

ภาคผนวก จ

สำเนาเอกสารรับรองเครื่องมือการตรวจวัด



Certificate of Calibration

Certificate No. : 67-420106-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

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

Equipment :

pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 700

pH

Resolution : 0.01 pH

Serial No. : 2884323

ID No. : N/A

Electrode

Model : ECEC7252101B

Serial No. : 01X099320

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 | SG-E-00307/66 | 23 Aug 2025 | National Institute of Metrology Thailand (NIMT) |

2. Standard Buffer Solution

| pH | Cert. No. | Lot No. | Exp. Date | Traceability |
|--------|-----------|---------|-------------|---|
| 4.008 | 61293328 | 1027612 | 15 Sep 2026 | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |
| 6.987 | 61297593 | 1027614 | 15 Sep 2025 | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |
| 10.010 | 61306165 | 1027613 | 15 Sep 2025 | 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. : 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 Reading (pH) | Correction (pH) | Uncertainty (± pH) |
|-----------------------------------|---------------------------|-----------------------|----------------------|-------------------------|
| | | | | |
| 4, 7, 10 | 4.008 | 4.01 | 0.00 | 0.0097 |
| | 6.987 | 7.00 | -0.01 | 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. : 67-400547-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

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

Equipment :

Temperature Indicator with Thermistor Probe
Temperature Indicator

Manufacturer : Eutech Model : pH 700

Range : N/A °C Resolution : 0.1 °C

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

Thermistor probe

Model : N/A Sheath Material : Stainless

Diameter : 3 mm. Length : 115 mm.

Serial No. : 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 :

Permpoon Chumpu

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

400023 24E633 21 Feb 2026

National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpoon Chumpu)

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 |

Remarks

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 Wisetuknakhon 25, Pracha-Uthit Rd., Thungku, Bangkok 10140 ThailandEquipment : 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 : 1003.0 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) |

Approved by :

(Sajja Sangkhum)

Supervisor

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

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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 | 0.00040 | 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 | |
| | Sdev. : 0.000000 | g |

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Sajja





Certificate of Calibration

Certificate No. : 67-410112-1

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisutesuknakhon 25, Pracha-Uttid 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 Sanchusri

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 :

(Permpon Chianpu)

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 Wisetukhachon 25, Pracha-Utd Rd., Thungru Bangkok 10140 Thailand

Equipment : Temperature controlled enclosure (Refrigerator)

Manufacturer : Biobase

Model : BXC-V250M (H)

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 : Pempon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with RTD Probe

ID.No. Cert.No.

400046 & 400042 67-400442-1

Traceability

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

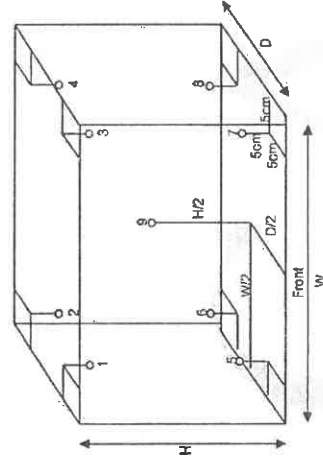
Certificate No. : 67-400548-1

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 | | Overall Variation (°C) |
|--------------------|-----------------------------|--------------------------------|--------------------|-------------------|---------------------------|
| | | | Uniformity (°C) | Stability (°C) | |
| 4.0 | 2.0 | 2.00 | 1.23 | 0.13 | 1.40 |

Remarks 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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MSC-TS1-7817025
CALIBRATION 0010

Certificate of Calibration

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

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

Equipment : Temperature controlled enclosure (Oven)

Manufacturer : Memmert
Range : N/A °C
Serial No. : B419,1092
Model : UF110
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 : (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 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

400046 & 400023 67-400198-1 01 Oct 2024 National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

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Certificate of Calibration

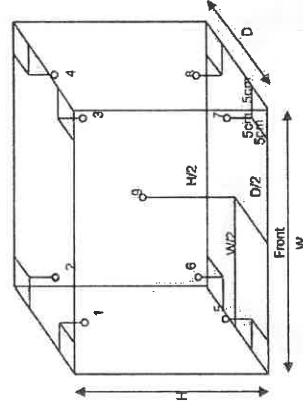
Certificate No. : 67-400548-2

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 | 104.6 | 103.2 | 103.3 | 104.8 | 103.2 | 103.7 | 0.84 |
| 105.0 | 105.0 | 105.0 | 104.3 | 104.9 | 105.8 | 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) |
|--------------------|-----------------------------|--------------------------------|-----------------------------|----------------------------|----------------------------|-----|---------------------------|
| | | | Measured Uniformity (°C) | Measured Stability (°C) | | | |
| 103.0 | 103.0 | 103.0 | 1.3 | 0.3 | 0.3 | 2.0 | |
| 104.0 | 104.0 | 104.0 | 1.5 | 0.3 | 0.3 | 2.1 | |
| 105.0 | 105.0 | 105.0 | 1.4 | 0.3 | 0.3 | 2.0 | |
| 150.0 | 150.0 | 150.0 | 2.3 | 0.5 | 0.5 | 2.7 | |
| 180.0 | 180.0 | 180.0 | 2.5 | 0.5 | 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 = 2, 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 Wisatesukhakhon 25, Pracha-Utd Rd., Thungkru Bangkok 10140 ThailandEquipment : 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 : Penmon 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-90Reference Standard Instruments : This certification is traceable to the International System of Units
Standard Digital Thermometer with RTD probe

ID No. 400046 & 400024 Cert. No. 67-400198-2 Due Date 30 Sep 2024 Traceability National Institute of Metrology Thailand (NIMT)

Approved by : 
(Penmon Chanpu)
Supervisor

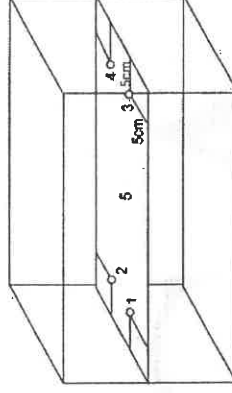
The Uncertainties are for a confidence probability of approximately 95%

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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%

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Certificate of Calibration

Page : 1 of 2

Certificate No. : 67-400548-4

Submitted by : M Green Group Co., Ltd.

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

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : Biobase

Model : Biochemistry Incubator

Range : 0 °C to 65 °C

Resolution : 0.1 °C

ID No. : N/A

Serial No. : KYP1502202003

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 Chamu

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

Approved by :

(Permpon Chamu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Page : 2 of 2

Certificate No. : 67-400548-4

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

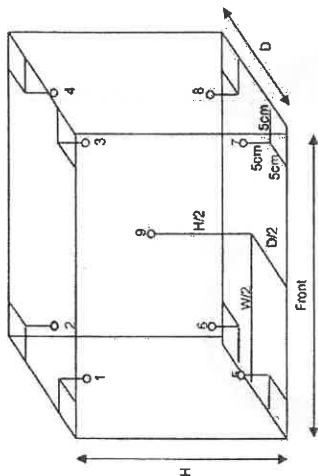
This instrument was setting air ventilation at position 0 (close)

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) |
|--------------------|-----------------------------|--------------------------------|-----------------------------|------|----------------------------|------|---------------------------|
| | | | 0.38 | 0.43 | 0.43 | 0.43 | |
| 20.0 | 20.4 | 20.4 | 0.38 | 0.43 | 0.43 | 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 Wisatsuknakhon 25, Pracha-Utd Rd., Thungkru, Bangkok 10140 ThailandEquipment : 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. : 94-49747Environment : Ambient Temperature : (23 ± 2) °C
Relative Humidity : (50 ± 15) %
Line Voltage : (220 ± 22) VACDate of Received : 20 September 2024
Date of Calibration : 23 September 2024
Date of Issue : 23 September 2024
Calibrated by : Chotip Sanchusi

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 23E1866 01 Jun 2025 National Institute of Metrology Thailand (NIMT)
400004 23E1866 01 Jun 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. : 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%

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Certificate of Calibration

Certificate No. : 67-300569-1

Page : 1 of 2

Submitted by

: M Green Group Co., Ltd.

188/46 Wisatsuknakhon 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

The Uncertainties are for a confidence probability of approximately 95%

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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 Wisatsuknaknon 25, Pracha-Ud Rd., Thungkrn, 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 :

(Wipa Tovadee)

Supervisor

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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%

-o-o-





Certificate of Calibration

Certificate No. : 67-300569-3

Page : 1 of 2

Submitted by

: M Green Group Co., Ltd.

188/46 Wisatesuknakhon 25, Pracha-Utd 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 ± 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 : 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.

Cert. No.

Due Date

Traceability

2411005

67-200310-4

02 Dec 2024

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Toivadee)

Supervisor

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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 °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 Wisetukulnakhon 25, Prachia-Ukid Rd., Thungkri, 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 : $(20 \pm 3) ^\circ\text{C}$

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 : 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. : 241005

Cert.No. : 67-200210-4

Traceability

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Signature)
(Wipa Tonadee)

Supervisor

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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 $20 ^\circ\text{C}$

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 1σ \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%

- o o o -

(Signature)





NSC-TIS-TS11025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-300571-1

Submitted by : M Green Group Co., Ltd.

188/46 Wisatsuknaknon 25, Pracha-Utd 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 : 1003.9 mbar.

Date of Received : 20 September 2024

Date of Calibration : 24 September 2024

Date of Issue : 24 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. : 24-1002

Cert. No. : 67-200210-1

Due Date : 02 Dec 2024

Traceability :

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. : 67-300571-1

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) |
|-----------------------|-------------------------|
| 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 Wisetukulnakhon 25, Pracha-Utd Rd., Thungkrn, Bangkok 10140 Thailand

Equipment : Cylinder
Manufacturer : GLASSCO Class : A
Capacity : 250 ml Graduation : 2 ml
ID No. : CY25001/19


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 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 Towadee)
Supervisor



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Certificate of Calibration

Certificate No. : 67-300571-2 Page : 2 of 2

Result of Calibration : This result of type 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 \pm 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%

- o o o -







NSG-TISI-16517025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-300571-3

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

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

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

Environment :
Ambient Temperature : $(20 \pm 3) ^\circ\text{C}$
Relative Humidity : $(50 \pm 10) \%$
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 : 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 |
|--------|-------------|-------------|---|
| 241002 | 67-200210-1 | 02 Dec 2024 | National Institute of Metrology (Thailand) (NIMT) |

Approved by :

(Signature)
(Wipaa. Toivadee)

Supervisor

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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 $20 ^\circ\text{C}$

UUC Condition As-Received : Good

| Nominal Volume (ml) | Measuring Volume (ml) |
|-----------------------|-------------------------|
| 500 | 500.74 |
| 1000 | 1003.10 |

Uncertainty of measurement with in $\pm 0.17 \text{ ml}$

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 -

(Signature)



Certificate of Calibration

Page : 1 of 2

Certificate No. : 67-300572-1

Submitted by : M Green Group Co., Ltd.

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

Equipment : Imhoff Cone

Manufacturer : VITLAB

Capacity : 1000 ml Graduation : 0.1, 50 ml

ID No. : CY1000/01/22

Environment : 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 : Arceat Sornbun

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. Cert. No. Due Date

241002 67-200210-1 02 Dec 2024

Traceability

National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipa Torddee)

Supervisor

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Certificate of Calibration

Page : 2 of 2

Certificate No. : 67-300572-1

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 | 500.74 |
| 1000 | 1009.16 |

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%

-o-o-





NSG-TISI-TISI7025
CALIBRATION 0036

Certificate of Calibration

Certificate No. : 67-300570-1 Page : 1 of 2

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

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.

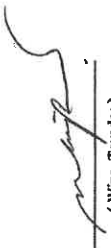
Date of Received : 20 September 2024
Date of Calibration : 24 September 2024
Date of Issue : 24 September 2024
Calibrated by : Anserat Sombun

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 Towadee)
Supervisor

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Certificate of Calibration

Certificate No. : 67-300570-1 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) |
|-----------------------|-------------------------|
| 100 | 100.063 |

Uncertainty of measurement with in \pm 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%

-ofo-







Certificate of Calibration

Certificate No. : 67-300570-2 **Page :** 1 of 2

Submitted by : M Green Group Co., Ltd.

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

Equipment : Volumetric Flask

Manufacturer : GLASSCO **Class** : A

Capacity : 250 ml

ID No. : VF250/01/19

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

Relative Humidity : (50 ± 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 : Arcnat 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 Towadee)

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 °C

UUC Condition As-Received : Good

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

Uncertainty of measurement with in \pm 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%

-000-

(Signature)





Certificate of Calibration

Certificate No. : 67-300570-3

Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisatsraknakhon 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 Sorbun

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 :

(Signature)
(Wipa Towadee)

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-

(Signature)



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Subprachan 3 Rd., Bangpoo, Pakkret, Nonthaburi 11120
Tel (02) 964-6211 Fax (02) 964-5155, e-mail : calibratech.co@yahoo.com, calibratech.co@hotmail.com



NSC-TS-17025
CALIBRATION 0030

Certificate of Calibration

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

Submitted by : M Green Group Co., Ltd.
188/46 Wisatsukrakchon 25, Pracha-Ud 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

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 Swaphong

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 : 
(Sajja Sangkhum)
Supervisor

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CAL-F0031-03



CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Subprachan 3 Rd., Bangpoo, Pakkret, Nonthaburi 11120
Tel (02) 964-6211 Fax (02) 964-5155, e-mail : calibratech.co@yahoo.com, calibratech.co@hotmail.com

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-



CAL-F0031-03





Certificate of Calibration

Certificate No. : 67-210362-2

Page : 1 of 2

Submitted by :

M Green Group Co., Ltd.

188/46 Wisetuesuknakhon 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 / m³Assumed 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 Swapphon

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 :

(Saifa Singkhum)

Supervisor

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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-



NSC-TS1-71517025
CALIBRATION 003D

Certificate of Calibration

Certificate No. : 67-210362-3 Page : 1 of 2

Submitted by : M Green Group Co., Ltd.

188/46 Wisutesuknakhorn 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 / m³Assumed 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 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

E221-E2210

MM-0042-22

21 Mar 2025

National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Sutja Sangthum)

Supervisor

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Certificate of Calibration

Certificate No. : 67-210362-3 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 +0.06 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%

-o0o-

Sutja





บริษัท ไทยยูนิค จำกัด THAI UNIQUE CO., LTD.

80-82 ถนนประชาภิบาล แขวงบางขุนพรหม เขตพระนคร กรุงเทพฯ 10200
80-82 Prachathipatani Rd., Bangkokphrom, Pranakorn, Bangkok 10200
Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawan@thaiunique.com, Website : www.thaiunique.com

ATOMIC ABSORPTION SPECTROMETER TEST CERTIFICATE

Certificate No : SY/2410/22223
Instrument Type : Atomic Absorption Spectrophotometers
Model : AA240FS
Serial Number : EL08043418
Organization : Test Tech Co., Ltd
Address : 3032 Soi 63 Rama II Rd. Samaeam Bangkokunien, 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 |



บริษัท ไทยยูนิค จำกัด THAI UNIQUE CO., LTD.

80-82 ถนนประชาภิบาล แขวงบางขุนพรหม เขตพระนคร กรุงเทพฯ 10200
80-82 Prachathipatani Rd., Bangkokphrom, Pranakorn, Bangkok 10200
Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawan@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 % | *** | *** |
|-------------------|---------|-----|-----|

Zeeman Magnetic Sensitivity Ratio (%)*

| | | | |
|-------------------|--------|-----|-----|
| MSR @ Cu 324.7 nm | > 70 % | *** | *** |
|-------------------|--------|-----|-----|

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: Suriva Nacharon
Engineer : Suriva Nacharon

Date : 17 / Oct / 2024

APPROVED BY :

Signature: Suchai Sanguntatichai
Service Manager: Suchai Sanguntatichai
Date : 17 / Oct / 2024



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: 22-Feb-2024

| | | | | |
|---|--|-----------------------------------|-------------|--|
| 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: | Chainarong | Service Order Number: | WO-02710284 | |
| Date PM Performed: (DD-MM-YYYY) | 22-Feb-2024 | Next PM Due Date: (DD-MM-YYYY) | 22-Feb-2025 | |
| 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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Component List

| Component / Specific Model | Serial # | Configuration Notes |
|----------------------------|--------------|----------------------|
| FAS 400 | 400521100101 | Syngstix 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 | Quantity | 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 | MG0-141 | |
| N1013002 | 1.0A Neutral density filter | 1 | MG2-045 | |
| 08030997 | 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 | 858ADB | |
| N3050139 | K Lumina HCL | 1 | 011604-41713 | |
| N3050152 | Ni Lumina HCL | 1 | 050914-010060 | |

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 cloth 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 PinAde 900 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 | Chopping 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 533.6 nm (Abs.) | Test Results | Pass/Fail |
|-----------------|----------------|--------------------------------------|--------------|-----------|
| 1.0 A ND Filter | ±5% from Cert. | 1.0547 | 1.0432 | Passed |
| 0.2 A ND Filter | ±5% from Cert. | 0.1903 | 0.1832 | 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 | 0.0038 | Passed |

8.3 AA Baseline Noise with Copper

Description: Check baseline noise.

| Parameter | Specification | Results | Pass/Fail |
|--------------------|---------------|---------|-----------|
| Standard Deviation | ≤ 0.001 | 0.0001 | Passed |

8.4 D₂ Background Compensation with Copper

Description: Verifies the instrument's ability to compensate for background absorption.

| Parameter | Specification | Results | Pass/Fail |
|--------------------|---------------|---------|-----------|
| Standard Deviation | ≤ 0.010 | 0.0090 | 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 | 0.0001 | 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 | 0.0002 | 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. | 0.3366 | 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 | 307.3 pg/0.0044 A 2.09 % |
| 2. Characteristics mass for Arsenic. (500uL of 10ug/L As and 5 replicates) Characteristics mass %RSD | 134.7 pg/0.0044 A 1.63 % |
| 2. Characteristics mass for Selenium. (500uL of 10ug/L Se and 5 replicates) Characteristics mass %RSD | 80.4 pg/0.0044 A 1.02 % |
| Wavelength Accuracy Check | |
| As 193.700 nm +/- 0.3nm | 193.700 nm |
| Cu 324.750 nm +/- 0.3nm | 324.700 nm |
| Ba 553.550 nm +/- 0.3nm | 553.650 nm |
| K 766.490 nm +/- 0.3nm | 766.490 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: 22-Feb-2024 (DD-MMM-YYYY) |
| Authorized Customer Representative: | Date: 22-Feb-2024 (DD-MMM-YYYY) |



MAINTENANCE AND IPV TEST CERTIFICATE MODEL
OPTIMA 8000

| | |
|---|---|
| Customer : บริษัท เทคโนโลยี ไทย จำกัด | Date Tested: May 14, 2024 |
| Address : 30,32 ซอยพหลโยธิน 2 แขวง 63 กรุงเทพมหานคร 10700 | Recommendation Recertification Period 12 Months |
| Re-certification Due: May 14, 2025 | |
| Date Last Certified: May 18, 2023 | |
| Visit Number: 1 of 1 | |
| User Name: คุณวิวัฒน์ จงประเสริฐกุล | |
| Phone: 02-893-4211-17 | |
| Fax: lab_center@testtech.co.th | |
| PerkinElmer Phone: 02-719-6420 ext 206 | |
| PerkinElmer Fax: 02-318-5597 | |

| CONFIGURATION TESTED | | | |
|-----------------------|--------------------|------------------------|--|
| MODEL | SERIAL NUMBER | SOFTWARE | |
| OPTIMA 8000 (EQL-180) | 078S1411171C | ICP WinLab32 version 5 | |
| TESTED EQUIPMENT | CALIBRATION NUMBER | EXPIRATION | |
| IPV Methods | | | |
| TEST STANDARD USED | PART NUMBER | EXPIRATION DATE | |
| Multielement Standard | N069-1579 | Dec 30, 2024 | |
| Instrument Cal. STD4 | N930-0221 | Nov 30, 2024 | |
| CUSTOMER SUPPLIED | COMMENTS | CUSTOMER INITIALS | |
| 2 % HNO3 | | | |
| 10 % HNO3 | | | |



MAINTENANCE AND IPV TEST CERTIFICATE MODEL
OPTIMA 8000

| | |
|--|---------------------------|
| SERIAL NUMBER: 078S1411171C | DATE TESTED: May 14, 2024 |
| 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 exterior 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 |

MAINTENANCE AND IPV TEST CERTIFICATE MODEL
OPTIMA 8000

| SERIAL NUMBER: 078S1411171C | | DATE TESTED: May 14, 2024 |
|----------------------------------|-------------------|---------------------------|
| PARAMETER | SPECIFICATION | FINAL VALUE |
| Spectral Resolution : UV | | |
| As 193.696 nm | ≤ 0.009 nm | 0.00735 nm |
| Ni 231.604 nm | ≤ 0.011 nm | 0.00913 nm |
| Ni 341.476 nm | ≤ 0.015 nm | 0.01386 nm |
| Spectral Resolution : VIS | | |
| Ba 455.403 nm | ≤ 0.020 nm | 0.01721 nm |
| Precision | | |
| Zn 206.200 nm | % RSD ≤ 1.0 % | 0.35 % |
| Mg 280.271 nm | % RSD ≤ 1.0 % | 0.27 % |
| Mg 285.213 nm | % RSD ≤ 1.0 % | 0.46 % |
| Ba 455.403 nm | % RSD ≤ 1.0 % | 0.48 % |
| Detection Limits : Axial | | |
| Tl 190.801 nm | 3(sed) ≤ 10.0 ppb | 1.00 ppb |
| As 193.696 nm | 3(sed) ≤ 10.0 ppb | 3.32 ppb |
| Se 196.026 nm | 3(sed) ≤ 5.0 ppb | 3.88 ppb |
| Pb 220.353 nm | 3(sed) ≤ 3.0 ppb | 1.45 ppb |
| Detection Limits : Radial | | |
| As 193.696 nm | 3(sed) ≤ 60.0 ppb | 3.41 ppb |
| Zn 213.857 nm | 3(sed) ≤ 2.0 ppb | 0.30 ppb |
| Mn 257.610 nm | 3(sed) ≤ 1.0 ppb | 0.03 ppb |
| La 379.478 nm | 3(sed) ≤ 3.0 ppb | 0.27 ppb |
| Ba 455.403 nm | 3(sed) ≤ 0.3 ppb | 0.05 ppb |
| Ba 493.408 nm | 3(sed) ≤ 0.6 ppb | 0.06 ppb |
| BEC : Axial (IB X 1000)/(IS-IB) | | |
| Mn 257.610 nm | ≤ 30 ppb | 10.70 ppb |
| BEC : Radial (IB X 1000)/(IS-IB) | | |
| Mn 257.610 nm | < 30 ppb | 21.54 ppb |

MAINTENANCE AND IPV TEST CERTIFICATE MODEL
OPTIMA 8000

| | |
|--|---|
| SERIAL NUMBER: 078S1411171C | DATE TESTED: May 14, 2024 |
| Remarks : Commissioning follow as commissioning performance sheets. | |
| <div>This is to certify that the above tests have been performed and the configuration tested meets <input checked="" type="checkbox"/> does not meet <input type="checkbox"/></div> <div>the PerkinElmer Specifications listed on this certificate.</div> <div>This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.</div> | |
| Service Department PerkinElmer Scientific (Thailand) Co., Ltd. | |
| Customer Service Engineer: | (Narong Wajunakitt) Service Engineer |



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



NS-CITS-TS17025
CALIBRATION 100%

CERTIFICATE No : 25T0970
REFERENCE No : 76012-2

PAGE : 1 OF 2

Certificate of Calibration

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

Calibration, EQL
S. aureus

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

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

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.

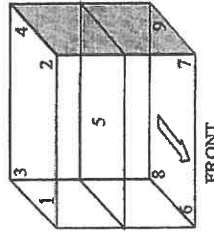
2. REFERENCE STANDARD INSTRUMENTS :-

- 1) DATA LOGGER WITH RTD HYDRA 2635A
2) CERTIFICATE 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 : 2
Overall Line Voltage (V) variation : 11
Instrument Condition : Normal
Chamber Size (W*L*H): 56*40*72 cm



CHAMBER PERFORMANCE

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

TEMPERATURE MEASUREMENT ACCURACY TEST

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

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

NOTE 2 : LOCATION 5 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.
THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.
END OF CALIBRATION REPORT



F-G010 REV : 03



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



CERTIFICATE No : 24E11174
REFERENCE No : 75187-2

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : pH METER
MANUFACTURER : TOA DKK
MODEL : HM-41X
SERIAL No : 858942
ID No : EQL-225
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
3032 RAMA II SOI 63, RAMA II RD., SAMAEADAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : PRASERT D.
CALIBRATION DATE : 04-Nov-24

APPROVED BY :
PONGSAK J.
ISSUED DATE : 05-Nov-24
RECEIVED DATE : 04-Nov-24

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



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Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 24E11174

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : pH METER
MANUFACTURER : TOA DKK
ID No : EQL-225
RECEIVED DATE : 04-Nov-24
AMBIENT TEMPERATURE : 25° C ± 1° C
CONDITION OF THIS RESULTS OF CALIBRATION
1. THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASUREMENT METHOD BASED ON WI-TQ-062 AND WI-TQ-063. THE
DISPLAY UNIT WAS TESTED BY GENERATING STANDARD VOLTAGE TO THE UNIT AND READ THE VALUE COMPARED WITH
CALCULATED VALUE. THE DISPLAY AND ELECTRODE WAS CALIBRATED BY USING STANDARD pH BUFFER SOLUTION.
2. REFERENCE STANDARD INSTRUMENTS :

| INSTRUMENT | MODEL | SERIAL No/ LOT No | CERTIFICATE No | DUE DATE |
|---------------------------|----------|----------------------|----------------|-----------|
| 1) pH STANDARD SOLUTION | 00651-06 | CC801395 | 4880-15044130 | 18-Apr-26 |
| 2) pH STANDARD SOLUTION | 00651-08 | CC801899 | 4881-15078560 | 01-May-26 |
| 3) pH STANDARD SOLUTION | 00651-10 | CC803826 | 4882-15161223 | 31-May-26 |
| 4) PROCESS CALIBRATOR | CA150 | 91S6079 | 24E1251 | 09-Apr-25 |
| 5) BATH | 260014 | 1247 48074 | 24T9693 | 12-Sep-25 |
| 6) THERMOMETER WITH PROBE | 421504 | 59003379 | 24T9694 | 12-Sep-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 SI UNIT MAINTAINED AT :-

- NATIONAL INSTITUTE OF STANDARD AND TECHNOLOGY, USA.
- NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION : WITHOUT ADJUSTMENT

1. DISPLAY UNIT ONLY

SLOPE FACTOR k = 2.303 RT/F = 59 mV/pH

| mV APPLIED | UUC READING (mV) | CORRECTION (mV) | UNCERTAINTY OF MEASUREMENT (± mV) | COVERAGE FACTOR k |
|---------------|---------------------|--------------------|---|-------------------------|
| 177.48 | 177 | 0.48 | 0.59 | 2.0 |
| 0.00 | 0 | 0.00 | 0.59 | 2.0 |
| -177.48 | -178 | 0.52 | 0.59 | 2.0 |

2. DISPLAY UNIT WITH pH ELECTRODE SN: 903F0080MK

| STANDARD pH BUFFER SOLUTION (pH) | UUC READING (pH) | CORRECTION (pH) | UNCERTAINTY OF MEASUREMENT (± pH) | COVERAGE FACTOR k |
|--|---------------------|--------------------|---|-------------------------|
| 4.0060 | 4.01 | -0.004 | 0.013 | 2.0 |
| 7.0000 | 7.00 | 0.000 | 0.013 | 2.0 |
| 10.0070 | 10.01 | -0.003 | 0.014 | 2.0 |

3. DISPLAY UNIT MEASUREMENT TEMPERATURE WITH PROBE

| STANDARD READING (°C) | UUC* READING (°C) | IMMERSION DEPTH (mm) | CORRECTION (°C) | UNCERTAINTY OF MEASUREMENT (±°C) |
|-----------------------------|-------------------------|----------------------------|--------------------|--|
| 25.004 | 25.1 | 80 | -0.096 | 0.21 |

UUC : UNIT UNDER CALIBRATION

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

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

END OF CALIBRATION REPORT

F-G010 REV 03



BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY

99/9 Moo 2, Maha Sawet, Phuthamthorin, Nakhon Pathom, 73100, Thailand. Tel: +66 3424 5299 Fax: +66 3424 5250
E-mail: bkk@becthai.com Website: www.becthai.com



NSC-TB1-TB 17825
CALIBRATION #131

Certificate No. : CAL-24-196

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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, Bangkhunthian,
: 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 Sangthajaroentap)

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.

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20/02/24



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CALIBRATION LABORATORY

99/9 Moo 2, Maha Sawet, Phuthamthorin, Nakhon Pathom, 73100, Thailand. Tel: +66 3424 5299 Fax: +66 3424 5250
E-mail: bkk@becthai.com Website: www.becthai.com



NSC-TB1-TB 17825
CALIBRATION #131

Certificate No. : CAL-24-196

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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 |
| Didymium 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 Starra 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 E825-09 (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 |

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BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
CALIBRATION LABORATORY

99/ Moo 2, Muea Saeak, Prathumwan, Nakhon Pathom: 7370, Thailand. Tel: +66 9424 5299 Fax: +66 3424 5290
Email: bkl@becthai.com Website: www.becthai.com



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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 | 0.569 | -0.0013 | 0.0045 | 2.00 |
| | 0.7336 | 0.733 | -0.0006 | 0.0045 | 2.00 |
| 440.0 | 1.0709 | 1.070 | -0.0009 | 0.0045 | 2.00 |
| | 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 |
| | 0.5205 | 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:

UUC* : Unit Under Calibration

- End of Report -
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20/02/24



Bara Scientific
Solutions of Science

Bara Scientific Co., Ltd.
888 U Chu Liang Building Floor7 Rama4 Road
Siam Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375466-7
www.barscientific.com



ISO 17025
CALIBRATION LAB

Certificate of Calibration

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Certificate No. BSCC-UV-166/24
Equipment UV/Vis Spectrophotometer
Model UV-1900L
Manufacturer Shimadzu
Serial No. A12535780311 ML
ID No. ECL-233
Date of receipt 26 April 2024
Date of calibration 26 April 2024
Date of issue 30 April 2024
Customer name Test Tech Co., Ltd.
Address 30/32 Rama II Soi 63, Rama II Road, Samee Dam, Bang Khun Thian, Bangkok 10150

Temperature (24.9 - 25.4) °C (On site)
Humidity (49.4 - 51.1) %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. 106372 and 106371
Photometric Accuracy is traceable to certificate No. 106364 and 111398
Stray Light is traceable to certificate No. 106377
The above certificate are traceable to SI unit through Stama Scientific Ltd.
(UKAS accredited calibration laboratory NO. 0659)

Calibrated by Mr. Wanchana Janboey

Approved by

Mr. Sonthi Temboonsakdi
Service Manager

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
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988 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-160/24

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Calibration Results:

1. Wavelength Accuracy

| Certified Wavelength (nm) | UUC (nm) | Error (nm) | Uncertainty (\pm 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 (\pm A) |
|-----------------|--------------------------|---------|-----------|------------------------|
| 235 | CNR | CNR | CNR | CNR |
| 257 | 0.0000 | 0.0000 | 0.0000 | 0.0075 |
| 313 | 0.8354 | 0.8333 | -0.0021 | 0.0075 |
| 350 | 0.0000 | -0.0001 | -0.0001 | 0.0075 |
| | 0.8199 | 0.8190 | -0.0009 | 0.0075 |

*CNR = Customer not request

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988 U Chu Liang Building Floor 7 Rama4 Road
Siam Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
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Certificate of Calibration

Certificate No.

BSCC-UV-160/24

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Calibration Results:

3. Photometric Accuracy (Visible)

| Wavelength (nm) | Certified Absorbance (A) | UUC (A) | Error (A) | Uncertainty (\pm A) |
|-----------------|--------------------------|---------|-----------|------------------------|
| 420.0 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5761 | 0.5791 | 0.0030 | 0.0042 |
| | 0.7119 | 0.7132 | 0.0013 | 0.0042 |
| | 1.0189 | 1.0221 | 0.0032 | 0.0042 |
| 440.0 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5610 | 0.5636 | 0.0026 | 0.0042 |
| | 0.7001 | 0.7012 | 0.0011 | 0.0042 |
| | 1.0026 | 1.0052 | 0.0026 | 0.0042 |
| 465.0 | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| 546.1 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5249 | 0.5280 | 0.0031 | 0.0042 |
| | 0.6975 | 0.6971 | -0.0004 | 0.0042 |
| | 1.0009 | 1.0012 | 0.0003 | 0.0042 |
| 590.0 | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| 635.0 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5966 | 0.5973 | 0.0007 | 0.0042 |
| | 0.7620 | 0.7611 | -0.0009 | 0.0042 |
| | 1.0982 | 1.0976 | -0.0006 | 0.0042 |

*CNR = Customer not request

4. Stray Light*

| Standard cut-off wavelength (nm) | Unit Under Calibration(UUC) | |
|----------------------------------|-----------------------------|----------------|
| | Wavelength (nm) | Absorbance (A) |
| 200.85 \pm 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
*Stray Light not NSC-ONSC Accredited.

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

End of Certificate

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บริษัท ซีจี ไซแอนติฟิค จำกัด
CG SCIENTIFIC CO., LTD.

การดูแลบำรุงรักษาเชิงป้องกัน Preventive Maintenance

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



บริษัท ซีจี ไซแอนติฟิค จำกัด
CG SCIENTIFIC CO., LTD.

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



บริษัท ซีจี ไซแอนติฟิค จำกัด
CG SCIENTIFIC CO., LTD.

1. ข้อมูลการให้บริการ (Service Contact)

| | |
|------------------|---|
| หน่วยงานลูกค้า : | บริษัท เทสต์ ทศ จำกัด |
| ที่อยู่ : | 30.32 ซอยพชรงามที่ 2 ซอย 63 แขวงสามยุค เขตบางขุนเทียน กรุงเทพมหานคร 10150 |
| โทรศัพท์ : | |
| อีเมล : | |
| บุคคลติดต่อ : | |
| ชื่อ-นามสกุล : | คุณ กนกนาถ ชูเพ็ญทิพย์ |
| ตำแหน่ง : | |
| โทรศัพท์ : | 02-893-4211-17 |
| อีเมล : | lab_center@testtech.co.th |

ข้อมูลการบริการจำนวน 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 |
| หมายเลขรุ่น : | EQL-062 |

2.2 ผู้ดำเนินการ

ดำเนินการทำ PM โดย

| | |
|----------------|------------------------|
| ชื่อ-นามสกุล : | คุณธนฤทธิ์ เตชะวรรัตน์ |
| ตำแหน่ง : | วิศวกร |
| แผนก : | บริการหลังการขาย |
| ฝ่าย : | บริการหลังการขาย |

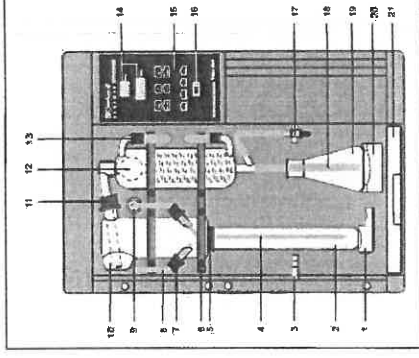


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Part 3: Operational Qualification (OQ)

3.1 ตรวจสอบสภาพเครื่อง

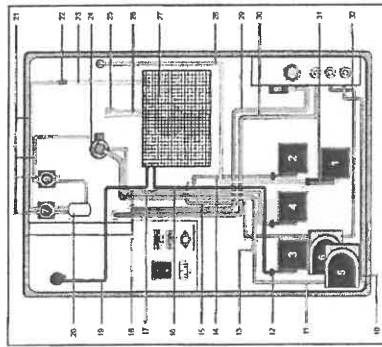
FRONT



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



REAR



| No | Description | PASS | FAIL | N/A |
|-----|---|-------------------------------------|--------------------------|--------------------------|
| 1. | Diaphragm pump NaOH | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. | Diaphragm pump H ₂ O ₂ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. | Diaphragm pump H ₂ O for steam generator | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. | Diaphragm pump H ₂ O for sample | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. | Peristaltic pump for suction sample | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. | Peristaltic pump for suction receiver | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. | Pinch-solenoid valve steam | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. | Magnetic valve with pressure control | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. | Pinch-solenoid valve shut-off | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. | Verprene-tubing 4x8 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. | Verprene-tubing 4x8 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. | Non-return valve for diaphragm pumps | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. | Tubing reduction PP 51x10x8 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. | Silicone tubing 4x7 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. | Silicone tubing 4x7 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. | Silicone-tubing 4x7 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. | Verprene-tubing 8x12 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. | Verprene tubing 4x7 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. | Silicone tubing 4x7 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. | Ventilation glass | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. | Novoprene-tubing 4.8x8 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. | Tubing reduction | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. | Silicone tubing 6x10 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. | PP-distributor with PP-thread | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. | SKT-valve (built in with brass fitting) | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. | Silicone tubing 8x16x80 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. | Steam generator | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. | PTE-inlet tubing NaOH | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. | Silicone tubing 8x16 for cooling water inlet | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. | Silicone tubing 8x16 for cooling water outlet | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. | Viton-tubing 6x12*50 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. | Silicone tubing 4x7 mm. | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



Part 4: รายละเอียดการตรวจสอบ

4.1 ขั้นตอนการบริการ

ตรวจสอบระบบไฟฟ้า (Electrical Test)

- ความต้านทานไฟฟ้าของเครื่องกับกราวด์
- กระแสไฟฟ้าใช้งาน

| PASS | FAIL | Remark |
|-------------------------------------|--------------------------|--------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

ตรวจสอบสภาพเครื่อง (Optical Test)

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

| PASS | FAIL | Remark |
|-------------------------------------|--------------------------|--------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

ตรวจสอบ Function การทำงาน (The Function Test)

- ระบบเครื่องและควบคุมความดันของ Steam
- ระบบการขึ้นน้ำเข้า Sample Tube
- ระบบการเติม NaOH
- ระบบการ Suction คัด Sample Tube และ Receiver

| PASS | FAIL | Remark |
|-------------------------------------|--------------------------|--------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

4.2 รายงานผลการให้บริการ

1. TECHNICAL DATA

Main Supply 220 volt + 10% 50 Hz
Nominal current

| PASS | FAIL | Remark |
|-------------------------------------|--------------------------|--------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

1.1 COOLING WATER BATH

Temperature 15-20 °C
Cooling Water Outlet
Control Temperature

| PASS | FAIL | Remark |
|-------------------------------------|--------------------------|--------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

1.2 OPTICAL TEST VAP 30

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

| PASS | FAIL | Remark |
|-------------------------------------|--------------------------|--------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

2. SYSTEM COOLING WATER INLET

Cooling Water Inlet
Cooling Water Outlet
Flow control valve

| PASS | FAIL | Remark |
|-------------------------------------|--------------------------|--------|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

B. SYSTEM CONTROL

| | | | |
|-------------------------------------|---------------------------------------|--------------------------|-----------|
| <input checked="" type="checkbox"/> | Key Board | <input type="checkbox"/> | *Vap30_40 |
| <input checked="" type="checkbox"/> | Display | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | Program□ | <input type="checkbox"/> | *Vap40 |
| <input checked="" type="checkbox"/> | Adding H ₂ O | <input type="checkbox"/> | *Vap30_40 |
| <input checked="" type="checkbox"/> | Adding NaOH | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | Adding H ₈ BO ₃ | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | Suction Sample | <input type="checkbox"/> | |

4. SYSTEM DISTILLATION

| | | | |
|--------------------------|--------------------------|-------------------------------------|--------------------------|
| Boiler | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Level Sensor | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Neoprene-Tubing | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Solenoid Valve Shut-Off | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Solenoid Valve Steam | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Excess Pressure Detector | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Ventilation Valve | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Heater | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

5. PUMP.

| | | |
|-------------------------------------|-------------------------------------|--------------------------|
| Pump H ₂ O Steam | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| - Non-Return Valve | | |
| Pump H ₂ O Sample | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| - Non-Return Valve | | |
| Pump NaOH | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| - Non-Return Valve | | |
| Pump H ₃ BO ₃ | <input type="checkbox"/> | <input type="checkbox"/> |
| - Non-Return Valve | | |
| Pump suction | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

6. THE FOLLOWING PROGRAM RUN

| | | |
|--------------------|-----------|-------------------------------------|
| Addition H_2O | 0-99 sec. | <input checked="" type="checkbox"/> |
| Addition NaOH | 0-99 sec. | <input checked="" type="checkbox"/> |
| Addition H_3BO_3 | 0-99 sec. | <input type="checkbox"/> |
| Reaction Time | 0-99 min | <input checked="" type="checkbox"/> |
| Distillation Time | 0-99 min | <input type="checkbox"/> |
| Steam Capacity | 30%-100% | <input checked="" type="checkbox"/> |
| Suction Time | 0-99 sec. | <input checked="" type="checkbox"/> |

The instrument is in perfect technical shape

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.

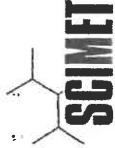
| Error message | Measures |
|---------------------------------|---|
| No tap water | Check cooling water inlet for blockages. Ensure the tap is turned on |
| No sample tube | Insert tube |
| Check chemicals | Check set of tanks |
| Low water Press enter | Check the water inlet distilled H ₂ O |
| Filling 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 |
|--|---|
| <div style="border: 1px solid black; padding: 5px; text-align: center;"> Stop Prog. No. x continue=Enter </div> | Enter = continue of interrupted program Reset = Standby mode |

Other error messages

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



SCIMET Co., Ltd.
1194 Soi Wachirathansathit 57, Bangkok,
Phrakhanong, Bangkok 10260 Thailand
Email: scime2022@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
Job No.: KSMIT2402432
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, Bangkokthunien Bangkok 10150 Thailand

Calibration Place

TEST TECH CO., LTD.(503 ห้องศูนย์น้ำ)
30,32 Rama II Soi 63, Rama II Rd., Samaedam, Bangkokthunien 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, W106, based on Hach Manufacturer Method 8195

Traceability

This certificate is traceable to Primary standard Fromazin and Stabical 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 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).

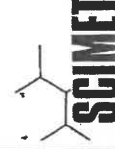
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SCIMET Co., Ltd.

(Mr. Dumrong Boonsopon)
Person in charge



(Mr. Thalemgkeat Pongngam)
Authorized signatory

FC06-03: 30 MAY 2023



Certificate No.: C06240053

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Calibration Results:

Before Adjustment

| Std Turbidity (NTU) | UUC Reading | Correction | Deviation | Uncertainty |
|---------------------|-------------|------------|-----------|-------------|
| 0.040 | 0.121 | -0.081 | 0.002 | 0.070 |
| 20.40 | 20.0 | 0.40 | 0.0 | 1.0 |
| 205.0 | 198 | 7.0 | 0.3 | 10 |
| 1026.0 | 995 | 31.0 | 0.0 | 50 |
| 4114.0 | 4017 | 97.0 | 5.0 | 200 |

After Adjustment

| Std Turbidity (NTU) | UUC Reading | Correction | Deviation | Uncertainty |
|---------------------|-------------|------------|-----------|-------------|
| 0.040 | 0.122 | -0.082 | 0.003 | 0.070 |
| 20.40 | 20.5 | -0.10 | 0.0 | 1.0 |
| 205.0 | 205 | 0.0 | 0.3 | 10 |
| 1026.0 | 1027 | -1.0 | 0.3 | 50 |
| 4114.0 | 4113 | 1.0 | 1.1 | 200 |

The End of Certificate

บริษัท สยามเมท จำกัด (SCIMET CO., LTD.)
1194 Soi Wachirathansathit 57, Bangkok, Phrakhanong, Bangkok 10260 Thailand
Email: scime2022@gmail.com, Tel: 02 460 9239

FC06-03: 30 MAY 2023