

ภาคผนวกที่ 4

เอกสารสอบเทียบเครื่องมือ



BECTHAI BANGKOK EQUIPMENT & CHEMICAL CO., LTD.
99/9 Moo 2, Maha Sawat, Phutthamonthon, Nakhon Pathom. 73170. Thailand.
Tel: +66 3424 5299 Fax: +66 3424 5250
E-mail: bkk@becthai.com Website: www.becthai.com



Certificate No. : CAL-25-243

Page : 1 of 3

CERTIFICATE OF CALIBRATION

| | | |
|-----------------------|---|--|
| Equipment | : | Spectrophotometer |
| Manufacturer | : | Thermo Scientific |
| Model | : | Genesys 20 |
| Serial No. | : | 3SGT041007 |
| ID No. | : | LB-Eq-029 |
| Customer | : | Special Lab Envi And Consultant Co.,Ltd. |
| | : | 47/91-93 Moo 3, Tambol Tait, |
| | : | Amphur Pakrad, Nonthaburi, 11120 |
| Location | : | Becthai Laboratory |
| Date of Receipt | : | 30 April 2025 |
| Date of Calibration | : | 2 May 2025 |
| Date of Issue | : | 2 May 2025 |
| Ambient Temperature | : | (25±10) °C |
| Relative Humidity | : | (60±20) % |
| Condition As-Received | : | Used Item |

Calibrated by

Ms. Nopparat Suntarotayan

Calibration Engineer

Approved by

(Ms. Jintana Sangthaijaroenlap)

Calibration Manager

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

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

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



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Certificate No. : CAL-25-243

Page : 2 of 3

CALIBRATION REPORT

Conditions of this result of calibration

1. Reference Standard Material :

| <u>Material</u> | <u>Model</u> | <u>Serial No.</u> | <u>Cert.No.</u> | <u>Due date</u> |
|------------------------|--------------|-------------------|-----------------|------------------|
| Holmium Glass Filter | RM-HG | 12705 | 117342 | 13 December 2025 |
| Neutral Density Filter | RM-1N2N3N | 8323 | 117341 | 13 December 2025 |

2. Traceability : This certification is traceable to the International System of Unit maintained at;
The Starna Scientific Ltd. Accredited Calibration Laboratory No. 0659.

3. Method of calibration :

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

4. Result of calibration :

(☒) without adjustment (☐) after adjustment

5. Equipment Specifications:

Spectral Bandwidth : 8 nm
Data Interval : 1 nm
Scan Speed : N/A nm/min



Certificate No. : CAL-25-243

Page : 3 of 3

CALIBRATION REPORT

Wavelength Calibration

| Certified Values of Reference Material | Nominal Value (nm) | UUC*Reading (nm) | Error (nm) | Uncertainty of Measurement (\pm nm) | k Factor |
|--|--------------------|------------------|------------|--|----------|
| 418.40 | 418 | 418 | -0.40 | 0.59 | 2.00 |
| 537.00 | 537 | 537 | 0.00 | 0.59 | 2.00 |
| 638.00 | 638 | 638 | 0.00 | 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 | 0.573 | 0.0027 | 0.0045 | 2.00 |
| | 0.7336 | 0.739 | 0.0054 | 0.0045 | 2.00 |
| | 1.0709 | 1.074 | 0.0031 | 0.0045 | 2.00 |
| 440.0 | Zero | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5592 | 0.561 | 0.0018 | 0.0045 | 2.00 |
| | 0.716 | 0.720 | 0.0040 | 0.0045 | 2.00 |
| | 1.0454 | 1.046 | 0.0006 | 0.0045 | 2.00 |
| 465.0 | Zero | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5094 | 0.511 | 0.0016 | 0.0045 | 2.00 |
| | 0.6601 | 0.663 | 0.0029 | 0.0045 | 2.00 |
| | 0.963 | 0.965 | 0.0020 | 0.0045 | 2.00 |
| 546.1 (546.0) | Zero | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5206 | 0.523 | 0.0024 | 0.0045 | 2.00 |
| | 0.6677 | 0.672 | 0.0043 | 0.0045 | 2.00 |
| | 0.9763 | 0.979 | 0.0027 | 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 | 1.020 | -0.0001 | 0.0045 | 2.00 |
| 635.0 | Zero | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5377 | 0.542 | 0.0043 | 0.0045 | 2.00 |
| | 0.6649 | 0.670 | 0.0051 | 0.0045 | 2.00 |
| | 0.9736 | 0.977 | 0.0034 | 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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Certificate No. : CAL-25-243

Page : 1 of 3

CERTIFICATE OF CALIBRATION

| | | |
|-----------------------|---|--|
| Equipment | : | Spectrophotometer |
| Manufacturer | : | Thermo Scientific |
| Model | : | Genesys 20 |
| Serial No. | : | 3SGT041007 |
| ID No. | : | LB-Eq-029 |
| Customer | : | Special Lab Envi And Consultant Co.,Ltd. |
| | : | 47/91-93 Moo 3, Tambol Tait, |
| | : | Amphur Pakrad, Nonthaburi, 11120 |
| Location | : | Becthai Laboratory |
| Date of Receipt | : | 30 April 2025 |
| Date of Calibration | : | 2 May 2025 |
| Date of Issue | : | 2 May 2025 |
| Ambient Temperature | : | (25±10) °C |
| Relative Humidity | : | (60±20) % |
| Condition As-Received | : | Used Item |

Calibrated by

Ms. Nopparat Suntarotayan

Calibration Engineer

Approved by

(Ms. Jintana Sangthaijaroenlap)

Calibration Manager

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

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



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Certificate No. : CAL-25-243

Page : 2 of 3

CALIBRATION REPORT

Conditions of this result of calibration

1. Reference Standard Material :

| <u>Material</u> | <u>Model</u> | <u>Serial No.</u> | <u>Cert.No.</u> | <u>Due date</u> |
|------------------------|--------------|-------------------|-----------------|------------------|
| Holmium Glass Filter | RM-HG | 12705 | 117342 | 13 December 2025 |
| Neutral Density Filter | RM-1N2N3N | 8323 | 117341 | 13 December 2025 |

2. Traceability : This certification is traceable to the International System of Unit maintained at;
The Starna Scientific Ltd. Accredited Calibration Laboratory No. 0659.

3. Method of calibration :

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

4. Result of calibration :

(☒) without adjustment (☐) after adjustment

5. Equipment Specifications:

Spectral Bandwidth : 8 nm
Data Interval : 1 nm
Scan Speed : N/A nm/min



Certificate No. : CAL-25-243

Page : 3 of 3

CALIBRATION REPORT

Wavelength Calibration

| Certified Values of Reference Material | Nominal Value (nm) | UUC*Reading (nm) | Error (nm) | Uncertainty of Measurement (\pm nm) | k Factor |
|--|--------------------|------------------|------------|--|----------|
| 418.40 | 418 | 418 | -0.40 | 0.59 | 2.00 |
| 537.00 | 537 | 537 | 0.00 | 0.59 | 2.00 |
| 638.00 | 638 | 638 | 0.00 | 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 | 0.573 | 0.0027 | 0.0045 | 2.00 |
| | 0.7336 | 0.739 | 0.0054 | 0.0045 | 2.00 |
| | 1.0709 | 1.074 | 0.0031 | 0.0045 | 2.00 |
| 440.0 | Zero | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5592 | 0.561 | 0.0018 | 0.0045 | 2.00 |
| | 0.716 | 0.720 | 0.0040 | 0.0045 | 2.00 |
| | 1.0454 | 1.046 | 0.0006 | 0.0045 | 2.00 |
| 465.0 | Zero | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5094 | 0.511 | 0.0016 | 0.0045 | 2.00 |
| | 0.6601 | 0.663 | 0.0029 | 0.0045 | 2.00 |
| | 0.963 | 0.965 | 0.0020 | 0.0045 | 2.00 |
| 546.1 (546.0) | Zero | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5206 | 0.523 | 0.0024 | 0.0045 | 2.00 |
| | 0.6677 | 0.672 | 0.0043 | 0.0045 | 2.00 |
| | 0.9763 | 0.979 | 0.0027 | 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 | 1.020 | -0.0001 | 0.0045 | 2.00 |
| 635.0 | Zero | 0.000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5377 | 0.542 | 0.0043 | 0.0045 | 2.00 |
| | 0.6649 | 0.670 | 0.0051 | 0.0045 | 2.00 |
| | 0.9736 | 0.977 | 0.0034 | 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 -

Certificate of Calibration

Certificate No. : 68-400223-2

Page : 1 of 2

Submitted by : Special Lab Envi and Consultant Co., Ltd.
47/91 Moo 3 Thambol Tha-it, Pakkret, Nonthaburi 11120

Equipment : Temperature controlled enclosure(Incubator)
Manufacturer : Lovibond Model : FKU 1800
Range : N/A °C Resolution : 0.1 °C
Serial No. : 0914643-01 ID No. : LB-Eq-004

Environment : On site calibration was carried out at the Laboratory, Special Lab Envi and Consultant Co., Ltd.
Ambient Temperature : (26.0 to 26.5) °C
Relative Humidity : (45 to 50) %
Line Voltage : (226.0 to 226.5) V

Date of Received : 19 April 2025

Date of Calibration : 19 April 2025

Date of Issue : 25 April 2025

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units
Standard Digital Thermometer with RTD Probe

| ID No. | Cert. No. | Due Date | Traceability |
|-----------------|-------------|-------------|---|
| 400046 & 400042 | 68-400007-1 | 28 Jul 2025 | National Institute of Metrology Thailand (NIMT) |

Approved by :



(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400223-2

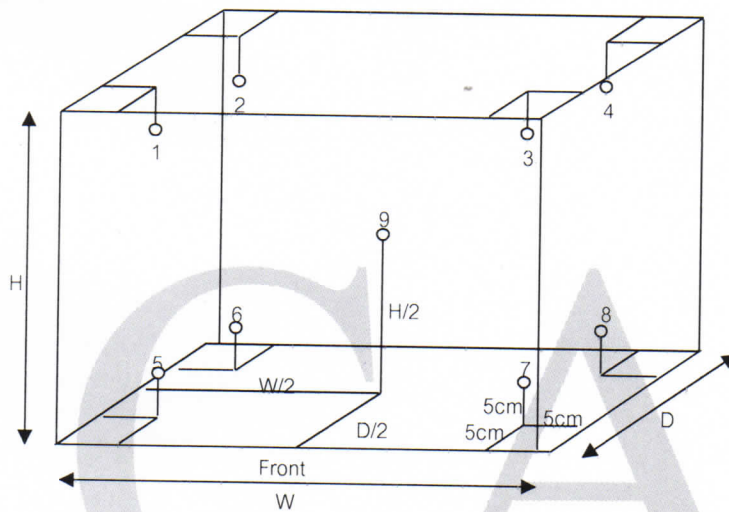
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber
 W = 0.55 m
 D = 0.73 m
 H = 0.50 m
 Capacity = 0.20 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 | 20.0 | 20.0 | 20.35 | 20.26 | 20.28 | 20.31 | 20.21 | 20.09 | 20.29 | 20.17 | 20.22 | 0.63 |

| Test Point (° C) | Setting Temperature (° C) | Indicating Temperature (° C) | Measured Uniformity (° C) | Measured Stability (° C) | Overall Variation (° C) |
|-----------------------|--------------------------------|-----------------------------------|--------------------------------|-------------------------------|------------------------------|
| 20.0 | 20.0 | 20.0 | 0.22 | 0.34 | 0.85 |

Remark The uncertainty is not combine uniformity of the air chamber

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

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

- o0o -

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Certificate of Calibration

Certificate No. : 68-200127-1

Page : 1 of 2

Submitted by : Special Lab Envi and Consultant Co., Ltd.
47/91-93 Moo 3, Tambol Tha-It, Pakkret, Nonthaburi 11120

Equipment : Electronic Balance
Manufacturer : AND Model : GR-200
Serial No. : 14245322 ID No. : LB-Eq-016
Capacity : 210 g Resolution : 0.0001 g

Environment : On site calibration was carried out at the Laboratory,

Special Lab Envi and Consultant Co., Ltd.

Ambient Temperature : (25.5 to 26.1) °C

Relative Humidity : (56.6 to 57.0) %

Air Pressure : 1008.0 mbar

Date of Received : 19 April 2025

Date of Calibration : 19 April 2025

Date of Issue : 22 April 2025

Calibrated by : Satja Sangkhum

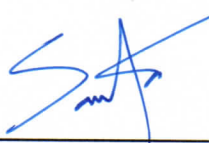
Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14
Edition 7 - November 2022

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

Standard Weights

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

Approved by :


(Surachai Premthong)
Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-200127-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

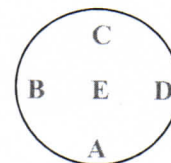
| Nominal Value (g) | Correction (g) | Uncertainty \pm (g) |
|----------------------|-------------------|--------------------------|
| 0.001 | 0.0000 | 0.00011 |
| 0.01 | 0.0000 | 0.00011 |
| 0.1 | 0.0000 | 0.00011 |
| 0.5 | 0.0000 | 0.00011 |
| 2 | 0.0000 | 0.00011 |
| 5 | 0.0000 | 0.00011 |
| 10 | 0.0000 | 0.00011 |
| 50 | 0.0001 | 0.00014 |
| 100 | 0.0001 | 0.00020 |
| 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 $k = 2.00$, providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g
 A B C D E
 -0.0005 0.0002 0.0004 0.0002 0.0000 g



Repeatability

Load test : 200 g
 Stdev. : 0.00005 g

- o0o -



Certificate of Calibration

Certificate No. : 68-400223-4

Page : 1 of 2

Submitted by : Special Lab Envi and Consultant Co., Ltd.
47/91-93 Moo 3, Tambol Tha-It, Pakkret, Nonthaburi 11120

Equipment : Temperature controlled enclosure (Refrigerator)
 Manufacturer : Frozen Model : CC-2288F
 Range : N/A °C Resolution : 1 °C
 Serial No. : CC-2288F-1163-003 ID No. : LB-Eq-046

Environment : On site calibration was carried out at the Laboratory, Special Lab Envi and Consultant Co., Ltd.
 Ambient Temperature : (25.5 to 26.5) °C
 Relative Humidity : (50 to 55) %
 Line Voltage : (226.0 to 226.5) V

Date of Received : 19 April 2025

Date of Calibration : 19 April 2025

Date of Issue : 26 April 2025

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units
 Standard Digital Thermometer with Thermocouple probe

| ID No. | Cert. No. | Due Date | Traceability |
|-----------------|-------------|-------------|---|
| 400029 & 400032 | 67-400584-1 | 29 Apr 2025 | National Institute of Metrology Thailand (NIMT) |

Approved by :



(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400223-4

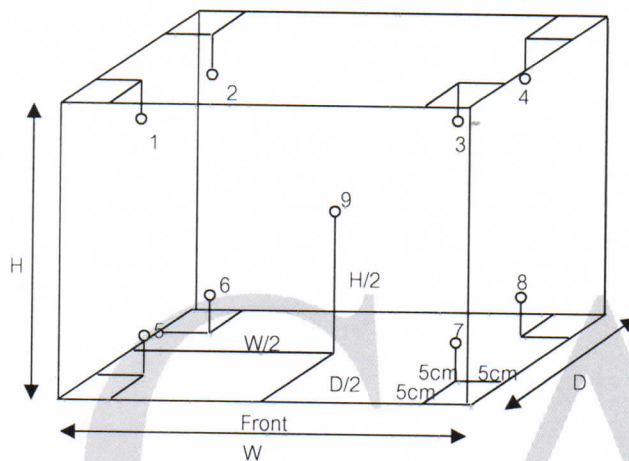
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Inside of Chamber

W = 1.02 m

D = 0.47 m

H = 1.48 m

Capacity = 0.71 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 | |
| 3 | 3 | 3 | 4.0 | 3.0 | 2.8 | 2.6 | 4.0 | 4.0 | 2.2 | 2.0 | 3.0 | 1.0 |

| Test Point (°C) | Setting Temperature (°C) | Indicating Temperature (°C) | Measured Uniformity (°C) | Measured Stability (°C) | Overall Variation (°C) |
|--------------------|-----------------------------|--------------------------------|-----------------------------|----------------------------|---------------------------|
| 3 | 3 | 3 | 1.3 | 0.5 | 2.7 |

Remark The uncertainty is not combine uniformity of the air chamber

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

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

- o0o -

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



Certificate of Calibration

Cert.No.: 24CH945

Page.: 1 of 2

Equipment : pH Meter
Manufacturer : Eutech
Model : pH 700
Serial No. : 2858459
ID No. : LB-Eq-027
Condition As-Received: Used Item
Received Date : 05 August 2024
Calibration Date : 06 August 2024
Reference : 2408-0150WN-1
Submitted by : Special Lab Envi And Consultant Co.,Ltd
47/91-93 Moo 3 Thambon Tha-it, Pakkret,
Nonthaburi 11120

Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)

Calibrated by : Walalak Sirithean
Saithip
Approved by : _____
Approved Signatory

() Unnopphol Harachai
() Ponpan Paipim
(✓) Saithip Meangmai

Issue Date : 6 August 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.



Cert.No.: 24CH945

Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument

| <u>Instrument</u> | <u>Serial No.</u> | <u>ID No.</u> | <u>Cert. No.</u> | <u>Due Date</u> |
|--------------------------------|-------------------|---------------|------------------|-----------------|
| 1) Document Process Calibrator | 54030049 | 130RC116 | 23E2802 | 27 Aug 2024 |

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

| <u>Buffer Solution</u> | <u>Manufacturer</u> | <u>Lot No.</u> | <u>Exp. date</u> |
|------------------------|---------------------|----------------|------------------|
| pH 4.008 | CPA chem | 970851 | 25 Apr 2026 |
| pH 6.986 | CPA chem | 970852 | 25 Apr 2025 |
| pH 9.997 | CPA chem | 970853 | 25 Apr 2025 |

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

Calibration Results

Function : mV Measurement

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

| Unit Under Calibration | Nominal Value | Standard Voltage Input | Actual Reading | | Uncertainty of Measurement (±mV) | Coverage factor <i>k</i> |
|---------------------------|---------------|------------------------|----------------|-------|---------------------------------------|-----------------------------|
| | pH | mV | mV | pH | | |
| pH Meter S/N.: 2858459 | 4.00 | 177.48 | 177.4 | 4.01 | 0.058 | 2.00 |
| | 7.00 | 0.00 | 0.0 | 7.00 | 0.058 | 2.00 |
| | 10.00 | -177.48 | -177.5 | 10.01 | 0.058 | 2.00 |

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

| Unit Under Calibration | Standard pH Buffer Solution | Actual pH Reading | Actual mV Reading (mV) | Uncertainty of pH Measurement (±) | Coverage factor <i>k</i> |
|-------------------------------|-----------------------------|-------------------|------------------------|-----------------------------------|-----------------------------|
| pH Electrode S/N.: 3205384 | 4.008 | 4.01 | 179.4 | 0.0071 | 2.00 |
| | 6.986 | 6.99 | 4.0 | 0.0099 | 2.00 |
| | 9.997 | 10.01 | -169.8 | 0.0092 | 2.00 |

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



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert. No.: 24LM125

Page.: 1 of 2

Equipment : pH Meter with Sensor

Manufacturer : Eutech

Model : pH 700

Serial No. : 2858459

ID No. : LB-Eq-027

Submitted by : Special Lab Envi And Consultant Co.,Ltd
47/91-93 Moo 3 Thambon Tha-it,
Pakkret Nonthaburi 11120

Location : TPA On Site Calibration Laboratory

Received Order : 05 August 2024

Calibrated Date : 06 August 2024

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

AC Line Voltage : (220 ± 22) V

Calibrated by : Warakorn Lerngagtrakul

Approved by :

Kunchit

Approved Signatory

- () Ponpan Paipim
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date : 06 August 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.



Equipment : pH Meter with Sensor
Condition As-Received : Used Item
Reference : 2408-0150WN-2
Procedure Used :-

Cert. No.: 24LM125
Page.: 2 of 2

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

| <u>Instrument</u> | <u>Serial No.</u> | <u>Cert. No.</u> | <u>Traceable</u> | <u>Due Date</u> |
|--------------------------|--------------------------|-------------------------|-------------------------|------------------------|
| 1) Digital Thermometer | 3240076 | 24I317 | TPA | 21 Mar 2025 |

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

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

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

Result of Calibration :- (*) Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor, S/N.: PH5TEMB01P

| <u>Calibration Point</u> (°C) | <u>Immersion Depth</u> (mm) | <u>Standard Temperature</u> (°C) | <u>UUC* Reading</u> (°C) | <u>Error</u> (°C) | <u>Uncertainty</u> (± °C) | <u>Coverage Factor</u> <i>k</i> |
|---|---|--|--------------------------------------|-------------------------------|---------------------------------------|---|
| 25.0 | 100 | 25.002 | 25.0 | -0.002 | 0.16 | 2.00 |

UUC* : Unit Under Calibration

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

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