

ภาคผนวก จ

สำเนาเอกสารรับรองเครื่องมือการตรวจวัด



NSC-718-716.17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-300653-1

Submitted by : M Green Group Co.,Ltd.

188/46 Wisutesuknakon 25, Pracha-Uttd Rd., Thungkru, Bangkok 10140 Thailand

Equipment : Cylinder

Manufacturer : GLASSCO

Class : A

Capacity : 100 ml

Graduation : 1 ml

ID No. : CY100/01/24

Environment

Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1007.7 mbar.

Date of Received : 28 August 2025

Date of Calibration : 05 September 2025

Date of Issue : 05 September 2025

Calibrated by : Areerat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID No. 241002

Cert.No. 68-200298-1

Due Date 02 Dec 2025

Traceability

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Tovadee)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-300653-1

Result of Calibration : This result of true Volume is referred to standard temperature at 20 °C

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
100	100.61

Uncertainty of measurement with in ± 0.063 ml

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 = 2.00 , providing a level of confidence of approximately 95%

- o0o -





Certificate of Calibration

Certificate No. : 68-300653-2

Page : 1 of 2

Submitted by

: M Green Group Co.,Ltd.

188/46 Wisutesukrakchon 25, Pracha-Uttd Rd., Thungkru, Bangkok 10140 Thailand

Equipment

: Cylinder

Manufacturer : GLASSCO

Class : A

Capacity : 250 ml

Graduation : 2 ml

ID No. : CY250/01/19

Environment

: Ambient Temperature :

(20 ± 3) °C

Relative Humidity :

(50 ± 10) %

Air Pressure :

1007.7 mbar.

Date of Received

: 28 August 2025

Date of Calibration

: 05 September 2025

Date of Issue

: 05 September 2025

Calibrated by

: Areerat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID No.

Cert. No.

Due Date

Traceability

241002

68-200298-1

02 Dec 2025

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Tovadee)

Supervisor

Certificate No. : 68-300653-2

Page : 2 of 2

Result of Calibration : This result of true Volume is referred to standard temperature at 20 °C

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
250	251.21

Uncertainty of measurement with in ± 0.087 ml

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 = 2.00 , providing a level of confidence of approximately 95%

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Certificate of Calibration

Certificate No. : 68-300653-3

Submitted by : M Green Group Co.,Ltd.

188/46 Wisatesuknakhon 25, Pracha-Uthid Rd., Thungkru, Bangkok 10140 Thailand

Equipment : Cylinder

Manufacturer : GLASSCO

Class : A

Capacity : 1000 ml

Graduation : 10 ml

ID No. : CY1000/01/24

Environment

Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1007.7 mbar.

Date of Received : 28 August 2025

Date of Calibration : 05 September 2025

Date of Issue : 05 September 2025

Calibrated by : Areerat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance

ID No. **Cert.No.** **Due Date** **Traceability**

241002 68-200298-1 02 Dec 2025

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Towadee)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-300653-3

Result of Calibration : This result of true Volume is referred to standard temperature at 20 °C

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
1000	1002.97

Uncertainty of measurement with in ± 0.17 ml

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 = 2.00 , providing a level of confidence of approximately 95%

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(Wipa Towadee)
Supervisor





Certificate of Calibration

Certificate No. : 68-410130-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisetusuknakhon 25, Pracha-Uttd Rd., Thungkru, Bangkok 10140 Thailand

Equipment :

Digital Thermo-Hygrometer

Manufacturer : Digicon

Model : TH-02A

Range Temperature : 0 °C to 50 °C Resolution : 0.1 °C

Range Humidity : 20 %R.H. to 99 %R.H. Resolution : 1 %R.H.

Serial No. : 1819A0771796 ID No. : N/A

Environment :

Ambient Temperature : (23 ± 2) °C

Relative Humidity : (50 ± 15) %

Date of Received :

28 August 2025

Date of Calibration : 02 September to 04 September 2025

Date of Issue :

04 September 2025

Calibrated by :

Chortip Samchusri

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4013

by compared with standard probe sensor humidity/temperature into humidity/temperature chamber.

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

Digital Indicator with Standard Probe Temp&Hum

ID No.

Cert. No.

Due Date

Traceability

400034 & 400036

SG-H-00599/68

02 Jan 2026

Success Gateway Co., Ltd., Accredited by TISI Calibration No.0268

Approved by :

(Permon Chaiapu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-410130-1

Page : 2 of 2

UUC Condition As-Received : Good

Result of Calibration : Without Adjustment

Function : Temperature measurement

Reference Humidity @ 50 %R.H.

Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
19.97	19.7	0.3	0.46
24.97	24.7	0.3	0.46
29.99	29.6	0.4	0.46

Result of Calibration :

Without Adjustment

Function : Humidity measurement

Reference Temperature @ 25 °C

Standard Humidity (%R.H.)	UUC Reading (%R.H.)	Correction (%R.H.)	Uncertainty (± %R.H.)
40.01	37	3	2.2
60.00	56	4	2.3

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 of Calibration

Certificate No. : 68-200497-1

Page : 1 of 2

Submitted by :

M Green Group Co.,Ltd.

188/46 Wisatesuknakhon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 Thailand

Equipment :

Electronic Balance

Manufacturer : SHIMADZU

Model : AP225WD

Serial No. : D316300690

Capacity : 220 g

Resolution : 0.00001g/102g, 0.0001g/220g

Environment :

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

Ambient Temperature : (24.0 to 24.2) °C

Relative Humidity : (53.8 to 62.6) %

Air Pressure : 1008.0 mbar

Date of Received :

28 August 2025

Date of Calibration :

28 August 2025

Date of Issue :

04 September 2025

Calibrated by :

Akaradith 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 :

(Satja Sangkhum)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-200497-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

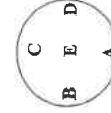
Nominal Value (g)	Correction (g)	Uncertainty ± (g)
0.001	0.00000	0.000016
0.01	0.00000	0.000016
0.1	0.00000	0.000018
1	0.00000	0.000027
10	0.00000	0.000053
20	-0.00002	0.000071
50	0.00004	0.00011
100	0.00009	0.00020
150	0.0001	0.00038
200	0.0000	0.00038

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 $k = 2.20$ providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g



A	B	C	D	E	F
0.00000	0.00008	0.00009	-0.00001	0.00000	g

Repeatability

Load test : 200 g

Sidev. : 0.000053 g

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S K SALES AND SERVICE CO.,LTD.
194/56, 194/57 Thaknam Rd. Samsoe Dam
Bang Khun Thian Bangkok 10150
Tel : 02-417-2144 Fax : 02-417-2155



Certificate of Calibration

Reference No. : 3677/2512-088
Customer : M green Group Co.,Ltd.
: 188/46 Wisatesuknakhon 25, Pracha-Utd Rd.,
: Thungkru Bangkok 10140 Thailand
Equipment : Heating Block
Manufacturer : MIULAB
Model : DKT200-2
Serial No. : MU-EC7-91255
ID No. :
Received Date : 15 December 2025
Calibrated Date : 19 December 2025
Issued Date : 22 December 2025

Environment	Start	Stop
Ambient Temperature (°C)	24.3	25.4
Relative Humidity (% RH)	62	63

Place Of Calibration : Temperature Calibration Room
Calibrated by : Mr. Thanapop Klaikaew
Calibration Method : SK-WJ-017

Condition of this result of calibration

- Reference standard instrument
Instrument Serial No. Certificate No. Due Date
1) Data Acquisition with sensor MY41085938 L2511-0001 30 April 2026
- This result of calibration was found accurate as shown on date and place of calibration only
- This certificate can be traceable to International System of Unit :

- Through Temperature Laboratory, SK Sales and Service Co.,Ltd.

Approved by :

Supachai Sakst

(Mr.Supachai Sakst)
Authorized Signatory



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

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Certificate No. : L2512-1005

Page 2 of 2

Result of Calibration Range : 150 (°C)
Resolution : 0.1 (°C)

Channel	UUC Setting (°C)	UUC Reading (°C)	STD Reading (°C)	UUC Error (°C)	Measurement Uncertainty (± °C)
1	150	150.0	150.75	-0.75	0.10
2	150	150.0	150.75	-0.75	0.10
3	150	150.0	150.74	-0.74	0.10
4	150	150.0	150.75	-0.75	0.10
5	150	150.0	150.81	-0.81	0.10

STD= Standard
UUC= Unit Under Calibration

	1	2	3	4	5	6
A	1					2
B				5		
C						
D	3					4

** End of Calibration Report **

Supachai

Certificate of Calibration

Page : 1 of 2

Certificate No. : 68-300660-1

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

Equipment : Imhoff Cone
Manufacturer : VITLAB
Capacity : 1000 ml Graduation : 50 ml
ID No. : CY1000/01/22

Environment : Ambient Temperature : (20 ± 3) °C
Relative Humidity : (50 ± 10) %
Air Pressure : 1002.7 mbar.

Date of Received : 28 August 2025
Date of Calibration : 01 September 2025
Date of Issue : 01 September 2025
Calibrated by : Areerat Sornbun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-22

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

Electronic Balance
ID No. 241002 Cert. No. 68-200298-1 Due Date 02 Dec 2025 Traceability National Institute of Metrology (Thailand) (NIMT)

Approved by : 
(Wipa Tovadee)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%
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Certificate of Calibration

Page : 2 of 2

Certificate No. : 68-300660-1

Result of Calibration : This result of true Volume is referred to standard temperature at 20 °C

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
500	501.20
1000	1008.19

Uncertainty of measurement with in ± 0.17 ml

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 = 2.00 , providing a level of confidence of approximately 95%

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Certificate of Calibration

Page : 1 of 2

Certificate No. : 68-400473-3

Submitted by : M Green Group Co., Ltd.

188/46 Wisatsukhakdon 25, Pracha-Utd Rd., Thungkru Bangkok 10140 Thailand

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : Biobase

Range : 0 °C to 65 °C

Resolution : 0.1 °C

Serial No. : KYP1502202003

ID No. : N/A

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 : Pernpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

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

400046 & 400047 68-400410-2 26 Jan 2026

Traceability
National Institute of Metrology Thailand (NIMT)

Approved by :

(Pernpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

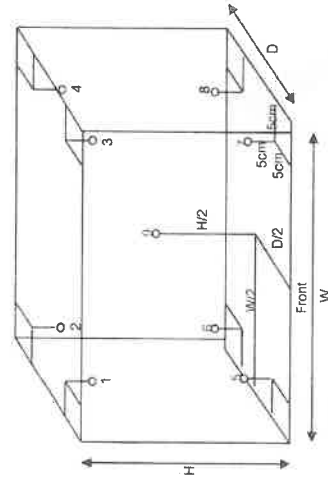
Certificate No. : 68-400473-3

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)
			0.86	0.86	0.48	0.48	
20.0	20.4	20.4					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%

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Certificate of Calibration

Page : 1 of 2

Certificate No. : 68-400490-1

Submitted by : M Green Group Co., Ltd.

188/46 Wisetuknakhon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 Thailand

Equipment : Liquid in Glass Thermometer

Manufacturer : N/A Model : N/A

Range : 0 °C to 100 °C Resolution : 1 °C

Serial No. : N/A Immersion : Total

ID No. : 94-49747

Environment : Ambient Temperature : (23 ± 2) °C

Relative Humidity : (50 ± 15) %

Line Voltage : (220 ± 22) VAC

Date of Received : 28 August 2025

Date of Calibration : 30 August 2025

Date of Issue : 30 August 2025

Calibrated by : Chortip Samchusri

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4001 based on ASTM E77-07 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

400001 TT-0023-24 16 Feb 2026

National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No. Cert. No. Due Date Traceability

400003 25E1656 22 May 2027

National Institute of Metrology Thailand (NIMT)

400004 25E1656 22 May 2027

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. : 68-400490-1

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Ice point check : UUC* reading 0 °C Standard reading -0.0320 °C

Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
39.8996	40	-0.1	0.31

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 of Calibration

Certificate No. : 68-400473-1

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisetukulhakdon 25, Pracha-Utd Rd., Thungkru Bangkok 10140 Thailand

Equipment : Temperature controlled enclosure (Oven)

Manufacturer : Memmert

Range : N/A °C

Serial No. : B419.1092

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

Ambient Temperature : (28.3 to 29.2) °C

Relative Humidity : (42.0 to 48.0) %

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 Thermocouple probe

ID.No. Cert.No. Due Date Traceability

400029 & 400030 68-400216-1 28 Oct 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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Certificate of Calibration

Certificate No. : 68-400473-1

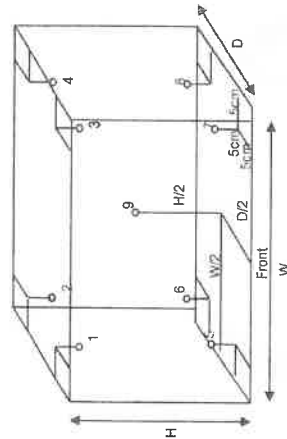
Page : 2 of 2

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 = 0.56 m
D = 0.40 m
H = 0.48 m
Capacity = 0.11 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	
103.0	103.0	103.0	103.5	103.0	104.7	103.5	102.3	102.6	104.2	101.9	102.8	0.88
104.0	104.0	104.0	104.5	104.0	105.6	104.5	103.3	103.6	105.2	102.9	103.8	0.84
105.0	105.0	105.0	105.4	105.0	106.7	105.5	104.3	104.6	106.2	103.9	104.9	0.84
150.0	150.0	150.0	150.5	150.1	153.1	150.8	148.4	149.1	152.0	147.9	149.5	1.3
180.0	180.0	180.0	180.9	180.2	184.0	181.0	177.8	178.8	182.5	177.0	179.2	1.5
Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)			Measured Stability (°C)			Overall Variation (°C)			
103.0	103.0	103.0			2.0			0.3			3.1	
104.0	104.0	104.0			1.9			0.2			3.0	
105.0	105.0	105.0			1.9			0.2	*		2.9	
150.0	150.0	150.0			3.8			0.4			5.5	
180.0	180.0	180.0			5.1			0.4			7.5	

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%

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Certificate of Calibration

Certificate No. : 68-420073-1

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatsukhakhon 25, Pracha-Utd 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 : ECF7252101B 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 : 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-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 :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-420073-1

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	177.4	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%

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Certificate of Calibration

Certificate No. : 68-400473-2 Page : 1 of 2

Submitted by : M Green Group Co., Ltd.
188/46 Wisatsukhakon 25, Pracha-Utd Rd., Thungkru Bangkok 10140 ThailandEquipment : Temperature controlled enclosure (Refrigerator)
Manufacturer : Biobase
Range : N/A °C
Serial No. : YC025025190108
Model : BXC-V250M (II)
Resolution : 0.1 °C
ID No. : N/A

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

Ambient Temperature : (28.3 to 29.2) °C
Relative Humidity : (42 to 48) %
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 ProbeID No. 400029 & 400048 Cert. No. 68-400411-1 Due Date 29 Jan 2026
Traceability National Institute of Metrology Thailand (NIMT)Approved by :
(Permpon Chanpu)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co., Ltd.



Certificate of Calibration

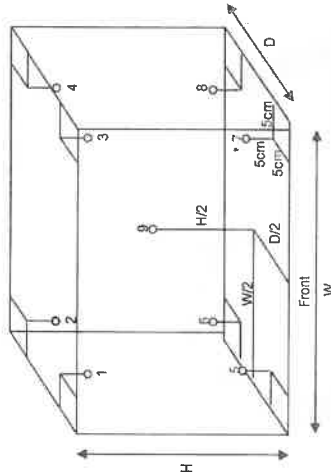
Certificate No. : 68-400473-2 Page : 2 of 2

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 = 0.50 m
D = 0.40 m
H = 1.20 m
Capacity = 0.24 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		
4.0	2.0	3.7	5.28	5.39	6.74	5.85	7.00	6.56	6.08	6.02	5.36	0.52	
			Measured			Uniformity (°C)			Measured			Overall Variation (°C)	
												1.84	

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-





Certificate of Calibration

Page : 1 of 2

Certificate No. : 68-400416-1

Submitted by : M Green Group Co., Ltd.

188/46 Wisatsukhakhon 25, Pracha-Utd Rd., Thungkru Bangkok 10140 Thailand

Equipment : Temperature Indicator with Thermistor Probe
Temperature IndicatorManufacturer : Eutech Model : pH 700
Range : N/A °C Resolution : 0.1 °C
Serial No. : 2884323 ID No. : N/AThermistor probe
Model : N/A Sheath Material : Stainless
Diameter : 3 mm. Length : 115 mm.
Serial No. : PH5TEMB01P 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 : Pempon 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 :

(Pempon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Page : 2 of 2

Certificate No. : 68-400416-1

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%

-o0o-





Certificate of Calibration

Certificate No. : 68-400473-4

Submitted by :

M Green Group Co., Ltd.

188/46 Wisatsukhakhon 25, Pracha-Utd Rd., Thungkru Bangkok 10140 Thailand

Equipment :

Water Bath

Manufacturer : Memmert

Model : WNB29

Range : N/A °C

Resolution : 0.1 °C

Serial No. : L619,0037

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 : Permporn Chanpu

Calibration Method :

This instrument was calibrated by In-house method CAL-M4006 based on ASTM E715-80

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 & 400024

30 Sep 2025

National Institute of Metrology Thailand (NIMT)

Approved by :

(Permporn Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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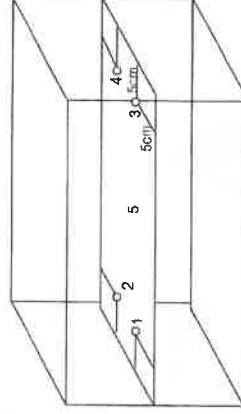
Certificate of Calibration

Certificate No. : 68-400473-4

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.					Uncertainty (± °C)	Measured Uniformity (°C)	Measured Stability (°C)
			1	2	3	4	5			
85.0	85.0	85.0	84.86	85.03	84.47	84.77	84.92	0.22	0.54	0.07

Remark The uncertainty is not combine uniformity of the water bath

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-



NSG-TS1-ITS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-210356-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisatsukrakhon 25, Pracha-Uthit Rd., Thungkru, Bangkok 10140 Thailand

Equipment :

Weight

Manufacturer : N/A

Material : Stainless Steel

Weight size : 1 g

ID No. : 63-210391-1

Assumed density of weight : 7950 kg / m³Assumed Air density : 1.2 kg / m³

Environment : Ambient Temperature : (20 ± 2) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1006.7 mbar

Date of Received : 28 August 2025

Date of Calibration : 01 September 2025

Date of Issue : 01 September 2025

Calibrated by : Wuttichai Swaiphong

Calibration Method : In-house method CAL-M2101 based on OIML R 111-1 : 2004(E)

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

Standard Weights

ID No. Cert. No. Due Date Traceability

E2413-E2425 MM-0044-25 11 Apr 2028

National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Sajja Sangthum)

Supervisor

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Certificate of Calibration

Certificate No. : 68-210356-1

Page : 2 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisatsukrakhon 25, Pracha-Uthit Rd., Thungkru, Bangkok 10140 Thailand

Equipment :

Weight

Manufacturer : N/A

Material : Stainless Steel

Weight size : 1 g

ID No. : 63-210391-1

Assumed density of weight : 7950 kg / m³Assumed Air density : 1.2 kg / m³

Environment : Ambient Temperature : (20 ± 2) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1006.7 mbar

Date of Received : 28 August 2025

Date of Calibration : 01 September 2025

Date of Issue : 01 September 2025

Calibrated by : Wuttichai Swaiphong

Calibration Method : In-house method CAL-M2101 based on OIML R 111-1 : 2004(E)

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

Standard Weights

ID No. Cert. No. Due Date Traceability

E2413-E2425 MM-0044-25 11 Apr 2028

National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Sajja Sangthum)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

No.	Nominal Value	Id.Mark	Conventional mass Value	Measuring Uncertainty
1	1 g	none	-0.006 mg	± 0.023 mg

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. : 68-210356-2

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisatsuknakhon 25, Pracha-Uth Rd., Thungkru, Bangkok 10140 Thailand

Equipment :

Weight

Manufacturer : N/A

Material : Stainless Steel

Weight size : 100 g

ID No. : 63-210391-2

Assumed density of weight : 7950 kg / m³

Assumed Air density : 1.2 kg / m³

Environment : Ambient Temperature : (20 ± 2) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1006.7 mbar

Date of Received : 28 August 2025

Date of Calibration : 01 September 2025

Date of Issue : 01 September 2025

Calibrated by : Wuttichai Swaiphong

Calibration Method : In-house method CAL-M2101 based on OIML R 111-1 : 2004(E)

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

Standard Weights

ID No. E2413-E2425

Cert.No. MM-0044-25

Due Date 11 Apr 2028

Traceability

National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Satja Sangkham)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-210356-2

Page : 2 of 2

Submitted by :

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

No.	Nominal Value	Id.Mark	Conventional mass Value	Measuring Uncertainty
1	100 g	none	100 g +0.03 mg	± 0.11 mg

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-

(Signature)





Certificate of Calibration

Certificate No. : 68-210356-3

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisatesuknakhon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 Thailand

Equipment :

Weight

Manufacturer : N/A

Material : Stainless Steel

Weight size : 200 g

ID No. : 63-210391-3

Assumed density of weight : 7950 kg / m³

Assumed Air density : 1.2 kg / m³

Ambient Temperature : (20 ± 2) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1006.7 mbar

Date of Received :

28 August 2025

Date of Calibration :

01 September 2025

Date of Issue :

01 September 2025

Calibrated by :

Wutichai Swatphong

Calibration Method : In-house method CAL-M2101 based on OIML R 111-1 : 2004(E)

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

Standard Weights

ID No.

Cert. No.

Due Date

Traceability

E2420

C02250960

06 Jun 2028

National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Saja Sangkhun)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-210356-3

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

No.	Nominal Value	Id.Mark	Conventional mass Value	Measuring Uncertainty
1	200 g	none	200 g -0.10 mg	± 0.17 mg

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 No. : CAL-24-196

Page : 2 of 3

CALIBRATION REPORT

Conditions of this result of calibration

1. Reference Standard Material :

Material	Model	Serial No.	Cert. No.	Due date
Holmium Glass Filter	RM-HG	12705	117342	13 December 2025
Dysmium Glass Filter	RM-DG	13498	117323	13 December 2025
Neutral Density Filter	RM-1N2N3N	8323	117341	13 December 2025

2. Traceability : This certification is traceable to the International System of Unit maintained at;

The Starna Scientific Ltd. Accredited Calibration Laboratory No. 0659.

3. Method of calibration :

The calibration procedure was carried out according to ASTM E275-08 (2022) and ASTM E925-09 (2014).

4. Result of calibration :

(✓) without adjustment () after adjustment

5. Equipment Specifications:

Spectral Bandwidth :	5 nm
Data Interval :	1 nm
Scan Speed :	1200 nm/min

Signature

Certificate No. : CAL-24-196

Page : 3 of 3

CALIBRATION REPORT

Wavelength Calibration

Certified Values of Reference Material	Nominal Value (nm)	UUC*Reading (nm)	Error (nm)	Uncertainty of Measurement ($\pm$ nm)	k Factor
361.40	361.40	361	-0.40	0.59	2.00
537.00	537.00	537	0.00	0.59	2.00
879.68	879.68	879	-0.68	0.59	2.00

Photometric Calibration for Visible

Wavelength (nm)	Certified Values of Reference Material (A)	UUC* Reading (A)	Error (A)	Uncertainty of Measurement ($\pm$ A)	k Factor
420.0	Zero	0.000	0.0000	0.0028	2.00
	0.5703	0.589	-0.0013	0.0045	2.00
	0.7336	0.733	-0.0006	0.0045	2.00
	1.0709	1.070	-0.0009	0.0045	2.00
440.0	Zero	0.000	0.0000	0.0028	2.00
	0.5592	0.559	-0.0002	0.0045	2.00
	0.716	0.718	0.0020	0.0045	2.00
	1.0454	1.045	-0.0004	0.0045	2.00
465.0	Zero	0.000	0.0000	0.0028	2.00
	0.5084	0.511	0.0016	0.0045	2.00
	0.6601	0.663	0.0029	0.0045	2.00
	0.963	0.966	0.0030	0.0045	2.00
546.1 (546.0)	Zero	0.000	0.0000	0.0028	2.00
	0.5206	0.522	0.0014	0.0045	2.00
	0.6677	0.670	0.0023	0.0045	2.00
	0.9763	0.977	0.0007	0.0045	2.00
590.0	Zero	0.000	0.0000	0.0028	2.00
	0.5522	0.553	0.0008	0.0045	2.00
	0.6966	0.698	0.0014	0.0045	2.00
	1.0201	1.021	0.0009	0.0045	2.00
635.0	Zero	0.000	0.0000	0.0028	2.00
	0.5377	0.540	0.0023	0.0045	2.00
	0.6649	0.667	0.0021	0.0045	2.00
	0.9736	0.974	0.0004	0.0045	2.00

Remark : Each individual filter is measured against the empty filter holder (blank) used to zero the Spectrophotometer.

Note:

UC* : Unit Under Calibration

ISSUE: 6 REV:5

- End of Report -
FM-CAL-33/2

2002/24

Signature



Calibration Results:
Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 2 nm and UUC at 2 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.61	418.5	0.11	0.13
536.66	536.7	-0.04	0.13
637.98	637.9	0.08	0.13
748.48	748.6	-0.12	0.13
807.03	807.4	-0.37	0.13

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.5772	0.576	0.0012	0.0045
	0.7198	0.719	0.0008	0.0045
	1.0394	1.039	0.0004	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.5608	0.560	0.0008	0.0045
	0.7062	0.705	0.0012	0.0045
	1.0189	1.018	0.0009	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.5214	0.521	0.0004	0.0045
	0.6652	0.664	0.0012	0.0045
	0.9577	0.957	0.0007	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.5192	0.518	0.0012	0.0045
	0.6907	0.689	0.0017	0.0045
	0.9949	0.993	0.0019	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.5530	0.551	0.0020	0.0045
	0.7555	0.753	0.0025	0.0045
	1.0761	1.073	0.0031	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.5604	0.559	0.0014	0.0045
	0.7418	0.739	0.0028	0.0045
	1.0467	1.044	0.0027	0.0045



CERTIFICATE OF CALIBRATION

Equipment	:	Spectrophotometer
Manufacturer	:	Thermo Scientific
Model	:	Genesys 30
Serial No.	:	9A1Z099145
ID No.	:	EQL-251
Customer	:	TEST TECH CO., LTD.
	:	30,32 Rama II Soi 63, Rama II Rd.,
	:	Samaedam, Bangkokkhunthian,
	:	Bangkok 10150
Location	:	Wastewater Room 3
Date of Receipt	:	10 June 2024
Date of Calibration	:	10 June 2024
Date of Issue	:	13 June 2024
Ambient Temperature	:	(25±10) °C
Relative Humidity	:	(60±20) %
Condition As-Received	:	Used Item

Calibrated by

Mr. Palawat Luchak

Calibration Engineer

Approved by

(Ms. Jintana Sangthaijaroenlap)

Calibration Manager

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

This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Indicated values are valid for the state of the Spectrophotometer at the time of calibration only.



Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor 7 Rama 4 Road
Silom Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375485-7
www.barascientific.com



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Certificate of Calibration

Certificate No. BSCC-UV-166/24
Calibration Results: 3 of 3
Number of Page(s)

3. Photometric Accuracy (Visible)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
420.0	0.0000 0.5761 0.7119 1.0789	0.0000 0.5791 0.7132 1.0221	0.0000 0.0030 0.0013 0.0032	0.0042 0.0042 0.0042 0.0042
440.0	0.0000 0.5510 0.7001 1.0026	0.0000 0.5636 0.7026 1.0052	0.0000 0.0026 0.0011 0.0026	0.0042 0.0042 0.0042 0.0042
485.0	CNR CNR CNR CNR	CNR CNR CNR CNR	CNR CNR CNR CNR	CNR CNR CNR CNR
546.1	0.0000 0.5249 0.6975 1.0009	0.0000 0.5260 0.6971 1.0012	0.0000 0.0011 -0.0004 0.0003	0.0042 0.0042 0.0042 0.0042
590.0	CNR CNR CNR CNR	CNR CNR CNR CNR	CNR CNR CNR CNR	CNR CNR CNR CNR
635.0	0.0000 0.5666 0.7820 1.0982	0.0000 0.5673 0.7811 1.0976	0.0000 0.0007 -0.0009 -0.0006	0.0042 0.0042 0.0042 0.0042

*CNR = Customer not request

4. Stray Light*

Standard cut-off wavelength (nm)	Unit Under Calibration(UUC)	
	Wavelength (nm)	Absorbance (A)
200.85±0.1nm	200.76	2.0091

The Stray Light transmission reference is less than 1.0%T and Stray light absorbance reference is greater than 2.00A

The measurement uncertainty is base on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%.
End of Certificate

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate. Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced except in full, without written approval of the Bara Scientific Co., Ltd.



Certificate of Calibration

Equipment: SPECTROPHOTOMETER
Model: DR6000
Serial No. (or I.D.): 1693421 (EQL-197)
Manufacturer: HACH
Condition: In Condition
Certificate No.: C06240153
Issued Date: 18 April 2024
Job No.: WO-00024683
Page: 1 of 3

Customer: TEST TECH CO., LTD.
30,32 Rama II Soi 63, Rama II Rd.,
Samaedam, Bangkokhunting Bangkok 10150 Thailand

Environment Condition: Temperature 29.8 °C ± 0.1 °C
Humidity 45.7 %RH ± 6.9 %RH

Calibration Place: TEST TECH CO., LTD. (ในกรุงเทพ)
30,32 Rama II Soi 63, Rama II Rd.,
Samaedam, Bangkokhunting Bangkok 10150 Thailand

Calibration By: Miss.Kaewkan Suradech
Calibration Date: 18 April 2024

The Method used: In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 387-04
Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Starna Scientific Limited.

The standard for Wavelength Certificate No. 118106 and 118118
The standard for Photometric Certificate No. 118123 and 118113
The standard for Stray light Certificate No. 118110 and 118112
The standard for Spectral resolution Certificate No. 118104

(Miss Kaewkan Suradech)
Person in charge

(Mr. Nitnun Sihawan)
Authorized signatory

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

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2533 Sukhumvit Road, Bangkok, Thailand 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/certificate-thailand

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Bara Scientific Co., Ltd.
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Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com



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Siam Bangkok Bangkok Thailand 10500
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www.barascientific.com

Certificate of Calibration

Number of Page(s) 1 of 3

Certificate No.

Equipment

Model

Manufacturer

Serial No.

ID No.

Date of receipt

Date of calibration

Date of issue

Customer name

Address

Temperature

Humidity

Equipment condition

Calibration Location

Calibration Procedure

Traceability

Calibrated by

Approved by

Mr. Sonthi

Mr. Sonthi Temboonsakdi
Service Manager

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Certificate of Calibration

Number of Page(s) 2 of 3

Certificate No.

BSCC-UV-166/24

Calibration Results:

1. Wavelength Accuracy

Certified Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (±nm)
279.44	279.18	-0.26	0.18
418.53	418.46	-0.07	0.18
536.52	536.54	0.02	0.18
684.50	684.63	0.13	0.18
879.41	879.43	0.02	0.18

2. Photometric Accuracy (UV)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
235	CNR	CNR	CNR	CNR
257	CNR	CNR	CNR	CNR
313	0.0000	0.0000	0.0000	0.0075
350	0.8364	0.8333	-0.0021	0.0075
	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
	0.0000	-0.0001	-0.0001	0.0075
	0.6199	0.6190	-0.0009	0.0075

*CNR = Customer not request

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
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Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor 7 Rama4 Road
Siam Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com



Certificate of Calibration

Certificate No.

BSCC-UV-156/25

Number of Page(s)

2 of 3

Calibration Results:

1. Wavelength Accuracy

Certified Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (±nm)
279.44	279.20	-0.24	0.18
418.53	418.51	-0.02	0.18
536.52	536.54	0.02	0.18
684.50	684.64	0.14	0.18
879.41	879.45	0.04	0.18

2. Photometric Accuracy (UV)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
235	CNR	CNR	CNR	CNR
257	0.0000	0.0000	0.0000	0.0075
313	0.8540	0.8505	-0.0035	0.0075
350	0.0000	-0.0001	-0.0001	0.0075
	0.6332	0.6320	-0.0012	0.0075

*CNR = Customer not request

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FW-UV-708-02 Rev.01 (2307163)



Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor 7 Rama4 Road
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www.barascientific.com



Certificate of Calibration

Certificate No.

BSCC-UV-156/25

Number of Page(s)

3 of 3

Calibration Results:

3. Photometric Accuracy (Visible)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
420.0	0.0000	0.0000	0.0000	0.0042
	0.5761	0.5788	0.0027	0.0042
	0.7119	0.7131	0.0012	0.0042
	1.0189	1.0207	0.0018	0.0042
440.0	0.0000	0.0000	0.0000	0.0042
	0.5610	0.5634	0.0024	0.0042
	0.7001	0.7010	0.0009	0.0042
	1.0026	1.0039	0.0013	0.0042
465.0	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
546.1	0.0000	0.0000	0.0000	0.0042
	0.5249	0.5258	0.0009	0.0042
	0.8975	0.8968	-0.0007	0.0042
	1.0009	1.0002	-0.0007	0.0042
580.0	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
635.0	0.0000	0.0000	0.0000	0.0042
	0.5666	0.5670	0.0004	0.0042
	0.7620	0.7609	-0.0011	0.0042
	1.0982	1.0966	-0.0016	0.0042

*CNR = Customer not request

4. Stray Light*

Standard cut-off wavelength (nm)	Wavelength (nm)	Transmission (%T)	Absorbance (A)
201.13±0.11nm	200.65	0.9706	2.0130

The Stray light transmission reference is less than 1.0%T and Stray light absorbance reference is greater than 2.00A

*Stray Light not NSC-ONSC Accredited.

The measurement uncertainty is base on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%.

End of Certificate

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
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FW-UV-708-02 Rev.01 (2307163)



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Solutions of Success

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Silom Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
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Certificate of Calibration

Number of Page(s) 1 of 3

Certificate No.	BSCC-UV-156725
Equipment	UV/Vis Spectrophotometer
Model	UV-1900U
Manufacturer	Shimadzu
Serial No.	A12535780311 ML
ID No.	EQL-233
Date of receipt	22 April 2025
Date of calibration	22 April 2025
Date of issue	25 April 2025
Customer name	Test Tech Co., Ltd.
Address	30,32 Rama II Soi 63, Rama II Road, Samae Dam, Bang Khun Thian, Bangkok 10150.
Temperature	(25.5 - 26.6) °C (On site)
Humidity	(43.3 - 49.7) %RH (On site)
Equipment condition	Good Operation
Calibration Location	Water Room
Calibration Procedure	In-house method WI-UV-702-01 based on ASTM E275-01
Traceability	Wavelength Accuracy is traceable to certificate No. 126732 and 126733 Photometric Accuracy is traceable to certificate No. 126735 and 111398 Stray Light is traceable to certificate No. 126749 The above certificate are traceable to SI unit through Starna Scientific Ltd. (UKAS accredited calibration laboratory NO. 0659)
Calibrated by	Mr. Wanchana Janloey

Approved by

Mr. Pannaphong Phannmekakul
Technical Manager

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
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๗14

ใบรับรองการทดสอบ "เครื่อง Spectrophotometer"
(Calibration Certificate of Spectrophotometer)



CERTIFICATE No : 25T0969
REFERENCE No : 76012-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
MODEL : WNE 22
SERIAL No : L516.1016
ID No : EQL-198
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 :
PONG-AK 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.



F-G010 REV : 03



CERTIFICATE No : 25T0969

PAGE : 2 OF 2

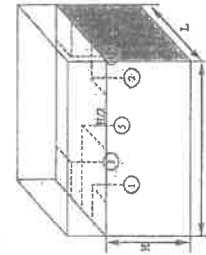
Calibration Report

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
ID NUMBER : EQL-198
RECEIVED DATE : 04-Feb-25
AMBIENT TEMPERATURE : 24 °C ± 1 °C
MODEL : WNE 22
SERIAL NUMBER : L516.1016
CALIBRATION DATE : 04-Feb-25
RELATIVE HUMIDITY : 50 %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 2625A 6603614 24T6473 01-Jul-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



PROBE INSTALLATION
POSITION IN THE BATH

GENERAL INFORMATION

Overall Variation of Ambient Temperature around the Bath (°C) : 2.2
Overall Variation of Line Voltage (V) : 9
Instrument Condition : Normal
Bath Inner Size (W*L*H) : 35*29*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	41.58	0.02	0.02	0.00	0.05
45.0	45.04	0.02	0.01	0.02	0.04
50.0	50.08	0.03	0.01	0.00	0.07

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
	#1	#2	#3	#4	Ref. 5	
41.5	41.59	41.57	41.59	41.59	41.57	0.14
45.0	45.0	45.04	45.04	45.05	45.04	0.14
50.0	50.0	50.07	50.08	50.08	50.07	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

F-G010 REV : 03



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., SAMAEADAM,
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

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QUALITY CALIBRATION CO., LTD.



F-C010 REV : 03



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

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 :-

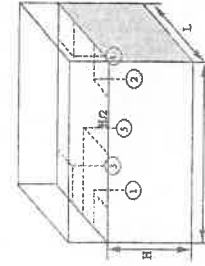
INSTRUMENT

1) DATA LOGGER WITH RTD
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)	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
	#1	#2	#3	#4	Ref. 5	
41.5	41.51	41.47	41.52	41.48	41.50	0.14
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

F-C010 REV : 03



QUALITY CALIBRATION CO., LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4384

www.qcalibration.com



CERTIFICATE No : 24T8052
REFERENCE No : 74209-1

PAGE : 1 OF 2

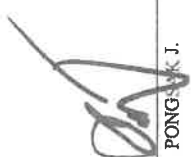
Certificate of Calibration

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
MODEL : WNE 45
SERIAL No : L720.0266
ID No : EQL-241
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEADAM,
BANGKHUNTHIAN, BANGKOK 10150

๗12

ใบรับรองการทดสอบ “เครื่องอ่างน้ำ”
(Calibration Certificate of Water bath)

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 13-Aug-24

APPROVED BY : 
PONGSAK J.
ISSUED DATE : 19-Aug-24
RECEIVED DATE : 13-Aug-24

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QUALITY CALIBRATION CO., LTD.



MAINTENANCE AND IPV TEST CERTIFICATE MODEL
OPTIMA 8000

SERIAL NUMBER:	078S141171C	DATE TESTED:	13-May-2025
PARAMETER	SPECIFICATION	FINAL VALUE	
Spectral Resolution : UV			
As 193.696 nm	≤ 0.009	0.00710 nm	
Ni 231.604 nm	≤ 0.011	0.00876 nm	
Ni 341.476 nm	≤ 0.015	0.01336 nm	
Spectral Resolution : VIS			
Ba 455.403 nm	≤ 0.020	0.01689 nm	
Precision			
Zn 206.200 nm	% RSD ≤ 1.0	0.38 %	
Mg 280.271 nm	% RSD ≤ 1.0	0.46 %	
Mg 285.213 nm	% RSD ≤ 1.0	0.78 %	
Ba 455.403 nm	% RSD ≤ 1.0	0.44 %	
Detection Limits : Axial			
Tl 190.801 nm	3(sd) ≤ 10.0 ppb	2.73 ppb	
As 193.696 nm	3(sd) ≤ 10.0 ppb	4.76 ppb	
Se 196.026 nm	3(sd) ≤ 5.0 ppb	4.37 ppb	
Pb 220.353 nm	3(sd) ≤ 3.0 ppb	1.77 ppb	
Detection Limits : Radial			
As 193.696 nm	3(sd) ≤ 60.0 ppb	7.02 ppb	
Zn 213.857 nm	3(sd) ≤ 2.0 ppb	0.28 ppb	
Mn 257.610 nm	3(sd) ≤ 1.0 ppb	0.06 ppb	
La 379.478 nm	3(sd) ≤ 3.0 ppb	0.55 ppb	
Ba 455.403 nm	3(sd) ≤ 0.3 ppb	0.09 ppb	
Ba 493.408 nm	3(sd) ≤ 0.6 ppb	0.07 ppb	
BEC : Axial (IB X 1000)(IS-IB)			
Mn 257.610 nm	≤ 30 ppb	6.48 ppb	
BEC : Radial (IB X 1000)(IS-IB)			
Mn 257.610 nm	≤ 30 ppb	8.14 ppb	

SERIAL NUMBER:	078S141171C	DATE TESTED:	13-May-2025
Remarks :	Commissioning follow as commissioning performance sheets.		
This is to certify that the above tests have been performed and the configuration tested			
☒ meets			
☐ does not meet			
the PerkinElmer Specifications listed on this certificate.			
This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.			
Service Department PerkinElmer Ltd.			
Customer Service Engineer: (Chainarong Thanin)			
Service Engineer			

MAINTENANCE AND IPV TEST CERTIFICATE MODEL

OPTIMA 8000

Customer :	บริษัท เทคโนโลยี	Date Tested:	13-May-2025
Address :	30, 32 ซอยพระรามที่ 2 ซอย 63 ถนนพระรามที่ 2 แขวงสามลำ เตอบึงขุนเทียน กรุงเทพฯ 10150	Recommendation Recertification	
User Name:	อุบลรัตน์ จงประเทืองกิจ	Period	12 Months
Phone:	02-893-4211-17	Recertification Due:	13-May-2026
Fax/ Email:	per_scientific@perkinelmer.co.th	Date Last Certified:	14-May-2024
		Visit Number:	1 of 1
		PerkinElmer Phone:	02-719-6420 ext 3
		PerkinElmer Fax:	02-318-5597

CONFIGURATION TESTED

MODEL	SERIAL NUMBER	SOFTWARE
OPTIMA 8000 (EQL-180)	078S1411171C	ICP WinLab32 version 5.5
TESTED EQUIPMENT IPV Methods	CALIBRATION NUMBER	EXPIRATION
TEST STANDARD USED Multiement Standard Instrument Cal. STD4	PART NUMBER N069-1579 N930-0221	EXPIRATION DATE DEC 30 2025 AUG 30 2025
CUSTOMER SUPPLIED 2 % HNO3 10 % HNO3	COMMENTS	CUSTOMER INITIALS

MAINTENANCE AND IPV TEST CERTIFICATE MODEL

OPTIMA 8000

SERIAL NUMBER:	078S1411171C	DATE TESTED:	13-May-2025
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1. MECHANICAL CHECKS

- A. Inspect and clean all fans and filters. ☐ OK
- B. Inspect and replace as necessary, all torch components including the RF coil. ☐ OK
- C. Inspect all tubing for sign of clacking or leaking. ☐ OK
- D. Adjust water and gas pressure regulator settings. ☐ OK
- E. Inspect and leak check pneumatics drawers. ☐ OK
- F. Clean the extenor of the instrument. ☐ OK

2. OPTICAL CHECKS

- A. Inspect and clean all optical components. ☐ OK
- B. As required, check and replace all purgefilters. ☐ OK
- C. Recheck optical alignment. ☐ OK

3. COOLING SYSTEM CHECKS

- A. Perform preventive maintenance on chiller. ☐ OK
- B. Flush out the chiller every six months. ☐ OK

4. PERFORMANCE CHECKS

- A. Torch View Alignment. ☐ OK
- B. Wavelength Calibration. ☐ OK

8.4 D₂ Background Compensation with Copper

Description: Verifies the instruments ability to compensate for Background absorption.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0075	Passed

8.5 AA-BG Baseline Noise with Copper

Description: Ensures that background correction does not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0002	Passed

8.6 AA-BG Baseline Noise with Arsenic

Description: Ensures that background correction does not produce excessive noise at a low wavelength.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0003	Passed

8.7 Flame Sensitivity

Description: Instrument Sensitivity checked against Copper standard.

Standard Copper Sensitivity	Specification	Results (Abs.)	Pass/Fail
5 mg/L Sensitivity SS Neb (if applicable)	> 0.250 Abs.	N/A	Not Applicable
2 mg/L Sensitivity HS Neb (if applicable)	> 0.250 Abs.	0.3463	Passed

10. 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.

Additional Comments

Additional Comments Regarding the PM	
PERFORMANCE TEST FOR FIAS	
1. Characteristics mass for Mercury. (500uL of 10ug/L Hg and 5 replicates) Characteristics mass %RSD	306.4 pg/0.0044 A 1.02 %
2. Characteristics mass for Arsenic. (500uL of 10ug/L As and 5 replicates) Characteristics mass %RSD	137.8 pg/0.0044 A 1.87 %
2. Characteristics mass for Selenium. (500uL of 10ug/L Se and 5 replicates) Characteristics mass %RSD	78.4 pg/0.0044 A 0.46 %
Wavelength Accuracy Check	
As 193.700 nm +/- 0.3nm	193.700 nm
Cu 324.750 nm +/- 0.3nm	324.800 nm
Ba 553.550 nm +/- 0.3nm	553.650 nm
K 766.490 nm +/- 0.3nm	766.590 nm

Review

The preventive maintenance checks and if applicable performance tests for PinAAcle 900F have been completed.	
This PinAAcle 900F Passes ☒ Fails ☐ the preventive maintenance.	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative:	Date: 18-Feb-2025 (DD-MMM-YY)
Authorized Customer Representative:	Date: 18-Feb-2025 (DD-MMM-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. PC Instrument Software:

- ☒ Instrument Software user files/databases archived, packed, and/or deleted as needed.

3. Mechanical:

- ☒ Inspect and clean all fans and filters. Replace filters if necessary
- ☒ Inspect all gas lines for leaks and/or wear. Replace if needed.
- ☒ Clean exterior of the instrument.
- ☒ Inspect the burner head, burner chamber, and nebulizer. Clean if needed as stated in the Hardware Guide.
- ☒ Check burner head dimensions with the feeler gauge as stated in the Hardware Guide in the Maintenance chapter section on cleaning the burner head and checking slot width. Replace if out of specification
- ☒ Check the condition of the end cap, burner head, and nebulizer O-rings. Replace if necessary.
- ☒ Check the drain system for signs of wear. Replace worn or damaged parts.
- ☒ Visually check for proper flame conditions when igniting the Air-C2H2 and N2O-C2H2 flames (if applicable).

4. Electrical:

- ☒ Inspect PC boards. Clean if necessary.
- ☒ Carefully check all internal and external cable connections.
- ☒ Check instrument firmware revisions upgrade to current levels (if necessary)
- ☒ Run Diagnostics Test within the Advanced function of the Spectrometer page. Check the results in the service log folder in the Spectrometer BM Log Viewer.

5. Optics:

- ☒ Inspect and clean the sample compartment windows, if needed.
- ☒ Inspect optics. Clean or replace if necessary.

6. Gasses:

- ☒ Verify that the Gasses supplied to the instrument are within the pressure and purity specifications found in the PinAAcle 900F Series Pre-Installation Checklist SOB.
- ☒ Verify that the acetylene filter and air filter element is dry. Replace if necessary.

7. Flame Interlock Check:

Description: Check to ensure that all safety interlocks are closed.

Parameter	Specification	Test Results	Pass/Fail
Flame Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Drain Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Nebulizer Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
C ₂ H ₂ Pressure Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Air Pressure Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Burner Head Sensor	Choosing Nitrous Oxide as the oxidant should trigger an interlock shuts down	Active	Passed

8. After PM Performance tests:

8.1 Detector Linearity with Barium

Description: Ensures that the detector is linear in the Visible Range.

Parameter	Specification	Certificate Value at 553.6 nm (Abs.)	Test Results	Pass/Fail
1.0 A ND Filter	± 5% from Cert.	0.9684	0.9702	Passed
0.2 A ND Filter	± 5% from Cert.	0.1944	0.1927	Passed

8.2 Baseline Noise at 1.0 Absorbance with Barium

Description: Ensures that a high absorbance will not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0008	Passed

8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.001	0.0002	Passed

Component List

Component / Specific Model	Serial #	Configuration Notes
FIAS 400	400S21100101	Syngistix version 4.0

Parts Lists

Parts Included with the PM		
Part Number (if applicable)	Description	Quantity
80501696	Fan Filters	2
N3160156	O-Ring Kits for Sampling Introduction (Stainless Steels Nebulizer)	N/A
N3160157	O-Ring Kits for Sampling Introduction (Plastic Nebulizer)	1
N9301714	Replacement Acetylene Filter Cartridge	1
TH001022	Replacement Air Filter Cartridge	2

Additional Reagents and Standards Required for PM			
Part Number (if applicable)	Description	Quality	Batch/Lot # Expired Date (MM/YY)
N9300183	1000 mg/L Copper Standard	AR	27-39CUY1 APR-2025

Additional Reagents and Standards Required for PM (Customer Support Solution)				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)
N/A	DI Water	250 ml.	AR	AR
N/A	0.5% HNO ₃	250 ml.	AR	AR

Additional Tools Required for PM				
Part Number (if applicable)	Description	Quantity	Serial #	
N1013000	0.2A Neutral density filter	1	MG0-685	
N1013002	1.0A Neutral density filter	1	MG2-680	
03030997	System 2 EDL Driver	1	839936	
N3050605	As System 2 EDL	1	06261	
N3050121	Cu Lumina HCL	1	101615-010080	
N3050109	Ba Lumina HCL	1	858A0B	
N3050139	K Lumina HCL	1	011604-41713	
N3050152	Ni Lumina HCL	1	050914-010060	



PinAAcle 900F Preventive Maintenance Report

Company Name: TEST TECH CO., LTD.
Instrument Location: 30,32 RAMA2 SOI 63, RAMA 2 RD.,
SAMMAEDAM, BANGKHUNTEN, BANGKOK 10150
Instrument Serial No.: PFBS21091601
Date: 18-Feb-2025

PinAAcle 900F Preventive Maintenance (PM)

Company Name:	TEST TECH CO., LTD.			
Address (Instrument Location):	30,32 RAMA2 SOI 63, RAMA 2 RD., BANGKHUNTEN, BANGKOK 10150			
Serial Number:	PFBS21091601	PM Number:	1 of 1	
Customer Name (if applicable):	Juralrat Jongprakobkit	Telephone Number:	087-5199005	
Customer Support Engineer Name:	Chaiharong	Service Order Number:	WO-03179699	
Date PM Performed: (DD-MMM-YYYY)	18-Feb-2025	Next PM Due Date: (DD-MMM-YYYY)	18-Feb-2028	
Standard Labor Hours to Complete PM :			5 hours	

Part Number	Release	Publication Date	PerkinElmer
09370145 Rev.9	A	January 2018	

Scope
The purpose of this PM is to ensure the continued functionality of the PinAAcle 900F 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 or calibration, including a current back-up of system software and/or data files.
The completed document 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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80-82 ถนนประชาธิปไตย แขวงบางขุนพรหม เขตพระนคร กรุงเทพฯ 10200
80-82 Prachathipatai Rd., Bangkokphrom, Pranakorn, Bangkok 10200
Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thaivai@thaiunique.com, Website : www.thaiunique.com

ATOMIC ABSORPTION SPECTROMETER TEST CERTIFICATE

Certificate No : SV2410/2223
Instrument Type : Atomic Absorption Spectrophotometers
Model : AA240FS
Serial Number : EL08043418
Organization : Test Tech Co., Ltd.
Address : 30,32 Soi 63 Rama II Rd. Samaedam Bangkhuntien, Bangkok 10150
Date : 17 Oct 2024

Hollow cathode lamps used

Element	Lamp number	Comments
Arsenic	56-101003-00	
Copper	56-101014-00	
Potassium	56-101042-00	
Iron	56-101027-00	
Manganese	56-101337-00	

Test description	Specification	Result	Comments
Light throughput (%Gain) or (EHT)			
Cu at 324.8 nm	≤ 64 % or 380 V	32 %	Pass
As at 193.7 nm	≤ 80 % or 540 V	54 %	Pass
K at 766.5 nm*	≤ 84 % or 540 V	64 %	Pass
Fe at 248.3 nm	≤ 80 % or 540 V	63 %	Pass
Mn at 279.5 nm	≤ 64 % or 380 V	53 %	Pass
Photometric noise Cu BGC off			
STDV @ 0 Abs	≤ 0.0005	0.0001	Pass



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80-82 Prachathipatai Rd., Bangkokphrom, Pranakorn, Bangkok 10200
Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thaivai@thaiunique.com, Website : www.thaiunique.com

Wavelength accuracy

Cu at 324.8 nm	323.0 nm - 326.0 nm	324.7 nm	Pass
As 193.7 nm	192.0 nm - 195.0 nm	193.7 nm	Pass
K at 766.5 nm*	765.0 nm - 768.0 nm	766.4 nm	Pass
Fe at 248.3 nm	246.8 nm - 249.8 nm	248.2 nm	Pass
Mn at 279.5 nm	278.0 nm - 281.0 nm	279.5 nm	Pass

High solids nebulizer setting**

Uptake rate	7.2 - 10.6 ml / min	7.8 ml/min	Pass
Max Abs	≥ 0.75 Abs	0.79 Abs	Pass
Precision(%RSD)	≤ 0.5 %	0.4 %	Pass

Zeeman Background Correction Accuracy (%)**

BCA @ Au 242.8 nm	< 3.7 %	***	***
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Zeeman Magnetic Sensitivity Ratio (%)***

MSR @ Cu 324.7 nm	> 70 %	***	***
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Characteristic mass and sensitivity ****

Sensitivity	≥ 0.21 Abs	****	****
Precision (%RSD)	≤ 4.0 %	****	****

* for Wideband PMT (Wavelength 190nm - 900nm)

** for Flame system

*** for Zeeman system

**** for Graphite furnace system



CALIBRATED BY :

Signature: 

Engineer : Suriya Nacharoen

Date : 17 / Oct / 2024

APPROVED BY :

Signature: 

Service Manager : Suchai Sangkattichai

Date : 17 / Oct / 2024



Without adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 41.5 °C

Locations	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
#1	41.58	0.08	0.23
#2	41.50	0.00	0.23
#3	41.58	0.09	0.23
#4	41.58	0.08	0.23
#5	41.49	-0.01	0.23
#6	41.35	-0.15	0.23
#7	41.54	0.04	0.23
#8	41.54	0.04	0.23
#9	41.54	0.04	0.23

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
41.5	41.5	41.5	41.53	41.50	41.59	41.58	41.49	41.35	41.54	41.54	41.54	0.23

Chamber Characterization

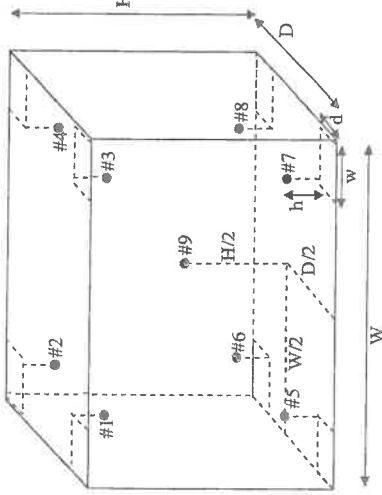
Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
41.5	0.20	0.02	0.28

Note: * Maximum uncertainty of the each position

The End of Certificate

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ใบรับรองการทดสอบ "เครื่อง Atomic Absorption Spectrophotometer"
(Calibration Certificate of Atomic Absorption Spectrophotometer)



Standard Installation Locations

Volume (Calibration Zone): 43 (Liters)

Inside chamber:

Standard Locations (#1, #2, #3, #4):
 W = 56 (cm) D = 40 (cm) H = 72 (cm)
 w = 10 (cm) d = 5 (cm) h = 20 (cm)
 Standard Locations (#5, #6, #7, #8):
 w = 10 (cm) d = 5 (cm) h = 12 (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	301	302	303	304	305	306	307	308	309

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the

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

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

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

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

Overall Variation: The difference of maximum and minimum measured temperatures throughout observation time.

Without adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 37.0 °C

Locations	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
#1	37.07	0.07	0.23
#2	36.99	-0.01	0.23
#3	37.07	0.07	0.23
#4	37.04	0.04	0.23
#5	36.97	-0.03	0.23
#6	36.85	-0.15	0.23
#7	37.06	0.06	0.23
#8	37.03	0.03	0.23
#9	37.04	0.04	0.23

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
37.0	37.0	37.0	#1	#2	#3	#4	#5	#6	#7	#8	#9	
			37.07	36.99	37.07	37.04	36.97	36.85	37.06	37.03	37.04	0.23

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
37.0	0.19	0.01	0.24

Note: * Maximum uncertainty of the each position



CERTIFICATE No : 25T0972

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF 160
ID No : EQL-218
RECEIVED DATE : 04-Feb-25
AMBIENT TEMPERATURE : 25 °C ± 1 °C

S/N : D518.0240
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.

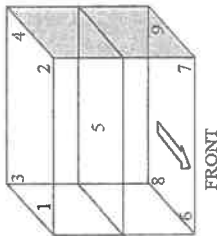
2. REFERENCE STANDARD INSTRUMENTS :-

- 1) DATA LOGGER WITH RTD HYDRA 2635A
MODEL SERIAL No CERTIFICATE No DUE DATE
7408027 24T0469 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

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 4	
Overall Line Voltage (V) variation : 13	
Instrument Condition : Normal	
Chamber Size (W*H*H): 56*40*72 cm	



CHAMBER PERFORMANCE

Calibration Point	Controller Temperature (°C)	Average All Position Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	35.0	34.99	0.02	0.10	0.20
36.0	36.0	35.98	0.02	0.11	0.19

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
	#1	#2	#3	#4	Ref 5	#6	#7	#8	#9	
35.0	34.97	34.95	34.93	34.92	34.99	35.07	35.04	35.05	35.03	0.25
36.0	35.96	35.94	35.93	35.91	35.96	36.06	36.03	36.04	36.01	0.25

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



Certificate of Calibration

Equipment: Incubator
Model: IF160
Serial No.(or ID): D519.0140 (EQL-231)
Manufacturer: Memmert
Condition: In Condition
Shelves(pc.): 2
Certificate No.: C31250176
Issued Date: 28 January 2025
Job No.: WO-00059088
Page: 1 of 5
Ventilation Valve: Closed

Customer: TEST TECH CO., LTD.

30,32 Rama II Soi 63, Rama II Rd.,
Samaedam, Bangkhunthian Bangkok 10150 Thailand.

Environment Condition: Temperature: 22 °C ± 0.5 °C
Humidity: 53 %RH ± 4.8 %RH
Voltage: 228 VAC ± 2.3 VAC

Calibration Place: TEST TECH CO., LTD. (Incubation room 408)

30,32 Rama II Soi 63, Rama II Rd.,
Samaedam, Bangkhunthian Bangkok 10150 Thailand.

Calibration By: Mr. Atachai Ngamchanat

Calibration Date: 28 January 2025

The Method used: In house method, CAL-WI-16, base on TLAS-G20

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Certificate No. C10250001

(Mr. Atachai Ngamchanat)

Person in charge

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

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

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

(Mr. Chalwat Sisanguan)

Authorized signatory

DKSH Technology Limited

2353 Sukhumvit Road, Bangkok 10160
Phone: +66 2039 7000 Email: hlo.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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CERTIFICATE No : 25T0970

PAGE : 2 OF 2

CERTIFICATE No : 25T0972
REFERENCE No : 76012-4

PAGE : 1 OF 2

Calibration Report

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

CONDITION OF THIS RESULTS OF CALIBRATION

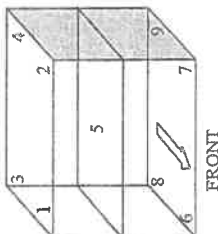
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED KTD P1000 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND 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 :-

- 1) DATA LOGGER WITH KTD HYDRA 2635A
- 2) THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
3. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
4. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.
5. RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

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 Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
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	35.91	35.99	36.04	0.25
41.6	41.6	41.49	41.53	41.43	41.52	41.59	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 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

Certificate of Calibration

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF 160
SERIAL No : D518.0240
ID No : EQL-218
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II RD., SAMAEADAM,
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.



F-G010 REV : 03



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Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584
www.qcalibration.com



CERTIFICATE No : 25T0971

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF 110
ID No : EQL-190
RECEIVED DATE : 04-Feb-25
AMBIENT TEMPERATURE : 25 °C ± 1 °C
RELATIVE HUMIDITY : 50 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TIAS 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 :-

1) DATA LOGGER WITH RTD
INSTRUMENT : MODEL : SERIAL No : CERTIFICATE No : DUE DATE
HYDRA 2635A 7408027 24T6469 26-Jun-25

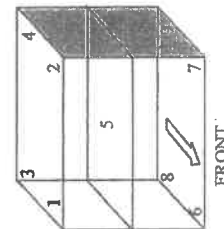
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

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



GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 4
Overall Line Voltage (V) variation : 15
Instrument Condition : Normal
Chamber Size (W*H): 56*40*48 cm

CHAMBER PERFORMANCE

Calibration Point	Controller Temperature (°C)	Average All Position (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
37.0	37.0	36.90	0.09	0.19	0.31
44.0	44.0	44.10	0.07	0.24	0.34

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
37.0	37.00	36.91	36.87	36.88	36.94	36.89	36.88	36.85	36.88	0.25
44.0	44.0	44.22	44.09	44.05	44.06	44.18	44.10	44.14	44.02	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

CERTIFICATE No : 25T0970
REFERENCE No : 76012-2

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., SAMAEADAM,
BANGKHUNTHIAN, BANGKOK 10150

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

APPROVED BY :
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.



F-G010 REV : 03



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



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



CERTIFICATE No : 25T6064

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : INB400
ID No : EQL-087
RECEIVED DATE : 23-Jun-25
AMBIENT TEMPERATURE : 26 °C ± 1 °C
S/N : E405.0946
CALIBRATION DATE : 23-Jun-25
RELATIVE HUMIDITY : 46 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

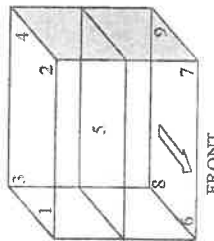
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD Pt100 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND 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 :-

- 1) DATA LOGGER WITH RTD HYDRA 2635A
2) THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
3. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
4. 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 : 1
Overall Line Voltage (V) variation : 6
Instrument Condition : Normal
Chamber Size (W*L*H): 40*33*40 cm



CHAMBER PERFORMANCE

Calibration Point (°C)	Average All Position (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
44.0	44.10	43.5	0.04	0.57	0.62
58.0	57.83	57.0	0.07	0.75	0.78

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	
43.5	43.5	43.94	44.08	43.84	43.77	44.34	44.29	44.31	44.04	44.30	0.36
57.0	57.0	57.65	57.75	57.52	57.51	58.22	57.98	58.16	57.59	58.14	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 : 0.

CERTIFICATE No : 25T0971
REFERENCE No : 76012-3

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF 110
SERIAL No : D415-0802
ID No : EQL-190
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 :
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.

F-G010 REV : 03



CERTIFICATE No : 25T6064
REFERENCE No : 77516-4

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : INB400
SERIAL No : E405.0946
ID No : EQL-087
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEADAM,
BANGKHUNTHIAN, BANGKOK 10150

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

APPROVED BY : 
ISSUED DATE : 24-Jun-25
RECEIVED DATE : 23-Jun-25

๗10

ใบรับรองการสอบเทียบ “ตู้บ่มเชื้อ”
(Calibration Certificate of Incubator)





Certificate No.: C08240209

Page 2 of 2

Calibration Results:

Without Adjustment

Std Turbidity (NTU)	UUC Reading	Correction	Deviation	Uncertainty
0.040	0.059	-0.019	0.0000	0.070
20.40	20.4	0.00	0.04	1.0
205.0	205	0.0	0.0	10
1026.0	1026	0.0	0.4	50
4114.0	4114	0.0	0.8	200

The End of Certificate



ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-00053212

หมายเลขเครื่อง: 2024080C0139

ชนิดเครื่องมือ: TURBIDIMETER

รุ่น: TL2300

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
26 Nov 2024			26 Nov 2024		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
☒	☐	1. ความสมบูรณ์เครื่อง	☒	☐	
☒	☐	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	☒	☐	
☒	☐	3. สวิทช์ ปิด - เปิด เครื่อง (On-Off Switch)	☒	☐	
☒	☐	4. ปุ่มกด (Keypad)	☒	☐	
☒	☐	5. หน้าจอ (Display, Screen Contrast)	☒	☐	
		Spectrophotometer			
☐	☐	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	☐	☐	
☐	☐	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	☐	☐	
☐	☐	8. ความยาวคลื่น (Wavelength Check)	☐	☐	
☐	☐	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	☐	☐	
☐	☐	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	☐	☐	
☐	☐	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	☐	☐	
		pH Meter and Conductivity Meter			
☐	☐	12. อิเล็กโทรด (Electrode and Connection Cable)	☐	☐	
☐	☐	13. ระดับสารละลายใน Electrode (Level KCl)	☐	☐	
☐	☐	14. ฝาปิดกันละออง Electrode (Dust Protection Hood)	☐	☐	
☐	☐	15. ขาจับอิเล็กโทรด (Stand)	☐	☐	
		Turbidimeter			
☒	☐	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	☒	☐	0.012 NTU
☐	☐	17. ระดับการส่องสว่างของแสง (≥ 2.5 ไม่นาน 3.0)	☐	☐	
		Automatic titrator			
☐	☐	18. สภาพ Piston Burettes	☐	☐	
☐	☐	19. Function Rinsing and Dosing	☐	☐	
☐	☐	20. ระบบฟอสฟอรัสและยูเรียกรุ่นประกอบ	☐	☐	

เพิ่มเติม/ข้อแนะนำ :

Mr. Pongpisut Suebchantha
Service Engineer

บริษัท ดีเคเอสเอช เทคโนโลยีส์ จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตวัฒนา กรุงเทพมหานคร 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/identific- thailand
Delivering Growth - In Asia and Beyond.

บริษัท ดีเคเอสเอช เทคโนโลยีส์ จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตวัฒนา กรุงเทพมหานคร 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/identific- thailand
Delivering Growth - In Asia and Beyond.

CAL-FM-R31-03: 20 Jul 2022

CAL-FM-C08-08: 20 Jul 2022



ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: KSMT2402432

ชนิดเครื่องมือ: TURBIDIMETER		รุ่น: 2100N	หมายเลขเครื่อง: 970400003415	
ตรวจสอบ (รับ)	รายการตรวจเช็ค	ตรวจสอบ (ส่ง)	หมายเหตุ	
12 Sep 2024		12 Sep 2024		
ปกติ	ไม่ปกติ	ปกติ	ไม่ปกติ	
☒	☐	1. ความสมบูรณ์เครื่อง	☒	☐
☒	☐	2. ความสะอาด (ร่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	☒	☐
☒	☐	3. สวิตช์ ปิด - เปิด เครื่อง (On-Off Switch)	☒	☐
☒	☐	4. ปุ่มกด (Keypad)	☒	☐
☒	☐	5. หน้าจอ (Display, Screen Contrast)	☒	☐
☒	☐	6. ค่าความทึบแสงต่ำสุด (No Sample)	☒	☐
☐	☐	7. ระดับการส่องสว่างของแสง (≥ 2.5 ไม่นเกิน 3.0)	☐	☐

เซ็นเซอร์ที่แนบมา:

Mr. Dumrong Boonsopon
Service Engineer

บริษัท ชายนันท์ จำกัด (SCIMET CO., LTD.)
1194 Soi Wachrethamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

FD08-01: 08 MAR 2023



Certificate of Calibration

Equipment: TURBIDIMETER
Model: TL2300
Serial No. (or ID.): 2024080C0139 (EQL-282)
Manufacturer: HACH
Condition: New
Certificate No.: C08240209
Issued Date: 23 December 2024
Job No.: WO-00053212
Page: 1 of 2
Customer: TEST TECH CO., LTD.
30, 32 Rama II Soi 63, Rama II Rd., Samaedam, Bangkokhuthian, Bangkok 10150, Thailand
Environment Condition: Temperature 23 °C ± 2 °C
Humidity 50 %RH ± 15 %RH
Calibration Place: Environment Laboratory, DKSH Technology Limited.
2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Calibration By: Mr. Pongpisut Suebchantha
Calibration Date: 26 November 2024
The Method used: In house method, CAL-VII-23, base on Hach Manufacturer Method 8195
Traceability: This certificate is traceable to Primary standard Fromazin and StabCal accepted by United States Environmental Protection Agency (EPA) through Hach Company
Certificate No. A3304 , A3312 , A3305 , A3304 , A3305

Mr. Pongpisut Suebchantha

(Mr. Pongpisut Suebchantha)

Person in charge

Miss Kaewkan Suradech

(Miss Kaewkan Suradech)

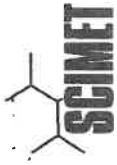
Authorized signatory

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

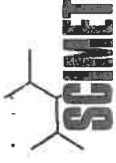
บริษัท เทคโนโลยี ดีเคเอส เอช จำกัด
2533 สุขุมวิท ถนน แขวงคลองเตย กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/condition-to-hach

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CAL-FM-C08-08: 20 Jul 2022



SCIMET Co., Ltd.
1194 Soi Wachirathamsathit 57, Bangchak,
Phraekhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239
https://www.scimet.co.th



Certificate No. C06240053

Calibration Certificate

Equipment: TURBIDIMETER
Model: 2100N
Serial No.(or ID): 970400003415 (EQL-024)
Manufacturer: HACH
Condition: In Condition
Customer: TEST TECH CO., LTD.
30,32 Rama II Soi 63, Rama II Rd., Samaedam, Bangkhuntien Bangkok 10150 Thailand
Job No.: KSMT2402432
Received Date: 12 September 2024
Issued Date: 12 September 2024
Page: 1 of 2

Customer: TEST TECH CO., LTD.
30,32 Rama II Soi 63, Rama II Rd., Samaedam, Bangkhuntien Bangkok 10150 Thailand

Calibration Place: TEST TECH CO., LTD.(503 แขวงสามเณนบุรี)
30,32 Rama II Soi 63, Rama II Rd., Samaedam, Bangkhuntien Bangkok 10150 Thailand

Calibration Date: 12 September 2024
Environment Condition: Temperature: 24.4 °C ± 0.2 °C
Humidity: 58.4 %RH ± 1.1 %RH
The Method used: In-house method, W06, based on Hach Manufacturer Method 8195
Traceability: This certificate is traceable to Primary standard Fromazin and StablCal accepted by United States Environmental Protection Agency (EPA) through Hach Company Certificate No. A3304 , A3312 , A3305 , A3304 , A3305
This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standards/laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement(GUM).
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SCIMET Co., Ltd.

(Mr. Durnrong Boonsopon)
Person in charge

(Mr. Thiamgkeat Pongngam)
Authorized signatory



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, 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.



F-G010 REV : 03



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

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 :-

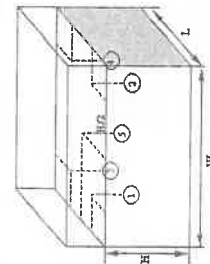
INSTRUMENT

1) DATA LOGGER WITH RTD
MODEL : 2625A
SERIAL No : 6603614
CERTIFICATE No : 25T5341
DUE DATE : 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 EXCLUDES 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 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	
41.5	41.5	41.51	41.47	41.52	41.48	0.14
44.5	44.5	44.48	44.46	44.50	44.47	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

F-G010 REV : 03



Certificate of Calibration

Equipment: TURBIDIMETER Certificate No.: C08240209
Model: TL2300 Issued Date: 23 December 2024
Serial No. (or ID.): 2024080C0139 (EQL-282) Job No.: WO-00053212
Manufacturer: HACH Page: 1 of 2
Condition: New
Customer: TEST TECH CO., LTD.
30, 32 Rama II Soi 63, Rama II Rd., Samaedam,
Bangkhunthian, Bangkok 10150, Thailand

Environment Condition: Temperature 23 °C $\pm$ 2 °C
Humidity 50 %RH $\pm$ 15 %RH
Calibration Place: Environment Laboratory, DKSH Technology Limited.
2533 Sukhumvit Road, Bangkok,
Phrakhanong, Bangkok 10260 Thailand
Calibration By: Mr. Pongpisut Suebochantha
Calibration Date: 26 November 2024
The Method used: In house method, CAL-VI-23, base on Hach Manufacturer Method 8195
Traceability: This certificate is traceable to Primary standard Fromazin and StabCal accepted by
United States Environmental Protection Agency (EPA) through Hach Company
Certificate No. A3304 , A3312 , A3305 , A3304 , A3305


(Mr. Pongpisut Suebochantha)
Person in charge

(Miss Kaewkan Suradech)
Authorized signatory

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

ข้อมูลพื้นฐานเกี่ยวกับ DKSH
DKSH Technology Limited
2533 Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10260
Phone: +66 2839 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth - In Asia and Beyond.

CAL-FM-C08-08: 20 Jul 2022



Certificate No.: C08240209

Page 2 of 2

Calibration Results:

Without Adjustment

Std Turbidity (NTU)	UUC Reading	Correction	Deviation	Uncertainty
0.040	0.059	-0.019	0.0000	0.070
20.40	20.4	0.00	0.04	1.0
205.0	205	0.0	0.0	10
1026.0	1026	0.0	0.4	50
4114.0	4114	0.0	0.8	200

The End of Certificate

ข้อมูลพื้นฐานเกี่ยวกับ DKSH
DKSH Technology Limited
2533 Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10260
Phone: +66 2839 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth - In Asia and Beyond.

CAL-FM-C08-08: 20 Jul 2022



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. PUMPING

	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	☐	☐	N/A
- Non-Return Valve	☒	☐	
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 :



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
Other error messages	
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 → Enter
Excess steam pressure	Switch the system off and call service
Sensor error	Switch the system off and call service



1. สัญญาการให้บริการ (Service Contact)

หน่วยงานลูกค้า :	บริษัท เพลส เทคโนโลยี
ที่อยู่ :	30-32 ซอยพระรามที่ 2 ขอบ 63 แขวงสามเสา เขตบางขุนเทียน กรุงเทพมหานคร 10150
โทรศัพท์ :	
อีเมล :	
บุคคลติดต่อ :	
ชื่อ-นามสกุล :	คุณ กรรณ ชุนพิทักษ์
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
หมายเลขครุภัณฑ์ :	EQL-062

2.2 ผู้ดำเนินการ

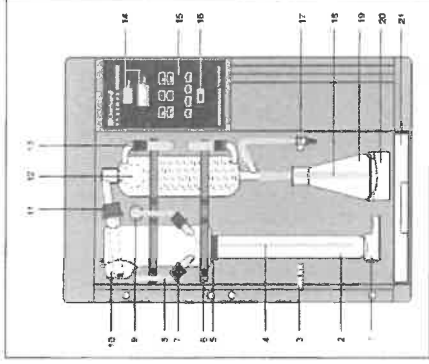
ดำเนินการทำ PM โดย

ชื่อ-นามสกุล :	คุณณฤทธิ์ เดชนวัฒน์
ตำแหน่ง :	วิศวกร
แผนก :	บริการหลังการขาย
ฝ่าย :	บริการหลังการขาย

Part 3: Operational Qualification (OQ)

3.1 ตรวจสอบสภาพเครื่อง

FRONT



No	Description	PASS	FAIL	N/A
1.	Quick damping 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.	Platfrom	☒	☐	☐
21.	Drip tray	☒	☐	☐



บริษัท ซีจี ไซแอนติฟิค จำกัด
CG SCIENTIFIC CO., LTD.



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

- Part 1: สัญญาการให้บริการ (Service Contact)
Part 2: ข้อมูลพื้นฐานของเครื่องมือ (Details of Instrument)
Part 3: ตรวจสอบเช็คสภาพเครื่อง
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





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., SAMAEADAM,
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



CERTIFICATE No : 25T0970

PAGE : 2 OF 2

Calibration Report

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

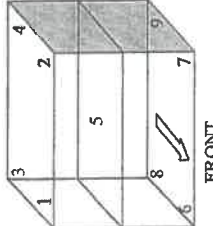
CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD P100 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 :-
 - 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

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



CERTIFICATE No : 25T8754
REFERENCE No : 78325-5

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL : UFE 500
SERIAL No : G512.2005
ID No : EQL-161
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 : CHAICHARN CH.
CALIBRATION DATE : 26-Aug-25
APPROVED BY : PRASERT D.
ISSUED DATE : 28-Aug-25
RECEIVED DATE : 26-Aug-25



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

F-G010 REV : 03



CERTIFICATE No : 25T8754

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL : UFE 500
ID No : EQL-161
RECEIVED DATE : 26-Aug-25
AMBIENT TEMPERATURE : 25 °C ± 1 °C
S/N : G512.2005
CALIBRATION DATE : 26-Aug-25
RELATIVE HUMIDITY : 53 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO IAS 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.

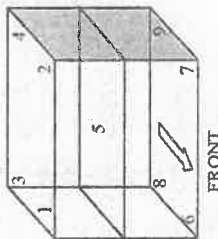
REFERENCE STANDARD INSTRUMENTS :-

- 1) DATA LOGGER WITH RTD HYDRA 2635A
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 : 1
Overall Line Voltage (V) variation : 3
Instrument Condition : Normal
Chamber Size (W*L*H): 56*40*48 cm



CHAMBER PERFORMANCE

Calibration Point (°C)	Average All Position (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
104.0	104.11	0.10	0.88	0.97

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	
104.5	104.5	104.15	104.14	104.25	103.95	103.64	104.12	104.46	104.06	104.24	0.38

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



CERTIFICATE No : 25T8755
REFERENCE No : 78325-6

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : HEATING BLOCK
MANUFACTURER : MULBERRY
MODEL : HB-44
SERIAL No : 1904009
ID No : EQL-207

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 : CHAICHARN CH.

CALIBRATION DATE : 26-Aug-25

APPROVED BY : 
PRASERT D.

ISSUED DATE : 28-Aug-25

RECEIVED DATE : 26-Aug-25



CERTIFICATE No : 25T8755

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : HEATING BLOCK
MANUFACTURER : MULBERRY
MODEL : HB-44
ID No : EQL-207
RECEIVED DATE : 26-Aug-25
AMBIENT TEMPERATURE : 25 °C ± 1 °C
SN : 1904009
CALIBRATION DATE : 26-Aug-25
RELATIVE HUMIDITY : 53 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASUREMENT METHOD WITH CALIBRATED RTD PT-100. THE PROBE WERE PLACED ON POINTS AND LOCATED AS THE PICTURE.

2. REFERENCE STANDARD INSTRUMENTS :-

1) DATA LOGGER WITH RTD : HYDRA 2635A
SERIAL No : 7408027
CERTIFICATE No : 25T5344
DUE DATE : 18-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

34	35	36	37	38	39	40	41	42	43	44
23	24	25	26	27	28	29	30	31	32	33
12	13	14	15	16	17	18	19	20	21	22
1	2	3	4	5	6	7	8	9	10	11

FRONT

HEATING BLOCK PERFORMANCE

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
150.0	150.0	0.34	1.71	1.90

TEMPERATURE MEASUREMENT ACCURACY TEST

Measured Temperature (°C) at Spread Locations											Uncertainty (± °C)
1	2	3	4	5	6	7	8	9	10	11	
149.50	149.41	150.06	149.89	150.29	150.74	150.88	150.67	150.39	149.73	149.77	0.82
Measured Temperature (°C) at Spread Locations											Uncertainty (± °C)
12	13	14	15	16	Ref.17	18	19	20	21	22	
149.76	149.74	149.59	149.90	150.63	150.69	150.70	150.63	150.08	149.88	149.47	0.82
Measured Temperature (°C) at Spread Locations											Uncertainty (± °C)
23	24	25	26	27	28	29	30	31	32	33	
149.54	149.53	149.90	150.47	150.71	150.91	150.65	150.25	150.57	149.89	149.53	0.82
Measured Temperature (°C) at Spread Locations											Uncertainty (± °C)
34	35	36	37	38	39	40	41	42	43	44	
149.26	149.75	149.95	150.50	150.56	150.49	150.16	150.80	149.95	150.02	149.61	0.82

NOTE 1 : LOCATION 17 WAS REFERENCE LOCATION.

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 COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.
END OF CALIBRATION REPORT





Calibration Results:
Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 2 nm and UUC at 2 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.61	418.6	0.01	0.13
536.66	536.8	-0.14	0.13
637.98	638.0	-0.02	0.13
748.48	748.9	-0.42	0.14
807.03	807.5	-0.47	0.13

Photometric Accuracy (Absorbance)			
Wavelength	Standard absorbance	Unit Under Calibration	Correction
420 nm	0.0000	0.000	0.0000
	0.5772	0.577	0.0002
	0.7198	0.719	0.0008
	1.0394	1.037	0.0024
440 nm	0.0000	0.000	0.0000
	0.5603	0.560	0.0008
	0.7062	0.705	0.0012
	1.0189	1.017	0.0019
465 nm	0.0000	0.000	0.0000
	0.5214	0.521	0.0004
	0.6652	0.665	0.0002
	0.9577	0.956	0.0017
546.1 nm	0.0000	0.000	0.0000
	0.5192	0.518	0.0012
	0.6907	0.690	0.0007
	0.9949	0.993	0.0019
590 nm	0.0000	0.000	0.0000
	0.5530	0.552	0.0010
	0.7555	0.755	0.0005
	1.0761	1.074	0.0021
635 nm	0.0000	0.000	0.0000
	0.5604	0.559	0.0014
	0.7418	0.741	0.0008
	1.0467	1.045	0.0017



Calibration Results:
Without Adjustment

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7533	0.750	0.0033	0.0080
257 nm	0.0000	0.000	0.0000	0.0080
	0.8745	0.870	0.0045	0.0080
313 nm	0.0000	0.000	0.0000	0.0080
	0.2926	0.293	-0.0004	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.6486	0.644	0.0046	0.0080

Stray light *			
Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%T)	Absorbance (A)
260.95 +/- 0.11 nm	261.0	1.2	1.921
392.04 +/- 0.11 nm	392.0	1.4	1.854

Spectral Resolution *

Nominal Concentration 0.02 % v/v	Peak	Trough	Ratio	SBW
Standard Wavelength (nm)	268.74	266.81	1.30	2.00
UUC: Wavelength (nm)	268.5	266.6		
Std Absorbance (A)	0.5137	0.3473		
UUC: Absorbance (A)	0.465	0.358		

* Calibration Marked "Not TISI Accredited" in this Certificate have been included for completeness.

The End of Certificate



Calibration Report

RESULT OF CALIBRATION (CONTINUE)-

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

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 of Calibration

Equipment: SPECTROPHOTOMETER
Model: DR6000
Serial No. (or ID.): 1693421 (EQL-197)
Manufacturer: HACH
Condition: In Condition
Certificate No.: C06250150
Issued Date: 10 April 2025
Job No.: WO-00067645
Page: 1 of 3

Customer: TEST TECH CO., LTD.
30,32 Rama II Soi 63, Rama II Rd.,
Samaedam, Bangkhuntien Bangkok 10150 Thailand.

Environment Condition:
Temperature 27.2 °C ± 0.5 °C
Humidity 50.1 %RH ± 0.3 %RH

Calibration Place:
TEST TECH CO., LTD. (แผนกน้ำดี)
30,32 Rama II Soi 63, Rama II Rd.,
Samaedam, Bangkhuntien Bangkok 10150 Thailand

Calibration By: Mr.Piyapat Saidoung
Calibration Date: 10 April 2025

The Method used: In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 387-04
Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Sigma Scientific Limited.

The standard for Wavelength Certificate No. 118106 and 118118
The standard for Photometric Certificate No. 118123 and 118113
The standard for Stray light Certificate No. 118110 and 118112
The standard for Spectral resolution Certificate No. 118104

(Mr. Piyapat Saidoung)

(Miss Kaewkan Suradech)
Authorized signatory

Person in charge

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

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Phone: +66 2359 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth - in Asia and Beyond.



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., SAMAEDAM,
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
QUALITY CALIBRATION CO., LTD.



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 TLA5 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.

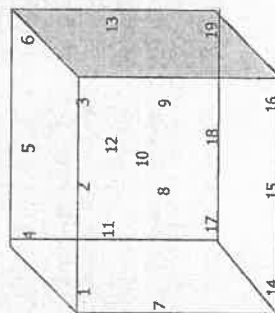
2. REFERENCE STANDARD INSTRUMENTS :-

- 1) DATA LOGGER WITH TC TYPE K HYDRA 2635A
25T8347 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

END OF CALIBRATION REPORT PAGE 2 OF 3

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

F-G010 REV : 03



CERTIFICATE No : 25T0975
REFERENCE No : 76012-7

PAGE : 1 OF 2

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 :
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.



F-Q010 REV : 03



CERTIFICATE No : 25T0975

PAGE : 2 OF 2

Calibration Report

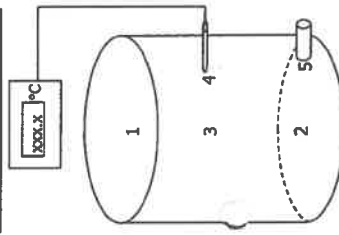
EQUIPMENT : AUTOCLAVE
MANUFACTURER : HIRAYAMA
ID NUMBER : EQL-155
RECEIVED DATE : 04-Feb-25
AMBIENT TEMPERATURE : 29° C ± 1° C
MODEL : HVE-50
SERIAL NUMBER : 30612085166
CALIBRATION DATE : 04-Feb-25
RELATIVE HUMIDITY : 55 %RH ± 10 % RH

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 : DATA LOGGER
MODEL : VALPROBE
SERIAL No : S350.S367.DV35.DN94
CERTIFICATE No : 25T0777
DUE DATE : 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



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 Air Temperature (°C)	Position 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

FRONT

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



F-Q010 REV : 03



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.: 25CG3566
Page.: 1 of 2

Equipment : Auto Burette
Capacity : 25 mL
Serial No. : -
ID. No. : 6210BU25/01
Manufacturer : EM
Made In : Germany
Submitted by : TEST TECH CO.,LTD. (Head Office)
30, 32 Rama II Soi 63, Rama II Rd.
Samaedam, Bangkhunthian, Bangkok 10150
Ambient Temperature : $(20 \pm 2.5) ^\circ\text{C}$
Relative Humidity : $(50 \pm 10) \%$
Barometric Pressure : 756 mmHg
Calibration Procedure : ASTM E 542 - 01
Calibrated by : Sa-ngeunkam Wongsa

Approved by :
(✓) Srisuda Khamtha
() Ponpan Paipim
() Chakrit Waewwanjua

Issue Date : 15 September 2025

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Auto Burette
Received Date : 11 September 2025
Condition As-Received : Used Item
Calibration Date : 15 September 2025
Reference : 2509-0413DN-1

Cert.No.: 25CG3566
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

Instruments	Model	Serial No.	ID. No.	Certificate No.	Traceability	Due date
1) Balance	XP205	B134206712	140RC007	25MM296	TPA	16 July 2026
2) Humidity/Baro/Temp	MHB-382SD	AM.42259	140EC016	25H1616	TPA	14 Aug 2026
3) Digital Thermometer	HH376	230806555	140EC013	25H1740	TPA	17 Jan 2026

This measurement result is traceable to SI Unit

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

3. True value is converted to true volume at the standard temperature of $20 ^\circ\text{C}$

Calibration result :

Nominal capacity (mL)	Reading (mL)	Std.dev	Uncertainty ($\pm$ mL)	k Factor
5	5.0196	0.00120	0.0059	2.00
15	15.0159	0.00118	0.0065	2.00

Remark mL = cm^3
Std.dev = Standard deviation

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 %.

-o-o-

8.4 D₂ Background Compensation with Copper

Description: Verifies the instruments ability to compensate for Background absorption.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0075	Passed

8.5 AA-BG Baseline Noise with Copper

Description: Ensures that background correction does not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0002	Passed

8.6 AA-BG Baseline Noise with Arsenic

Description: Ensures that background correction does not produce excessive noise at a low wavelength.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.005	0.0003	Passed

8.7 Flame Sensitivity

Description: Instrument Sensitivity checked against Copper standard.

Standard Copper Sensitivity	Specification	Results (Abs.)	Pass/Fail
5 mg/L Sensitivity SS Neb (if applicable)	> 0.250 Abs.	N/A	Not Applicable
2 mg/L Sensitivity HS Neb (if applicable)	> 0.250 Abs.	0.3463	Passed

10. 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.

Additional Comments

Additional Comments Regarding the PM	
PERFORMANCE TEST FOR FIAS	
1. Characteristics mass for Mercury. (500uL of 10ug/L Hg and 5 replicates) Characteristics mass %RSD	306.4 pg/0.0044 A 1.02 %
2. Characteristics mass for Arsenic. (500uL of 10ug/L As and 5 replicates) Characteristics mass %RSD	137.8 pg/0.0044 A 1.87 %
2. Characteristics mass for Selenium. (500uL of 10ug/L Se and 5 replicates) Characteristics mass %RSD	78.4 pg/0.0044 A 0.46 %
Wavelength Accuracy Check	
As 193.700 nm +/- 0.3nm	193.700 nm
Cu 324.750 nm +/- 0.3nm	324.800 nm
Ba 553.550 nm +/- 0.3nm	553.650 nm
K 766.490 nm +/- 0.3nm	766.590 nm

Review

The preventive maintenance checks and if applicable performance tests for PinAAcle 900F have been completed.

This PinAAcle 900F Passes ☒ Fails ☐ the preventive maintenance.

Review of Preventive Maintenance:

Authorized PerkinElmer Representative:	Date: 18-Feb-2025 (DD-MM-YYYY)
Authorized Customer Representative:	Date: 18-Feb-2025 (DD-MM-YYYY)

Chamrong
Jurairat

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. PC Instrument Software:
 - ☒ Instrument Software user files/databases archived, packed, and/or deleted as needed.
3. Mechanical:
 - ☒ Inspect and clean all fans and filters. Replace filters if necessary
 - ☒ Inspect all gas lines for leaks and/or wear. Replace if needed.
 - ☒ Clean exterior of the instrument.
 - ☒ Inspect the burner head, burner chamber, and nebulizer. Clean if needed as stated in the Hardware Guide.
 - ☒ Check burner head dimensions with the feeler gauge as stated in the Hardware Guide in the Maintenance chapter section on cleaning the burner head and checking sloth width. Replace if out of specification
 - ☒ Check the condition of the end cap, burner head, and nebulizer O-rings. Replace if necessary.
 - ☒ Check the drain system for signs of wear. Replace worn or damaged parts.
 - ☒ Visually check for proper flame conditions when igniting the Air-C2H2 and N2O-C2H2 flames (if applicable).

4. Electrical:

- ☒ Inspect PC boards. Clean if necessary.
- ☒ Carefully check all internal and external cable connections.
- ☒ Check instrument firmware revisions upgrade to current levels (if necessary)
- ☒ Run Diagnostics Test within the Advanced function of the Spectrometer page. Check the results in the service log folder in the Spectrometer BM Log Viewer.

5. Optics:

- ☒ Inspect and clean the sample compartment windows, if needed.
- ☒ Inspect optics. Clean or replace if necessary.

6. Gasses:

- ☒ Verify that the Gasses supplied to the instrument are within the pressure and purity specifications found in the PinAAcle 900F Series Pre-Installation Checklist SDB.
- ☒ Verify that the acetylene filter and air filter element is dry. Replace if necessary.

7. Flame Interlock Check:

Description: Check to ensure that all safety interlocks are closed.

Parameter	Specification	Test Results	Pass/Fail
Flame Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Drain Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Nebulizer Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
C ₂ H ₂ Pressure Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Air Pressure Sensor	Air/C ₂ H ₂ Flame correctly shuts down	Active	Passed
Burner Head Sensor	Choosing Nitrous Oxide as the oxidant should trigger an interlock shuts down	Active	Passed

8. After PM Performance tests:

8.1 Detector Linearity with Barium

Description: Ensures that the detector is linear in the Visible Range.

Parameter	Specification	Certificate Value at 553.6 nm (Abs.)	Test Results	Pass/Fail
1.0 A ND Filter	± 5% from Cert.	0.9684	0.9702	Passed
0.2 A ND Filter	± 5% from Cert.	0.1944	0.1927	Passed

8.2 Baseline Noise at 1.0 Absorbance with Barium

Description: Ensures that a high absorbance will not produce excessive noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.010	0.0008	Passed

8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

Parameter	Specification	Results	Pass/Fail
Standard Deviation	≤ 0.001	0.0002	Passed

Component List

Component / Specific Model	Serial #	Configuration Notes
FIAS 400	400521100101	Syngistix version 4.0

Parts Lists

Parts Included with the PM		
Part Number (if applicable)	Description	Quantity
B0501696	Fan Filters	2
N3160156	O-Ring Kits for Sampling Introduction (Stainless Steels Nebulizer)	N/A
N3160157	O-Ring Kits for Sampling Introduction (Plastic Nebulizer)	1
N9301714	Replacement Acetylene Filter Cartridge	1
TH001022	Replacement Air Filter Cartridge	2

Additional Reagents and Standards Required for PM			
Part Number (if applicable)	Description	Quality	Batch/Lot #
N9300183	1000 mg/L Copper Standard	AR	27-39CUIY1
			APR-2025

Additional Reagents and Standards Required for PM (Customer Support Solution)			
Part Number (if applicable)	Description	Quantity	Expiration Date (MM/YY)
N/A	DI Water	250 ml.	AR
N/A	0.5% HNO ₃	250 ml.	AR

Additional Tools Required for PM			
Part Number (if applicable)	Description	Quantity	Serial #
N1013000	0.2A Neutral density filter	1	MG0-685
N1013002	1.0A Neutral density filter	1	MG2-680
03030987	System 2 EDL Driver	1	839936
N3050605	As System 2 EDL	1	06261
N3050121	Cu Lumina HCL	1	101615-010080
N3050109	Ba Lumina HCL	1	858AD8
N3050139	K Lumina HCL	1	011604-41713
N3050152	Ni Lumina HCL	1	050914-010060



PinAAcle 900F Preventive Maintenance Report

Company Name: TEST TECH CO., LTD.
Instrument Location: 30,32 RAMA2 SOI 63, RAMA 2 RD.,
SAMMAEDAM, BANGKHUNTEN, BANGKOK 10150
Instrument Serial No.: PFBS21091601
Date: 18-Feb-2025

PinAAcle 900F Preventive Maintenance (PM)

Company Name:	TEST TECH CO., LTD.				
Address (Instrument Location):	30,32 RAMA2 SOI 63, RAMA 2 RD., BANGKHUNTEN, BANGKOK 10150				
Serial Number:	PFBS21091601	PM Number:	1 of 1		
Customer Name (if applicable):	Jurairat Jongrakobkit	Telephone Number:	087-5199005		
Customer Support Engineer Name:	Chainarong	Service Order Number:	WO-03179699		
Date PM Performed: (DD-MM-YYYY)	18-Feb-2025	Next PM Due Date: (DD-MM-YYYY)	18-Feb-2026		
Standard Labor Hours to Complete PM :					5 hours

Part Number	Release	Publication Date
09370145 Rev.9	A	January 2018

Scope
The purpose of this PM is to ensure the continued functionality of the PinAAcle 900F 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 or calibration, including a current back-up of system software and/or data files.
The completed document 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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