-๒๕๘๔ ๙๒ ๒๕๘๕-๒๕๘๖ ๙๓ ๒๕๘๗-๒๕๘๘ ๙๔ ๒๕๘๙-๒๕๙๐ ๙๕ ๒๕๙๑-๒๕๙๒ ๙๖ ๒๕๙๓-๒๕๙๔ ๙๗ ๒๕๙๕-๒๕๙๖ ๙๘ ๒๕๙๗-๒๕๙๘ ๙๙ ๒๕๙๙-๒๕๖๐ ๑๐๐ ๒๕๖๑-๒๕๖๒ ๑๐๑ ๒๕๖๓-๒๕๖๔ ๑๐๒ ๒๕๖๕-๒๕๖๖ ๑๐๓ ๒๕๖๗-๒๕๖๘ ๑๐๔ ๒๕๖๙-๒๕๗๐ ๑๐๕ ๒๕๗๑-๒๕๗๒ ๑๐๖ ๒๕๗๓-๒๕๗๔ ๑๐๗ ๒๕๗๕-๒๕๗๖ ๑๐๘ ๒๕๗๗-๒๕๗๘ ๑๐๙ ๒๕๗๙-๒๕๘๐ ๑๑๐ ๒๕๘๑-๒๕๘๒ ๑๑๑ ๒๕๘๓-๒๕๘๔ ๑๑๒ ๒๕๘๕-๒๕๘๖ ๑๑๓ ๒๕๘๗-๒๕๘๘ ๑๑๔ ๒๕๘๙-๒๕๙๐ ๑๑๕ ๒๕๙๑-๒๕๙๒ ๑๑๖ ๒๕๙๓-๒๕๙๔ ๑๑๗ ๒๕๙๕-๒๕๙๖ ๑๑๘ ๒๕๙๗-๒๕๙๘ ๑๑๙ ๒๕๙๙-๒๕๖๐ ๑๒๐ ๒๕๖๑-๒๕๖๒ ๑๒๑ ๒๕๖๓-๒๕๖๔ ๑๒๒ ๒๕๖๕-๒๕๖๖ ๑๒๓ ๒๕๖๗-๒๕๖๘ ๑๒๔ ๒๕๖๙-๒๕๗๐ ๑๒๕ ๒๕๗๑-๒๕๗๒ ๑๒๖ ๒๕๗๓-๒๕๗๔ ๑๒๗ ๒๕๗๕-๒๕๗๖ ๑๒๘ ๒๕๗๗-๒๕๗๘ ๑๒๙ ๒๕๗๙-๒๕๘๐ ๑๓๐ ๒๕๘๑-๒๕๘๒ ๑๓๑ ๒๕๘๓-๒๕๘๔ ๑๓๒ ๒๕๘๕-๒๕๘๖ ๑๓๓ ๒๕๘๗-๒๕๘๘ ๑๓๔ ๒๕๘๙-๒๕๙๐ ๑๓๕ ๒๕๙๑-๒๕๙๒ ๑๓๖ ๒๕๙๓-๒๕๙๔ ๑๓๗ ๒๕๙๕-๒๕๙๖ ๑๓๘ ๒๕๙๗-๒๕๙๘ ๑๓๙ ๒๕๙๙-๒๕๖๐ ๑๔๐ ๒๕๖๑-๒๕๖๒ ๑๔๑ ๒๕๖๓-๒๕๖๔ ๑๔๒ ๒๕๖๕-๒๕๖๖ ๑๔๓ ๒๕๖๗-๒๕๖๘ ๑๔๔ ๒๕๖๙-๒๕๗๐ ๑๔๕ ๒๕๗๑-๒๕๗๒ ๑๔๖ ๒๕๗๓-๒๕๗๔ ๑๔๗ ๒๕๗๕-๒๕๗๖ ๑๔๘ ๒๕๗๗-๒๕๗๘ ๑๔๙ ๒๕๗๙-๒๕๘๐ ๑๕๐ ๒๕๘๑-๒๕๘๒ ๑๕๑ ๒๕๘๓-๒๕๘๔ ๑๕๒ ๒๕๘๕-๒๕๘๖ ๑๕๓ ๒๕๘๗-๒๕๘๘ ๑๕๔ ๒๕๘๙-๒๕๙๐ ๑๕๕ ๒๕๙๑-๒๕๙๒ ๑๕๖ ๒๕๙๓-๒๕๙๔ ๑๕๗ ๒๕๙๕-๒๕๙๖ ๑๕๘ ๒๕๙๗-๒๕๙๘ ๑๕๙ ๒๕๙๙-๒๕๖๐ ๑๖๐ ๒๕๖๑-๒๕๖๒ ๑๖๑ ๒๕๖๓-๒๕๖๔ ๑๖๒ ๒๕๖๕-๒๕๖๖ ๑๖๓ ๒๕๖๗-๒๕๖๘ ๑๖๔ ๒๕๖๙-๒๕๗๐ ๑๖๕ ๒๕๗๑-๒๕๗๒ ๑๖๖ ๒๕๗๓-๒๕๗๔ ๑๖๗ ๒๕๗๕-๒๕๗๖ ๑๖๘ ๒๕๗๗-๒๕๗๘ ๑๖๙ ๒๕๗๙-๒๕๘๐ ๑๗๐ ๒๕๘๑-๒๕๘๒ ๑๗๑ ๒๕๘๓-๒๕๘๔ ๑๗๒ ๒๕๘๕-๒๕๘๖ ๑๗๓ ๒๕๘๗-๒๕๘๘ ๑๗๔ ๒๕๘๙-๒๕๙๐ ๑๗๕ ๒๕๙๑-๒๕๙๒ ๑๗๖ ๒๕๙๓-๒๕๙๔ ๑๗๗ ๒๕๙๕-๒๕๙๖ ๑๗๘ ๒๕๙๗-๒๕๙๘ ๑๗๙ ๒๕๙๙-๒๕๖๐ ๑๘๐ ๒๕๖๑-๒๕๖๒ ๑๘๑ ๒๕๖๓-๒๕๖๔ ๑๘๒ ๒๕๖๕-๒๕๖๖ ๑๘๓ ๒๕๖๗-๒๕๖๘ ๑๘๔ ๒๕๖๙-๒๕๗๐ ๑๘๕ ๒๕๗๑-๒๕๗๒ ๑๘๖ ๒๕๗๓-๒๕๗๔ ๑๘๗ ๒๕๗๕-๒๕๗๖ ๑๘๘ ๒๕๗๗-๒๕๗๘ ๑๘๙ ๒๕๗๙-๒๕๘๐ ๑๙๐ ๒๕๘๑-๒๕๘๒ ๑๙๑ ๒๕๘๓-๒๕๘๔ ๑๙๒ ๒๕๘๕-๒๕๘๖ ๑๙๓ ๒๕๘๗-๒๕๘๘ ๑๙๔ ๒๕๘๙-๒๕๙๐ ๑๙๕ ๒๕๙๑-๒๕๙๒ ๑๙๖ ๒๕๙๓-๒๕๙๔ ๑๙๗ ๒๕๙๕-๒๕๙๖ ๑๙๘ ๒๕๙๗-๒๕๙๘ ๑๙๙ ๒๕๙๙-๒๕๖๐ ๒๐๐ ๒๕๖๑-๒๕๖๒ ๒๐๑ ๒๕๖๓-๒๕๖๔ ๒๐๒ ๒๕๖๕-๒๕๖๖ ๒๐๓ ๒๕๖๗-๒๕๖๘ ๒๐๔ ๒๕๖๙-๒๕๗๐ ๒๐๕ ๒๕๗๑-๒๕๗๒ ๒๐๖ ๒๕๗๓-๒๕๗๔ ๒๐๗ ๒๕๗๕-๒๕๗๖ ๒๐๘ ๒๕๗๗-๒๕๗๘ ๒๐๙ ๒๕๗๙-๒๕๘๐ ๒๑๐ ๒๕๘๑-๒๕๘๒ ๒๑๑ ๒๕๘๓-๒๕๘๔ ๒๑๒ ๒๕๘๕-๒๕๘๖ ๒๑๓ ๒๕๘๗-๒๕๘๘ ๒๑๔ ๒๕๘๙-๒๕๙๐ ๒๑๕ ๒๕๙๑-๒๕๙๒ ๒๑๖ ๒๕๙๓-๒๕๙๔ ๒๑๗ ๒๕๙๕-๒๕๙๖ ๒๑๘ ๒๕๙๗-๒๕๙๘ ๒๑๙ ๒๕๙๙-๒๕๖๐ ๒๒๐ ๒๕๖๑-๒๕๖๒ ๒๒๑ ๒๕๖๓-๒๕๖๔ ๒๒๒ ๒๕๖๕-๒๕๖๖ ๒๒๓ ๒๕๖๗-๒๕๖๘ ๒๒๔ ๒๕๖๙-๒๕๗๐ ๒๒๕ ๒๕๗๑-๒๕๗๒ ๒๒๖ ๒๕๗๓-๒๕๗๔ ๒๒๗ ๒๕๗๕-๒๕๗๖ ๒๒๘ ๒๕๗๗-๒๕๗๘ ๒๒๙ ๒๕๗๙-๒๕๘๐ ๒๓๐ ๒๕๘๑-๒๕๘๒ ๒๓๑ ๒๕๘๓-๒๕๘๔ ๒๓๒ ๒๕๘๕-๒๕๘๖ ๒๓๓ ๒๕๘๗-๒๕๘๘ ๒๓๔ ๒๕๘๙-๒๕๙๐ ๒๓๕ ๒๕๙๑-๒๕๙๒ ๒๓๖ ๒๕๙๓-๒๕๙๔ ๒๓๗ ๒๕๙๕-๒๕๙๖ ๒๓๘ ๒๕๙๗-๒๕๙๘ ๒๓๙ ๒๕๙๙-๒๕๖๐ ๒๔๐ ๒๕๖๑-๒๕๖๒ ๒๔๑ ๒๕๖๓-๒๕๖๔ ๒๔๒ ๒๕๖๕-๒๕๖๖ ๒๔๓ ๒๕๖๗-๒๕๖๘ ๒๔๔ ๒๕๖๙-๒๕๗๐ ๒๔๕ ๒๕๗๑-๒๕๗๒ ๒๔๖ ๒๕๗๓-๒๕๗๔ ๒๔๗ ๒๕๗๕-๒๕๗๖ ๒๔๘ ๒๕๗๗-๒๕๗๘ ๒๔๙ ๒๕๗๙-๒๕๘๐ ๒๕๐ ๒๕๘๑-๒๕๘๒ ๒๕๑ ๒๕๘๓-๒๕๘๔ ๒๕๒ ๒๕๘๕-๒๕๘๖ ๒๕๓ 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Calibration Certificate

Certificate No.: 2602303-003-01

Page : 1 of 2

Equipment: CHAMBER (Incubator)
Manufacturer: MEMMERT
Model: IPP260
Serial No.: V618.0033
ID No.: UAE.MIC.021/2561
Order No.: 2602303
Operation No.: 2602303-003
Date of Receipt: 11 March 2026
Date of Calibration: 11 March 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakanong, Bangkok 10260

Metrological traceability:

1. Calibration Method:

- This instrument was calibrated by inserting 9 standard thermometers into its chamber, in accordance with WI-TE-014, based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).
- All data shown below are final values, and the initial data may be obtained upon request.

2. Reference Standard Instrument:

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A RTD	MY58003377 CH#101-100/ RTD#101-100	2601300-001-01	10 January 2027	NATIONAL FOOD INSTITUTE

3. This certificate is traceable to the International System of Units (SI).

4. This certificate is valid only for the instrument that was calibrated.

5. The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by Mr. Manas Somsak
Specialist

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

Date of Issue: 18 March 2026

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 02 Date: 01-10-68



Calibration Certificate

Certificate No.: 2602303-003-01

Page : 2 of 2

Calibration Condition:

Equipment: CHAMBER (Incubator) Place of Calibration: Microbiology Laboratory (302)
UUC* Resolution: 0.1 °C UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Condition of the item: Normal & Good Environment Conditions: Ambient Temperature (25.5 ± 1) °C
Without adjustment / As Found Relative Humidity (59.1 ± 3) %
- Time of record 1 hour 9 minute / point Line Voltage (223 ± 3) V.

Calibration Results:

Table 1 : Reporting of Temperature

Calibration Point (°C)	Std.#1	Std.#2	Std.#3	Std.#4	Std.#5	Std.#6	Std.#7	Std.#8	Std.#9	Measurement Uncertainty (±°C)
22.0	22.39	22.34	22.25	22.24	21.69	22.02	21.96	21.99	22.11	0.27
25.0	25.39	25.30	25.24	25.25	25.12	25.12	25.04	25.08	25.18	0.27

Table 2 : Reporting of Characterization Results

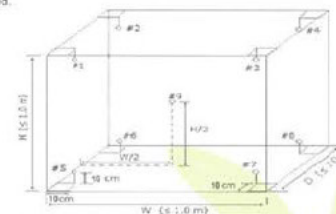
UUC* Setting (°C)	Max	UUC* Reading (°C) Min	Average	Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
22.0	22.0	22.0	22.0	0.029	0.28	0.46
25.0	25.0	25.0	25.0	0.049	0.17	0.37

Note

- UUC* : Unit Under Calibration
- The quoted uncertainty includes contributions from 'Stability' and 'Loading Effect' (20% of Temperature Uniformity).
- Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.
- 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.
- Overall Variation = The difference of The maximum and minimum measured temperatures throughout observation time.

For more information, details of the sensor installation should be reported.

Fresh air Damper	-	Open	-	Position
	X	Close	100%	Fan speed
		-	Not Available	
Dimension of inside chamber and sensor installation location (cm)				
W x H x D	64	x	60	x 50
a x b x c	10	x	10	x 10



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 of Report -----

F-CS-009 Revision 02 Date: 01-10-68





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert. No.: 26TM193
Page : 1 of 3

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 14
Serial No. : L416.0606
ID No. : MIC.002/2560
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory (302)
Received Order : 02 February 2026
Calibration Date : 02 February 2026
Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$
Relative Humidity : $(50 \pm 30) \%$
AC Line Voltage : $(220 \pm 22) \text{ V}$
Calibrated by : Krisda Malee

Approved by :
☐ Chakrit Waewwanjua
☐ Suwit Imjai
☒ Kunchit Promprat
Issue Date : 17 February 2026

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 : 2602-0004OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 26TM193
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)					Uncertainty (± °C)
			Position					
			1	2	3	4	5 (ref.)	
44.5	44.5	44.5	44.493	44.480	44.472	44.487	44.488	0.15

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
44.5	0.065	0.041	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



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2602-0004OC-1
Procedure Used :-

Cert. No.: 26TM193
Page : 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT04 Based on ASTM E715 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	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	25LM117	TPA	17 Jul 2026

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

3. This measurement result is traceable to the International System of Unit maintained through :

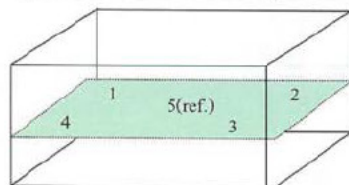
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	24	51	220
Finished of Calibration	25	53	221



Front

Position :	Ref. Std. ID No.:
1	4803988-001
2	4803988-002
3	4803988-003
4	4803988-004
5(ref.)	4803988-005

เอกสารไม่ควบคุม



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert. No.: 26TM194
Page : 1 of 3

Equipment : Water Bath

Manufacturer : Memmert

Model : WNE 14

Serial No. : L416.0612

ID No. : MIC.003/2560

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

Location : Microbiology Laboratory (302)

Received Order : 02 February 2026

Calibration Date : 02 February 2026

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

AC Line Voltage : (220 ± 22) V

Calibrated by : Krisda Malee

Kunchit

Approved by :

Approved Signatory

() Chakrit Waewwanjua

() Suwit Imjai

(✓) Kunchit Promprat

Issue Date : 17 February 2026

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 : 2602-0004OC-2
Procedure Used :-

Cert. No.: 26TM194
Page : 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT04 Based on ASTM E715 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	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	25LM117	TPA	17 Jul 2026

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

3. This measurement result is traceable to the International System of Unit maintained through :

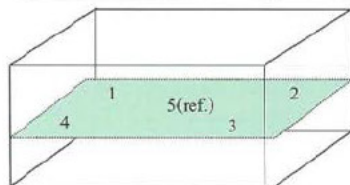
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Vclt)
Beginning of Calibration	25	52	221
Finished of Calibration	24	51	220



Front

Position :	Ref. Std. ID No.:
1	4803968-001
2	4803968-002
3	4803968-003
4	4803968-004
5(ref.)	4803968-005

เอกสารไม่ควบคุม



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2602-0004OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 26TM194
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)					Uncertainty (± °C)
			Position					
			1	2	3	4	5 (ref.)	
44.5	44.6	44.6	44.518	44.463	44.472	44.508	44.521	0.15

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
44.5	0.11	0.044	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

Calibration Certificate

Certificate No.: 2602303-007-01

Page : 1 of 2

Equipment: Autoclave
Manufacturer: ALP
Model: CL-4(L)
Serial No.: 808763
ID No.: UAE.MIC.026/2563
Order No.: 2602303
Operation No.: 2602303-007
Date of Receipt: 11 March 2026
Date of Calibration: 11 March 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udorn Suk 41, Sukhumvit Road
Bangchack, Prakhong, Bangkok 10260

Metrological traceability:

1. Calibration Method:

- This instrument was calibrated by inserting 3 standard data loggers with RTDs into its autoclave, in accordance with W-TE-018, based on BS 2645-1:2021, Autoclaves for sterilization in laboratories Part 1: Design, construction, safety and performance - specification.
- The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).
- All data shown below are final values, and the initial data may be obtained upon request.

2. Reference Standard Instrument:

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with RTD (Data Logger)	HiTemp140-PT	S33753	2542245-002-01	22 March 2026	NATIONAL FOOD INSTITUTE
	HiTemp140	S25502	2641300-004-01	10 January 2027	NATIONAL FOOD INSTITUTE
	PRTemp140	R38546	2641300-003-01	10 January 2027	NATIONAL FOOD INSTITUTE

3. This certificate is traceable to the International System of Units (SI).

4. This certificate is valid only for the instrument that was calibrated.

5. The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by Mr.Nuttapol Niyomchat
Specialist

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

Date of Issue: 19 March 2026

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: 02 Date: 01-10-68

2008 ถนนสุขุมวิท 36 แขวงคลองตันใต้ เขตวัฒนา กรุงเทพมหานคร 10110
2008 Soi 36, Aryn Aryn Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10700, Thailand
Tel : +66(0) 2422 8688 Fax : +66(0) 2422 8545



nfi.or.th

Calibration Certificate

Certificate No.: 2602303-007-01

Page : 2 of 2

Calibration Condition:

Equipment: Autoclave
Resolution: 0.1 °C
Condition of the item: Normal & Good
Without adjustment / As Found
- Setting program function sterilization: STERILIZE/NORMAL
- Time of sterilization: 15 Minute at 115.0, 121.0 °C

Place of Calibration: Room 301
UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Environment Conditions: Ambient Temperature (26.0 ± 1) °C
Relative Humidity (47.5 ± 3) %
Line Voltage (228.5 ± 4) V

Calibration Results:

Table 1 : Reporting of Temperature

Calibration Point (°C)	Measured Temperature (°C) @ Sensor No.			Measurement Uncertainty (±°C)
	Std.# 1	Std.# 2 (REF)	Std.# 3	
115.0	115.29	115.33	115.37	0.64
121.0	121.17	121.18	121.06	0.64

Table 2 : Reporting of Characterization Results

UUC Setting (°C)	UUC Reading (°C)				Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	Max	Min	Average	MPa			
115.0	115.1	114.9	115.0	0.08	0.23	0.53	0.51
121.0	121.1	120.9	121.0	0.12	0.24	0.37	0.67

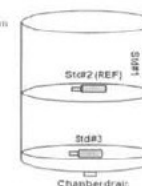
Note

- UUC : Unit Under Calibration
- The quoted uncertainty include "Stability" and "Loading effect (20% of Temp Uniformity)"
- Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.
- 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.
- Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

For more information, details of the sensor installation should be reported.

Standard at position

Std #1 - Attached to the least temperature probe, within 20 mm
Std #2 (REF) - In the upper half of the chamber
Std #3 - In the chamber drain, within 100 mm



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

----- End of Report -----

F-CS-009 Revision: 02 Date: 01-10-68

2008 ถนนสุขุมวิท 36 แขวงคลองตันใต้ เขตวัฒนา กรุงเทพมหานคร 10110
2008 Soi 36, Aryn Aryn Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10700, Thailand
Tel : +66(0) 2422 8688 Fax : +66(0) 2422 8545



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Calibration Certificate

Certificate No.: 2603377-001-01

Page : 1 of 2

Equipment: Autoclave
Manufacturer: ALP
Model: CL-4CL
Serial No.: 810010
ID No.: UAE.MIC.032/2565
Order No.: 2603377
Operation No.: 2603377-001
Date of Receipt: 4 June 2026
Date of Calibration: 4 June 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Address: 3 Soi Udon Suk 41, Sukhumvit Road,
Bangchack, Prakhong, Bangkok 10260

Metrological traceability:

1. Calibration Method:

- This instrument was calibrated by inserting 3 standard data loggers with RTDs into its autoclave, in accordance with W-TE-018, based on BS 2645-1:2021, Autoclaves for sterilization in laboratories Part 1: Design, construction, safety and performance - specification.
- The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).
- All data shown below are final values, and the initial data may be obtained upon request.

2. Reference Standard Instrument:

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with RTD (Data Logger)	HiTemp140-PT	T20607	2602103-005-01	7 March 2027	NATIONAL FOOD INSTITUTE
	HiTemp140-PT	T20610	2602103-003-01	7 March 2027	NATIONAL FOOD INSTITUTE
	HiTemp140-PT	T20615	2602103-007-01	7 March 2027	NATIONAL FOOD INSTITUTE

3. This certificate is traceable to the International System of Units (SI).

4. This certificate is valid only for the instrument that was calibrated.

5. The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by Mr.Yothin Chaoensuk
Scientist

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

Date of Issue: 9 June 2026

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: 03 Date: 30-03-49

เอกสารไม่ควบคุม

Calibration Certificate

Certificate No.: 2603377-001-01

Page : 2 of 2

Calibration Condition:

Equipment: Autoclave
Resolution: 0.1 °C
Condition of the item: Normal & Good
Without adjustment / As Found
- Setting program function sterilization STERILIZE/NORMAL
- Time of sterilization 15 Minute at 115.0 and 121.0 °C

Place of Calibration: Microbiology Laboratory (301)
UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Environment Conditions: Ambient Temperature (27.0 ± 1) °C
Relative Humidity (88.8 ± 1) %
Line Voltage (224.6 ± 1) V.

Calibration Results:

Table 1 : Reporting of Temperature

Calibration Point (°C)	Std.# 1	Measured Temperature (°C) @ Sensor No.	Std.# 2 (REF)	Std.# 3	Measurement Uncertainty (±°C)
115.0	115.41		115.42	115.39	0.64
121.0	121.43		121.44	121.41	0.64

Table 2 : Reporting of Characterization Results

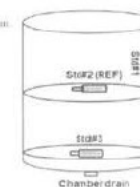
UUC* Setting (°C)	Max	UUC* Reading (°C)	Average	MPa	Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
115.0	115.0	115.0	115.0	0.10	0.13	0.13	0.26
121.0	121.0	121.0	121.0	0.12	0.17	0.12	0.36

Note

- UUC* : Unit Under Calibration
- The quoted uncertainty include "Stability" and "Loading effect (20% of Temp Uniformity)"
- Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.
- 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.
- Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

For more information, details of the sensor installation should be reported.

Standard at position
Std #1 Attached to the lead temperature probe, within 26 mm
Std #2 (REF) In the upper half of the chamber
Std #3 In the chamber drain, within 100 mm



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 of Report -----

F-CS-009 Revision: 03 Date: 30-03-49

เอกสารไม่ควบคุม