

ภาคผนวก ฉ.

เอกสารรับรองเครื่องมือการตรวจวัด



Certificate of Calibration

Certificate No. : 67-420106-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisutesukhakdon 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 : ECFC7252101B

Serial No. : 01 X099320

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

Ambient Temperature : (26.3 to 26.7) °C

Relative Humidity : (40 to 45) %

Date of Received : 20 September 2024

Date of Calibration : 20 September 2024

Date of Issue : 21 September 2024

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	SO-E-00307/66	23 Aug 2025	National Institute of Metrology Thailand (NIMT)
2. Standard Buffer Solution			
pH	Cert. No.	Lot No.	Exp. Date
4.008	61293328	1027612	15 Sep 2026
6.987	61297593	1027614	15 Sep 2025
10.010	61306165	1027613	15 Sep 2025

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-420106-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

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

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Buffer (pH)	UUC Reading		Correction (pH)	Uncertainty (± pH)
			(pH)	(mV)		
4, 7, 10	4.008	4.008	4.01	0.00	0.00	0.0097
	6.987	6.987	7.00	-0.01	-0.01	0.011
	10.010	10.010	10.01	0.00	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. : 67-400547-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisatsukhakhon 25, Pracha-Utth Rd., Tungkrui Bangkok 10140 Thailand

Equipment :

Temperature Indicator with Thermistor Probe

Temperature Indicator

Manufacturer : Eutech Model : pH 700
 Range : N/A °C Resolution : 0.1 °C
 Serial No. : 2884323 ID No. : N/A

Thermistor probe

Model : N/A Sheath Material : Stainless
 Diameter : 3 mm. Length : 115 mm.
 Serial No. : PH5TEMB01P 279 ID No. : N/A

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

Ambient Temperature : (26.3 to 26.7) °C
 Relative Humidity : (40 to 45) %
 Line Voltage : (220.0 to 223.0) VAC

Date of Received :

20 September 2024

Date of Calibration :

20 September 2024

Date of Issue :

21 September 2024

Calibrated by :

Permpon Chamru

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

400002 TT-0095-24 01 Jul 2026

National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No. Cert.No. Due Date Traceability

400033 24E633 21 Feb 2026

National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chamru)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-400547-1

Page : 2 of 2

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)
130	25.004	24.9	0.1	0.19

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. :

67-200334-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisutesitknakhon 25, Prachia-Unit 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 : (24.9 to 26.3) °C

Relative Humidity : (40.8 to 55.4) %

Air Pressure : 1003.9 mbar

Date of Received :

20 September 2024

Date of Calibration :

20 September 2024

Date of Issue :

21 September 2024

Calibrated by :

Akaradath Thippichai

Calibration Method :

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

Edition 7 - November 2022

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

Standard Weights

ID.No.

Cert.No.

Due Date

Traceability

E261-E2624

C02232088

08 Nov 2024

National Institute of Metrology (Thailand), (NIMT)

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

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Approved by :

(Sajja Sangkhum)

Supervisor

Certificate of Calibration

Certificate No. : 67-200334-1

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 $\pm$ (g)
0.001	0.00000	0.000015
0.01	0.00000	0.000016
0.1	0.00000	0.000018
1	0.00000	0.000026
10	0.00000	0.000053
20	-0.00003	0.000071
50	0.00006	0.00011
100	0.00004	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 $k = 2.13$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

A

B

C

D

E

-0.00005

0.00001

0.00002

0.00000

0.00000

g

Repeatability

Load test

:

200

g

Sider.

:

0.000000

g

-o0o-

CAL-0001-03

CAL-R001-03



Certificate of Calibration

Certificate No. : 67-410112-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisutesuknakhon 25, Prachua-Utd Rd., Thungkri, 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 : 20 September 2024

Date of Calibration : 23 September to 24 September 2024

Date of Issue : 24 September 2024

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 & 400035 SG-H-00611/67 04 Jan 2025 Success Gateway Co., Ltd., Accredited by TISI Calibration No.0268

Approved by :

(Permon Chuapru)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-410112-1

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)
19.99	19.7	0.3	0.46
25.00	24.7	0.3	0.46
30.01	29.7	0.3	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	38	2	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. : 67-400548-1 Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

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

Equipment :

Temperature controlled enclosure (Refrigerator)

Manufacturer : Biobase

Model : BXC-V250M (II)

Range : N/A °C

Resolution : 0.1 °C

Serial No. : YC025025190108

ID No. : N/A

Environment :

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

Ambient Temperature : (26.3 to 27.4) °C

Relative Humidity : (39 to 47) %

Line Voltage : (226.0 to 230.0) V

Date of Received : 20 September 2024

Date of Calibration : 20 September 2024

Date of Issue : 21 September 2024

Calibrated by :

Permpon Chantpu

Calibration Method :

CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with RTD Probe

ID No. Cert.No. Due Date

Traceability

400046 & 400042 67-400442-1 26 Jan 2025

National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chantpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

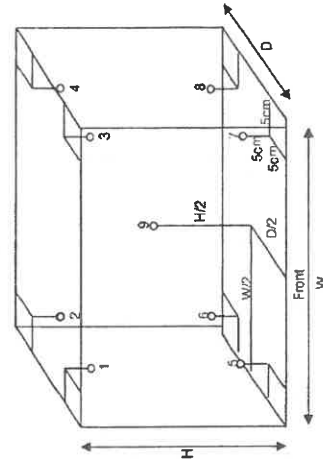
Certificate No. : 67-400548-1 Page : 2 of 2

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 = 0.50 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	2.0	4.70	4.42	5.04	4.99	4.52	4.22	4.74	4.67	3.89	0.45

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
4.0	2.0	2.00	1.23	0.13	1.40

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. : 67-400548-2

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisatsukkhakon 25, Pracha-Utd Rd., Thungru Bangkok 10140 Thailand

Equipment :

Temperature controlled enclosure (Oven)

Manufacturer : Memmert

Model : UF110

Range : N/A °C Resolution : 0.1 °C

Serial No. : B419.1092 ID No. : N/A

Environment :

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

Ambient Temperature : (26.3 to 27.4) °C

Relative Humidity : (39 to 47) %

Line Voltage : (226.0 to 230.0) V

Date of Received :

20 September 2024

Date of Calibration :

20 September 2024

Date of Issue :

21 September 2024

Calibrated by :

Permpoon Chianpu

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.

Traceability

400046 & 400023

Due Date

National Institute of Metrology Thailand (NIMT)

67-400198-1

01 Oct 2024

Approved by :

(Permpoon Chianpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-400548-2

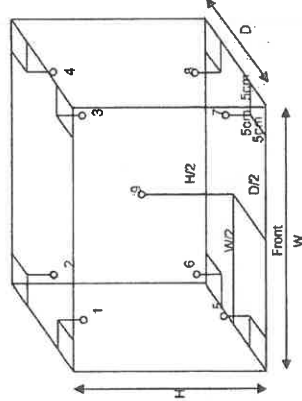
Page : 2 of 2

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 = 0.56 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	102.3	102.9	103.7	103.7	102.3	102.3	103.8	102.2	102.7	0.82
104.0	104.0	104.0	103.3	103.9	104.8	104.8	103.2	103.3	104.8	103.2	103.7	0.84
105.0	105.0	105.0	104.3	104.9	105.7	105.7	104.3	104.3	105.8	104.3	104.7	0.83
150.0	150.0	150.0	149.3	149.9	151.3	151.2	149.1	149.2	151.2	149.3	149.5	1.1
180.0	180.0	180.0	179.0	179.8	181.4	181.1	178.8	179.0	181.1	178.8	179.3	1.1

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
103.0	103.0	103.0	1.3	0.3	2.0
104.0	104.0	104.0	1.5	0.3	2.1
105.0	105.0	105.0	1.4	0.3	2.0
150.0	150.0	150.0	2.3	0.5	2.7
180.0	180.0	180.0	2.5	0.5	3.3

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 = providing a level of confidence of approximately 95%

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Certificate of Calibration

Certificate No. : 67-400548-3

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatsukhakhon 25, Pracha-Utd Rd., Thungku 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 :

(26.3 to 27.4) °C

Relative Humidity :

(39 to 47) %

Line Voltage :

(226.0 to 230.0) V

Date of Received :

20 September 2024

Date of Calibration :

20 September 2024

Date of Issue :

21 September 2024

Calibrated by :

Permpoon 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.

Traceability

400046 & 400024

30 Sep 2024

National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpoon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

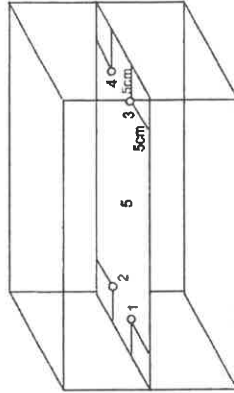
Certificate No. : 67-400548-3

Page : 2 of 2

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	84.55	84.44	84.49	84.46	84.62	0.20	0.25	0.06

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 -





Certificate of Calibration

Certificate No. : 67-400548-4

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisetseukhakdon 25, Pracha-Ud Rd., Thungkru Bangkok 10140 Thailand

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : Biobase

Range : 0 °C to 65 °C

Serial No. : KYP1502202003

Model : Biochemistry Incubator

Resolution : 0.1 °C

ID No. : N/A

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

Ambient Temperature : (31.0 to 32.0) °C

Relative Humidity : (50 to 55) %

Line Voltage : (226.0 to 230.0) V

Date of Received : 20 September 2024

Date of Calibration : 20 September 2024

Date of Issue : 21 September 2024

Calibrated by : Permpon Chaupru

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 Traceability

400029 & 400048 67-400444-1 02 Feb 2025 National Institute of Metrology Thailand (NIMT)

The temperature scale used was based on ITS-90

The uncertainty is for a confidence probability of approximately 95%

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CAL-F0031-03

Approved by : (Permpon Chaupru) Supervisor

Certificate of Calibration

Certificate No. : 67-400548-4

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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

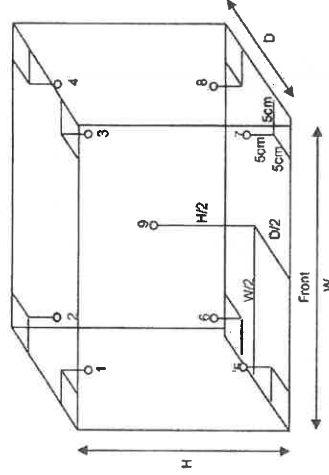
Inside of Chamber

W = 0.45 m

D = 0.41 m

H = 0.85 m

Capacity = 0.16 m³



Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
20.0	20.4	20.4	20.23	20.18	20.08	20.15	19.90	19.92	19.96	19.90	19.96	0.82

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.4	20.4	0.38	0.43	0.96

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. : 67-400560-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisatsuknakhom 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 : 20 September 2024

Date of Calibration : 23 September 2024

Date of Issue : 23 September 2024

Calibrated by : Chortip Sanchusri

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

400001 TT-0023-24 16 Feb 2026

Traceability

National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No. Cert.No. Due Date

400003 23E1866 01 Jun 2025

Traceability

National Institute of Metrology Thailand (NIMT)

400004 23E1866 01 Jun 2025

National Institute of Metrology Thailand (NIMT)

Approved by :

(Perngpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-400560-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Ice point check : UUC* reading 0 °C Standard reading -0.0321 °C

Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
39.8223	40	-0.2	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%

- 0.03 °C -





Certificate of Calibration

Certificate No. : 67-300569-1

Page : 1 of 2

Submitted by

: M Green Group Co., Ltd.

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

Equipment

: Burette

Manufacturer : GLASSCO

Class : A

Capacity : 10 ml

Graduation : 0.05 ml

ID No. : 2212-0344-1

Environment

: Ambient Temperature :

(20 ± 3)

°C

Relative Humidity :

(50 ± 10)

%

Air Pressure :

1008.0

mbar.

Date of Received

: 20 September 2024

Date of Calibration

: 23 September 2024

Date of Issue

: 23 September 2024

Calibrated by

: Areerat Sombun

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

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

Electronic Balance

ID No.

Cert. No.

Due Date

Traceability

241005

67-200210-4

02 Dec 2024

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Tovadee)

Supervisor

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Certificate of Calibration

Certificate No. : 67-300569-1

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

Delivery Time : 19.92 sec.

Nominal Volume (ml)	Measuring Volume (ml)
2	2.0044
5	5.0024
10	9.9915

Uncertainty of measurement with in

±

0.0039 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. : 67-300569-2

Page : 1 of 2

Submitted by

: M Green Group Co., Ltd.

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

Equipment

: Burette

Manufacturer : GLASSCO

Class : A

Capacity : 25 ml

Graduation : 0.1 ml

ID No. : 2212-0344-2

Environment

: Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1008.0 mbar.

Date of Received : 20 September 2024

Date of Calibration : 23 September 2024

Date of Issue : 23 September 2024

Calibrated by : Arcerat Sombun

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

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

Electronic Balance

ID No.

Cert.No.

Due Date

Traceability

241005

67-200210-4

02 Dec 2024

National Institute of Metrology (Thailand) (NIMT)

Approved by :

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300569-2

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

Delivery Time : 46.13 sec.

Nominal Volume (ml)	Measuring Volume (ml)
5	5.0039
15	14.9824
25	24.9757

Uncertainty of measurement with in ± 0.0066 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%

-o00o-





Certificate of Calibration

Certificate No. : 67-300569-3

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

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

Equipment : Measuring Pipette

Manufacturer : GLASSCO **Class :** A

Capacity : 10 ml **Graduation :** 0.1 ml

ID No. : MP10/01/19

Environment :
Ambient Temperature : $(20 \pm 3) ^\circ\text{C}$
Relative Humidity : $(50 \pm 10) \%$
Air Pressure : 1000.8 mbar.

Date of Received : 20 September 2024

Date of Calibration : 23 September 2024

Date of Issue : 23 September 2024

Calibrated by : Areearat Sombun

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

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

Electronic Balance

ID No. : 67-200210-4 **Due Date :** 02 Dec 2024 **Traceability :** National Institute of Metrology (Thailand) (NIMT)

Approved by : (Wipa Toivadee)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300569-3

Page : 2 of 2

Result of Calibration : This result of true Volume is referred to standard temperature at $20 ^\circ\text{C}$

UUC Condition As-Received : Good

Delivery Time : 12.20 sec.

Nominal Volume (ml)	Measuring Volume (ml)
2	1.9998
5	4.9871
10	9.9742

Uncertainty of measurement with in ± 0.0039 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. : 67-300569-4

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

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

Equipment : Measuring Pipette
Manufacturer : GLASSCO Class : A
Capacity : 25 ml Graduation : 0.1 ml
ID No. : MP25/01/19

Environment : Ambient Temperature : (20 ± 3) °C
Relative Humidity : (50 ± 10) %
Air Pressure : 1000.8 mbar.

Date of Received : 20 September 2024
Date of Calibration : 23 September 2024
Date of Issue : 23 September 2024
Calibrated by : Areerat Sombun

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

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

Electronic Balance

ID No.	Cert. No.	Due Date	Traceability
2411005	67-200210-4	02 Dec 2024	National Institute of Metrology (Thailand) (NIMT)

Approved by : _____

(Signature of Supervisor)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300569-4

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

Delivery Time : 15.20 sec.

Nominal Volume (ml)	Measuring Volume (ml)
5	5.0302
15	15.0832
25	25.0398

Uncertainty of measurement with in $\pm$ 0.0067 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. : 67-300571-1

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

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

Equipment : Cylinder
Manufacturer : GLASSCO
Capacity : 100 ml
ID No. : CY100/01/24
Class : A
Graduation : 1 ml

Environment :
Ambient Temperature : $(20 \pm 3) ^\circ\text{C}$
Relative Humidity : $(50 \pm 10) \%$
Air Pressure : 1003.9 mbar.

Date of Received : 20 September 2024
Date of Calibration : 24 September 2024
Date of Issue : 24 September 2024
Calibrated by : Arcarat Sombun

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

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

Electronic Balance

ID.No.	Cert.No.	Due Date	Traceability
241002	67-200210-1	02 Dec 2024	National Institute of Metrology (Thailand) (NIMT)

Approved by :

(wipa rovaee)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300571-1

Page : 2 of 2

Result of Calibration : This result of true Volume is referred to standard temperature at $20 ^\circ\text{C}$

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
50	50.45
100	100.52

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. : 67-300571-2

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisutsuknakhon 25, Pracha-Uitd 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 : 1004.1 mbar.

Date of Received : 20 September 2024

Date of Calibration : 24 September 2024

Date of Issue : 24 September 2024

Calibrated by : Areerat Sornbun

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

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

Electronic Balance

ID No.

Cert. No.

Due Date

Traceability

241002

67-200210-1

02 Dec 2024

National Institute of Metrology (Thailand) (NIMT)

Approved by :

Supervisor

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Certificate of Calibration

Certificate No. : 67-300571-2

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)
150	151.02
250	251.16

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%

-o0o-





Certificate of Calibration

Certificate No. : 67-300571-3 **Page : 1 of 2**

Submitted by : M Green Group Co., Ltd.

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

Equipment : Cylinder
Manufacturer : GLASSCO
Capacity : 1000 ml
ID No. : CY1000/01/24
Class : A
Graduation : 10 ml

Environment : Ambient Temperature : (20 ± 3) °C
Relative Humidity : (50 ± 10) %
Air Pressure : 1001.7 mbar.

Date of Received : 20 September 2024
Date of Calibration : 24 September 2024
Date of Issue : 24 September 2024
Calibrated by : Arcarat Sombun

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

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

Electronic Balance

ID No.	Cert. No.	Due Date	Traceability
241002	67-200210-1	02 Dec 2024	National Institute of Metrology (Thailand) (NIMT)

Approved by :

Supervisor



The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-300571-3 **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)
500	500.74
1000	1003.10

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%

-o0o-



Certificate of Calibration

Certificate No. : 67-300572-1 Page : 1 of 2

Submitted by : M Green Group Co., Ltd.
188/46 Wisatsuknakhot 25, Pracha-Uttd Rd., Thungkru, Bangkok 10140 ThailandEquipment : Imhoff Cone
Manufacturer : VITLAB
Capacity : 1000 ml Graduation : 0.1, 50 ml
ID No. : CY1000/01/22Environment : Ambient Temperature : (20 ± 3) °C
Relative Humidity : (50 ± 10) %
Air Pressure : 1001.5 mbar.Date of Received : 20 September 2024
Date of Calibration : 23 September 2024
Date of Issue : 23 September 2024
Calibrated by : Areeat Sombun

Calibration Method : In-house method CAL-M3001 based on ASTM E 542-01

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

Electronic Balance
ID No. 241002 Cert.No. 67-200210-1 Due Date 02 Dec 2024
Traceability National Institute of Metrology (Thailand) (NIMT)Approved by :
SupervisorThe Uncertainties are for a confidence probability of approximately 95%
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Certificate of Calibration

Certificate No. : 67-300572-1 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)
500	500.74
1000	1009.16

Uncertainty of measurement with in $\pm$ 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%

-o0o-





Certificate of Calibration

Certificate No. : 67-300570-1

Submitted by : M Green Group Co., Ltd.

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

Page : 1 of 2

Equipment : Volumetric Flask

Manufacturer : GLASSCO

Class : A

Capacity : 100 ml

ID No. : VF100/01/19

Environment : Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1003.9 mbar.

Date of Received : 20 September 2024

Date of Calibration : 24 September 2024

Date of Issue : 24 September 2024

Calibrated by : Areerat Sombun

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

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

Electronic Balance

ID No. Cert.No.

Due Date

Traceability

241005 67-200210-4

02 Dec 2024

National Institute of Metrology (Thailand) (NIMT)

Approved by :

Supervisor

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Certificate of Calibration

Certificate No. : 67-300570-1

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

UUC Condition As-Received : Good

Page : 2 of 2

Nominal Volume (ml)	Measuring Volume (ml)
100	100.003

Uncertainty of measurement with in ± 0.018 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. : 67-300570-2

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisetseanukhakhon 25, Prachin-Uthid Rd., Thungkru, Bangkok 10140 Thailand

Equipment : Volumetric Flask

Manufacturer : GLASSCO

Class : A

Capacity : 250 ml

ID No. : VF250/01/19

Environment : Ambient Temperature : $(20 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 10) \%$

Air Pressure : 1003.8 mbar.

Date of Received : 20 September 2024

Date of Calibration : 24 September 2024

Date of Issue : 24 September 2024

Calibrated by : Atsarat Sombun

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

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

Electronic Balance

ID No. : 67-200210-1

Cert. No. : 67-200210-1

Due Date : 02 Dec 2024

Traceability : National Institute of Metrology (Thailand) (NIMT)

Approved by :



(Signature of Supervisor)

Supervisor

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Certificate of Calibration

Certificate No. : 67-300570-2

Page : 2 of 2

Result of Calibration : This result of true Volume is referred to standard temperature at $20 ^\circ\text{C}$

UUC Condition As-Received : Good

Nominal Volume (ml)	Measuring Volume (ml)
250	250.04

Uncertainty of measurement with in ± 0.051 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%

- oOo -





Certificate of Calibration

Certificate No. : 67-300570-3

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

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

Equipment : Volumetric Flask

Manufacturer : GLASSCO

Class : A

Capacity : 1000 ml

ID No. : VF1000/01/19

Environment : Ambient Temperature : (20 ± 3) °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1003.3 mbar.

Date of Received : 20 September 2024

Date of Calibration : 24 September 2024

Date of Issue : 24 September 2024

Calibrated by : Areerat Sombun

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

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

Electronic Balance

ID No. : 241002

Cert. No. : 67-200210-1

Due Date : 02 Dec 2024

Traceability

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Tovadee)

Supervisor

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Certificate of Calibration

Certificate No. : 67-300570-3

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)
1000	1000.25

Uncertainty of measurement with in ± 0.14 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. : 67-210362-1 Page : 1 of 2

Submitted by : M Green Group Co., Ltd.
188/46 Wisetukulnakhon 25, Pracha-Utd 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 / m³
Assumed Air density : 1.2 kg / m³
Environment : Ambient Temperature : (20 ± 2) °C
Relative Humidity : (50 ± 10) %
Air Pressure : 1005.7 mbar

Date of Received : 20 September 2024
Date of Calibration : 23 September 2024
Date of Issue : 23 September 2024
Calibrated by : Wutichai Swarphong

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
E221-E2210 MM-0042-22 21 Mar 2025 National Institute of Metrology (Thailand), (NIMT)

Approved by :
Supervisor



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Certificate of Calibration

Certificate No. : 67-210362-1 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	1 g	none	1 g -0.003 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%

- o O o -





Certificate of Calibration

Certificate No. : 67-210362-2 Page : 1 of 2

Submitted by : M Green Group Co., Ltd.
188/46 Wisutesuknakhon 25, Pracha-Utd 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 : 1005.7 mbar

Date of Received : 20 September 2024

Date of Calibration : 23 September 2024

Date of Issue : 23 September 2024

Calibrated by : Wutichai Swapkong

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

E221-E2210 MM-0042-22 21 Mar 2025 National Institute of Metrology (Thailand), (NIMT)

Approved by
(Saja Sangkhum)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-210362-2 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	100 g	none	100 g +0.06 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-





Certificate of Calibration

Certificate No. : 67-210362-3

Submitted by :

M Green Group Co., Ltd.

188/46 Wisutesaknakhon 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

Environment :

Ambient Temperature :

(20 ± 2) °C

Relative Humidity :

(50 ± 10) %

Air Pressure :

1005.7 mbar

Date of Received : 20 September 2024

Date of Calibration : 23 September 2024

Date of Issue : 23 September 2024

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.

E221-E2210

Traceability

National Institute of Metrology (Thailand), (NIMT)

Cert. No.

MM-0042-22

Due Date

21 Mar 2025

Approved by

(Sarja Singkhum)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 67-210362-3

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 +0.06 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%

-ofo-





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



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

CERTIFICATE No : 24T1189
REFERENCE No : 72116-7

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : AUTOCLAVE
MANUFACTURER : HIRAYAMA
MODEL : HVE-50
SERIAL No : 30612085166
ID No : EQL-155
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 : 09-Feb-24

APPROVED BY :  PONGSAK J.
ISSUED DATE : 12-Feb-24
RECEIVED DATE : 09-Feb-24

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

F-C010 REV : 03



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

CERTIFICATE No : 24T1189

PAGE : 2 OF 2

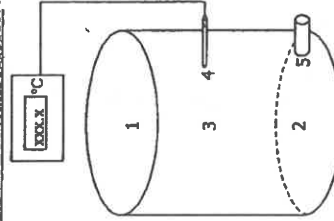
Calibration Report

EQUIPMENT : AUTOCLAVE
MANUFACTURER : HIRAYAMA
MODEL : HVE-50
ID NUMBER : EQL-155
SERIAL NUMBER : 30612085166
RECEIVED DATE : 09-Feb-24
AMBIENT TEMPERATURE : 30° C ± 1° C
RELATIVE HUMIDITY : 53 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

- 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 :-
 - DATA LOGGER
MODEL VALPROBE S350,S367,DV35,DN94
SERIAL No 24TU890
CERTIFICATE No 26-Jun-25
 - THIS CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
 - THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
 - THIS CERTIFICATE IS TRACEABLE TO 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 : 0.5 °C
Autoclave Condition : Normal
Chamber Size (Diameter*H): 30 * 71 cm

CHAMBER PERFORMANCE

Calibrate Point (°C)	Average all Position (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)	Pressure (MPa)	Holding time (min)	Operating Cycle time (min)
115	115.74	0.09	0.11	0.25	0.090	20	60
121	121.59	0.06	0.21	0.28	0.125	20	60

FRONT

TEMPERATURE MEASUREMENT ACCURACY TEST(°C)

		Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
Cont Temp	Ind Temp	#1	#2	#3	#4	#5	
115	115	115.72	115.74	115.79	115.71	115.71	0.59
121	121	121.59	121.62	121.56	121.58	121.59	0.59

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

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

NOTE 3 : LOCATION 3 WAS REFERENCE LOCATION.

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

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

END OF CALIBRATION REPORT



CERTIFICATE No : 24T1185
REFERENCE No : 72116-3

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 SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 09-Feb-24

APPROVED BY :
PONGSAK J.
ISSUED DATE : 12-Feb-24
RECEIVED DATE : 09-Feb-24

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 : 24T1185

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF 160
ID No : EQL-205
RECEIVED DATE : 09-Feb-24
AMBIENT TEMPERATURE : 25 °C ± 1 °C
SN : D518.0082
CALIBRATION DATE : 09-Feb-24
RELATIVE HUMIDITY : 53 %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 :-

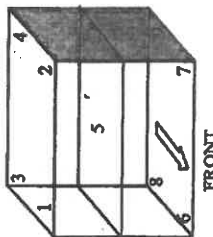
- 1) DATA LOGGER WITH RTD : HYDRA 2635A
- 2) SERIAL No : 7301307
- 3) THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM 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*72 cm



CHAMBER PERFORMANCE

Calibrate Point (°C)	Average All Position Temp. (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	35.03	0.05	0.09	0.16
36.0	36.05	0.07	0.08	0.19
41.5	41.45	0.08	0.13	0.20

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	34.98	35.01	35.00	35.00	35.02	35.08	35.07	35.04	35.10	0.25
36.0	36.0	36.00	36.03	36.03	36.02	36.04	36.09	36.10	36.04	36.12	0.25
41.5	41.5	41.45	41.45	41.39	41.46	41.46	41.47	41.43	41.44	41.49	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