# ภาคผนวกที่ 3

## เอกสารขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

ที่ อก ๐๓๒๒/๑๗๕๖๕



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๘ ธ.ค. ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เซ้าเทิร์นไทยคอนซัลติ้ง จำกัด

อ้างถึง คำขอต่ออายุของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๐ พฤศจิกายน ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เซ้าเทิร์นไทยคอนซัลติ้ง จำกัด จำนวน ๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เซ้าเทิร์นไทยคอนซัลติ้ง จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๗๖ สถานที่ตั้ง เลขที่ ๕๙/๔๕ หมู่ที่ ๕ ตำบลศรีสุนทร อำเภอถลาง จังหวัดภูเก็ต ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เซ้าเทิร์นไทยคอนซัลติ้ง จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

| | |
|---|---|
| ๑) นายพิมุข สอนมี | ทะเบียนเลขที่ ว-๑๗๖-ค-๐๐๐๑ |
| ๒) นายศิริพงศ์ พะสริ | ทะเบียนเลขที่ ว-๑๗๖-ค-๐๐๐๒ |
| ๓) นางเพ็ญนภา จันทร์เพ็ญ | ทะเบียนเลขที่ ว-๑๗๖-ค-๐๐๐๓ |
| ๔) นางสาวพรรวิษา จินรัตน์ | ทะเบียนเลขที่ ว-๑๗๖-ค-๐๐๐๔ |

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

| | |
|---|---|
| ๑) นางสาวกรรณิกา แก้วสามเขียว | ทะเบียนเลขที่ ว-๑๗๖-จ-๐๐๐๑ |
| ๒) นางสาวศิริรัตน์ นิเทศนพกุล | ทะเบียนเลขที่ ว-๑๗๖-จ-๐๐๐๒ |
| ๓) นางสาวจุฑาทิพย์ ชูถึง | ทะเบียนเลขที่ ว-๑๗๖-จ-๐๐๐๓ |
| ๔) นางสาวปรีชญา หมุกแก้ว | ทะเบียนเลขที่ ว-๑๗๖-จ-๐๐๐๔ |
| ๕) นางสาวบุษยา ประกอบแสง | ทะเบียนเลขที่ ว-๑๗๖-จ-๐๐๐๕ |
| ๖) นางสาวจุฑาภรณ์ จุฑามาตย์ | ทะเบียนเลขที่ ว-๑๗๖-จ-๐๐๐๖ |
| ๗) นางสาวกรรณนิการ์ ประทุมเพชร | ทะเบียนเลขที่ ว-๑๗๖-จ-๐๐๐๗ |
| ๘) นางสาวสุธาสินี ละเมาะ | ทะเบียนเลขที่ ว-๑๗๖-จ-๐๐๐๘ |

ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย ตามสิ่งที่ส่งมาด้วย

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หนังสือ....

หนังสือฉบับนี้จะหมดอายุในวันที่ ๑ ธันวาคม ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายนเรศวร์ ตรียงค์)
ผู้อำนวยการศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคใต้
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

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ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคใต้
โทร. ๐ ๗๔๓๒ ๕๐๒๙, ๐ ๗๔๘๙ ๐๖๓๔ ต่อ ๕๒๐๑
ไปรษณีย์อิเล็กทรอนิกส์ sirw@diw.mail.go.th

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เช้าเทิร์นไทยคอนซัลติ้ง จำกัด เลขทะเบียน ว-๑๗๖
ที่ อก ๐๓๒๒/ ลงวันที่

ขอบข่ายสารมลพิษที่ได้รับการขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๙ รายการ

น้ำเสีย จำนวน 9 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|---|---|---|
| 1 | Biochemical Oxygen Demand | 5-Day BOD Test, Azide Modification Method |
| 2 | Chemical Oxygen Demand | Closed Reflux, Titrimetric Method |
| 3 | Oil & Grease | Liquid-Liquid, Partition-Gravimetric Method |
| 4 | pH | Electrometric Method |
| 5 | Sulfide | Iodometric Method |
| 6 | Temperature | Laboratory and Field Method |
| 7 | Total Dissolved Solids | Dried at 180 °C |
| 8 | Total Kjeldahl Nitrogen | Macro-Kjeldahl, Titrimetric Method |
| 9 | Total Suspended Solids | Dried at 103-105 °C |

เอกสารอ้างอิง

APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 24th ed. Washington, DC: APHA, 2023.

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บุษยา รัตนสุภา
(นางสาวบุษยา รัตนสุภา)
นักวิทยาศาสตร์ชำนาญการ

# ภาคผนวกที่ 4

## เอกสารสอบเทียบอุปกรณ์เครื่องมือห้องปฏิบัติการ

PREMIER SYSTEM ENGINEERING CO., LTD.
123 Moo 8 Kanjanavanit Rd., Banpru, Hatyai, Songkhla 90250
E-mail : pse-cal@sritranggroup.com ,Fax. : (074)222912 Tel. : 084-2148162, 084-2148165, 074-222900-9

NSC-TISI-TIS 17025
CALIBRATION 0024

# CALIBRATION CERTIFICATE

CERTIFICATE No. : V25-0477
CSR No. : 250252


| | | |
|---|---|---|
| Customer | : | Southern Thai Consulting Co., Ltd.<br>59/45 Moo5 Srisoontorn, Talang, Phuket<br>83110 |
| Equipment | : | pH Meter |
| Manufacturer | : | SI Analytics |
| Model | : | lab 845 |
| Serial No. | : | 21021943 |
| ID. No. | : | - |
| Resolution | : | 0.01 pH |
| Instrument Condition | : | Good Condition |
| Location of Calibration | : | Customer Laboratory |
| Ambient Temperature | : | (25 ± 3)°C |
| Relative Humidity | : | (55 ± 15) % |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |
| Date of Issued | : | 4-Mar-2025 |

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กรรมการบริษัทฯ

APPROVED BY :

APPROVED SIGNATORY
( ) MR. PIYAPONG RATTANAKAN / Calibration Manager
( ) MR. BUNPOT SUWANNARAT / Technical Manager

Calibrated By : Mr. Alongkorn Chewaisarakul
( Calibration Technician )

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

@PSE-CAL

| | | |
|---|---|---|
| Equipment | : | pH Meter |
| Manufacturer | : | SI Analytics |
| Model | : | lab 845 |
| Serial No. | : | 21021943 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

**REFERENCE STANDARD INSTRUMENT :**

| Instrument Type | Nominal Value/Model | Serial No. | Cert. No. | | Traceability |
|---|---|---|---|---|---|
| pH Calibration Standard | 4.00 | 1027602 | 1027602 | 15-09-2025 | CPA Chem |
| pH Calibration Standard | 6.98 | 1027603 | 1027603 | 15-09-2025 | CPA Chem |
| pH Calibration Standard | 10.01 | 1027604 | 1027604 | 15-09-2025 | CPA Chem |
| Temperature/Electrical Calibrator | MC2-TE | 10548 | CAL0252-25P0013 | 26-01-2026 | RKT |

**CALIBRATION METHOD :**

In-house method : CA.WI.11.117 based on direct measurement by using standard voltage calibrator

In-house method : CA.WI.11.117 based on direct measurement by using certified reference material (CRM)

**TRACEABILITY :**

This Calibration Certificate is traceable to national standards which realize the unit of measurment according to the International System of Unit ( SI ) through :

CPA Chem : CPA chem Ltd. (ANAB Cert No. AR-1835)

RKT : Rockertek (Thailand) Co.,Ltd. , (NSC-TISI-TIS 17025 CALIBRATION 0069)

**CALIBRATION RESULTS :**

Function : Electrical Measurement

| Applied Voltage (mV) | pH meter Reading (mV) | Correction (mV) | Uncertainty ( ± mV) | Coverage Factor ( k ) |
|---|---|---|---|---|
| 177.48 | 178 | -0.52 | 0.60 | 2.00 |
| 0.00 | 1 | -1.00 | 0.59 | 2.00 |
| -177.48 | -177 | -0.48 | 0.60 | 2.00 |

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Function : Chemical Measurement

| Standard Buffer Solutions (pH) | pH meter Reading (pH) | Correction (pH) | Uncertainty ( ± pH) | Coverage Factor ( k ) |
|---|---|---|---|---|
| 4.007 | 4.01 | -0.003 | 0.013 | 2.09 |
| 6.976 | 6.98 | -0.004 | 0.019 | 2.02 |
| 10.010 | 9.96 | 0.050 | 0.058 | 2.25 |

Calibration curve - % off set - mV

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

The above results are valid exclusively for calibration sample as mentioned in the report.

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

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กรรมการบริษัทฯ

| | | |
|---|---|---|
| Equipment | : | pH Meter |
| Manufacturer | : | SI Analytics |
| Model | : | lab 845 |
| Serial No. | : | 21021943 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

**REFERENCE STANDARD INSTRUMENT :**

| Instrument Type | Model | Serial No. | Cert. No. | Due Date | Traceability |
|---|---|---|---|---|---|
| Digital Thermometer with Sensor | 376 | 220608721 | SDTH-002/1124 | 14-11-2025 | PSE |

**CALIBRATION METHOD :**

In-house method : CA.WI.11.180 comparison with standard thermometer

**TRACEABILITY :**

This Calibration Certificate is traceable to national standards which realize the unit of measurment according to the International System of Unit ( SI ) through :

PSE : Premier System Engineering Co., Ltd. ,(NSC-TISI-TIS 17025 CALIBRATION 0024)

**CALIBRATION RESULTS : ( Cont.)**

( / ) Without Adjustment ( ) After Adjustment

| Cal Point (°C) | Standard Temperature (°C) | UUC Reading (°C) | Correction (°C) | Uncertainty (±°C) |
|---|---|---|---|---|
| 25 | 25.00 | 25.0 | 0.00 | 0.25 |

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UUC : Unit Under Calibration

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

The above results are valid exclusively for calibration sample as mentioned in the report.

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

--End--

PREMIER SYSTEM ENGINEERING CO., LTD.
123 Moo 8 Kanjanavanit Rd., Banpru, Hatyai, Songkhla 90250
E-mail : pse-cal@sritranggroup.com ,Fax. : (074)222912 Tel. : 084-2148162, 084-2148165, 074-222900-9

NSC-TISI-TIS 17025
CALIBRATION 0024

# CALIBRATION CERTIFICATE

CERTIFICATE No. : T25-0653
CSR No. : 250252


| | | |
|---|---|---|
| Customer | : | Southern Thai Consulting Co., Ltd.<br>59/45 Moo5 Srisoontorn, Talang, Phuket<br>83110 |
| Equipment | : | Hot Air Oven |
| Manufacturer | : | Binder |
| Model | : | FD56 |
| Serial No. | : | 20210000003365 |
| ID. No. | : | - |
| Resolution | : | 1 °C |
| Instrument Condition | : | Good Condition |
| Location of Calibration | : | Customer Laboratory |
| Ambient Temperature | : | (30 ± 15) °C |
| Relative Humidity | : | (60 ± 20) % |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |
| Date of Issued | : | 4-Mar-2025 |

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กรรมการบริษัทฯ

APPROVED BY :

Calibrated By : Mr. Attapol Juntasurat
( Calibration Engineer )

APPROVED SIGNATORY
( / ) MR. PIYAPONG RATTANAKAN / Calibration Manager
( ) MR. BUNPOT SUWANNARAT / Technical Manager

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

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| | | |
|---|---|---|
| Equipment | : | Hot Air Oven |
| Manufacturer | : | Binder |
| Model | : | FD56 |
| Serial No. | : | 20210000003365 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

**REFERENCE STANDARD INSTRUMENT :**

| Instrument Type | Model | Serial No. | Cert. No. | Due Date | Traceability |
|---|---|---|---|---|---|
| Digital Thermometer with Sensor | 34970 A | MY 44042662 | DAT003/0824 | 01-08-2025 | PSE |

**CALIBRATION METHOD :**

In-house method : CA.WI.11.160 based on ASTM E145 : 94 (re-approved 2021)

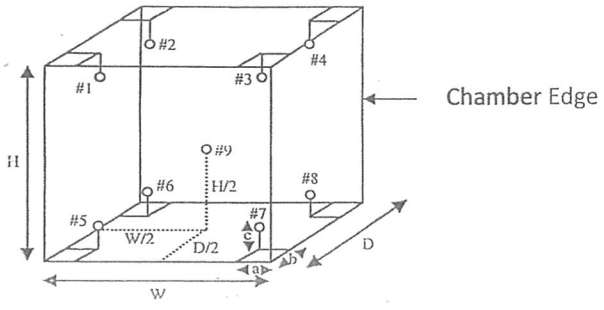
**TRACEABILITY :**

This Calibration Certificate is traceable to national standards which realize the unit of measurment according to the International System of Unit ( SI ) through :

PSE : Premier System Engineering Co., Ltd. ,(NSC-TISI-TIS 17025 CALIBRATION 0024)

**CALIBRATION RESULTS :**

Sensor Installation Diagram.




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| | | | | | |
|---|---|---|---|---|---|
| Dimension of the chamber | : | W x H x D | = | 40 x 40 x 33 | cm |
| Sensor Installation | : | a x b x c | = | 5 x 5 x 5 | cm |

The uncertainties are for a confidence probability of approximately 95 % .
The above results are valid exclusively for calibration sample as mentioned in the report.
This result of calibration was found accurate as shown on date and place of calibration only.

| | | |
|---|---|---|
| Equipment | : | Hot Air Oven |
| Manufacture | : | Binder |
| Model | : | FD56 |
| Serial No. | : | 20210000003365 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

CALIBRATION RESULTS : ( Cont.)

( / ) Without Adjustment ( ) After Adjustment

Temperature Measurement Accuracy Test

The measurement results of the hot air oven and associates are reported in the manner as shown below

| Cal Point | Measured Standard Temperature (°C) at Spread Locations | | | | | | | | | Uncertainty |
|---|---|---|---|---|---|---|---|---|---|---|
| (°C) | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | Ref. 9 | (± °C) |
| 104 | 103.823 | 104.225 | 103.823 | 104.015 | 103.778 | 104.033 | 104.085 | 103.758 | 103.776 | 0.67 |

Hot Air Oven Performance Result

The performance of the hot air oven are reported as shown below

| Cal Point (°C) | UUC Setting (°C) | UUC Reading (°C) | Chamber Stability (± °C) | Chamber Uniformity (± °C) | Overall Variation (± °C) |
|---|---|---|---|---|---|
| 104 | 104 | 104 | 0.11 | 0.49 | 0.63 |

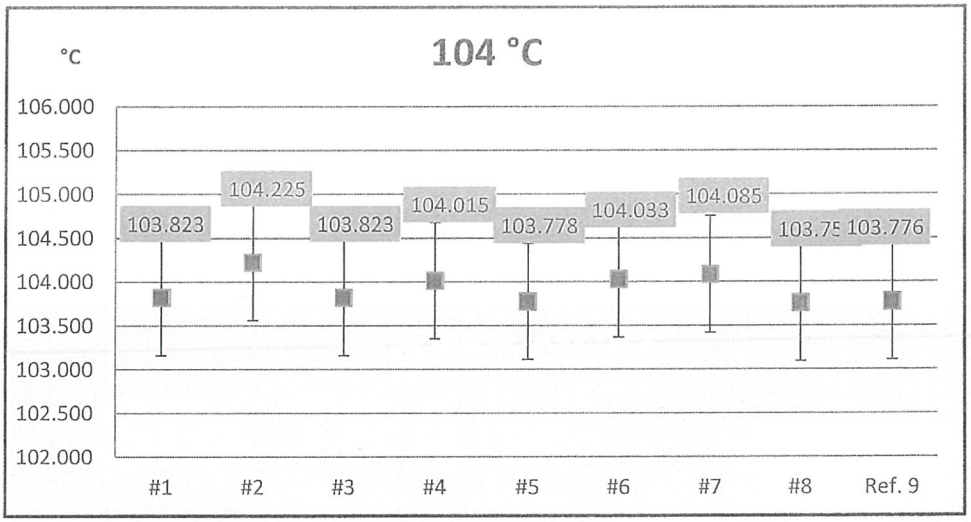
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UUC : Unit Under Calibration

The uncertainties are for a confidence probability of approximately 95 % .
The above results are valid exclusively for calibration sample as mentioned in the report.
This result of calibration was found accurate as shown on date and place of calibration only.

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Report Graph




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กรรมการบริษัทฯ

The above results are valid exclusively for calibration sample as mentioned in the report.

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

-- End --

PREMIER SYSTEM ENGINEERING CO., LTD.
123 Moo 8 Kanjanavanit Rd., Banpru, Hatyai, Songkhla 90250
E-mail : pse-cal@sritranggroup.com ,Fax. : (074)222912 Tel. : 084-2148162, 084-2148165, 074-222900-9

# CALIBRATION CERTIFICATE

CERTIFICATE No. : T25-0654
CSR No. : 250252


| | | |
|---|---|---|
| Customer | : | Southern Thai Consulting Co., Ltd.<br>59/45 Moo5 Srisoontorn, Talang, Phuket<br>83110 |
| Equipment | : | COD Reactor |
| Manufacturer | : | Lovibond |
| Model | : | RD125 |
| Serial No. | : | 0423/00542 |
| ID. No. | : | - |
| Resolution | : | - |
| Instrument Condition | : | Good Condition |
| Location of Calibration | : | Customer Laboratory |
| Ambient Temperature | : | (30 ± 15) °C |
| Relative Humidity | : | (60 ± 20) % |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |
| Date of Issued | : | 3-Mar-2025 |

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กรรมการบริษัทฯ

APPROVED BY :

Calibrated By : Mr. Attapol Juntasurat
( Calibration Engineer )

APPROVED SIGNATORY
( ) MR. PIYAPONG RATTANAKAN / Calibration Manager
( ) MR. BUNPOT SUWANNARAT / Technical Manager

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

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| | | |
|---|---|---|
| Equipment | : | COD Reactor |
| Manufacturer | : | Lovibond |
| Model | : | RD125 |
| Serial No. | : | 0423/00542 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

**REFERENCE STANDARD INSTRUMENT :**

| Instrument Type | Model | Serial No. | Cert. No. | Due Date | Traceability |
|---|---|---|---|---|---|
| Digital Thermometer with Sensor | 34970 A | MY 44042662 | DAT003/0824 | 02-08-2025 | PSE |

**CALIBRATION METHOD :**

In-house method : CA.WI.11.160 based on ASTM E145 : 1994 (re-approved 2011)

**TRACEABILITY :**

This Calibration Certificate is traceable to national standards which realize the unit of measurment according to the International System of Unit ( SI ) through :

PSE : Premier System Engineering Co., Ltd. ,(NSC-TISI-TIS 17025 CALIBRATION 0024)

**CALIBRATION RESULTS :**

Sensor Installation Diagram




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The uncertainties are for a confidence probability of approximately 95 % .
The above results are valid exclusively for calibration sample as mentioned in the report.
This result of calibration was found accurate as shown on date and place of calibration only.

| | | |
|---|---|---|
| Equipment | : | COD Reactor |
| Manufacture | : | Lovibond |
| Model | : | RD125 |
| Serial No. | : | 0423/00542 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

CALIBRATION RESULTS : ( Cont.)

( / ) Without Adjustment ( ) After Adjustment

Temperature Measurement Accuracy Test

The measurement results of the COD Reactor and associates are reported in the manner as shown below

| Cal Point | Measured Standard Temperature (°C) at Spread Locations | | | | | | | | | Uncertainty |
|---|---|---|---|---|---|---|---|---|---|---|
| (°C) | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 | (± °C) |
| 150 | 151.299 | 147.200 | 147.791 | 148.604 | 150.268 | 149.030 | 149.150 | 148.082 | 151.746 | 0.18 |

| Cal Point | Measured Standard Temperature (°C) at Spread Locations | | | | | | | | | Uncertainty |
|---|---|---|---|---|---|---|---|---|---|---|
| (°C) | #10 | #11 | #12 | #13 | #14 | #15 | #16 | #17 | #18 | (± °C) |
| 150 | 151.831 | 148.283 | 146.341 | 150.289 | 150.245 | 150.111 | 150.150 | 149.029 | 151.111 | 0.18 |

| Cal Point | Measured Standard Temperature (°C) at Spread Locations | | | | | | Uncertainty |
|---|---|---|---|---|---|---|---|
| (°C) | #19 | #20 | #21 | #22 | #23 | #24 | (± °C) |
| 150 | 149.287 | 150.834 | 148.796 | 149.018 | 151.437 | 151.266 | 0.18 |

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UUC : Unit Under Calibration

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

The above results are valid exclusively for calibration sample as mentioned in the report.

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

-- End --

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กรรมการบริษัทฯ

PREMIER SYSTEM ENGINEERING CO., LTD.
123 Moo 8 Kanjanavanit Rd., Banpru, Hatyai, Songkhla 90250
E-mail : pse-cal@sritranggroup.com ,Fax. : (074)222912 Tel. : 084-2148162, 084-2148165, 074-222900-9

NSC-TISI-TIS 17025
CALIBRATION 0024

# CALIBRATION CERTIFICATE

CERTIFICATE No. : M25-0359
CSR No. : 250252


| | | |
|---|---|---|
| Customer | : | Southern Thai Consulting Co., Ltd.<br>59/45 Moo5 Srisoontorn, Talang, Phuket<br>83110 |
| Equipment | : | Electronic Balance |
| Manufacturer | : | Sartorius |
| Model | : | PRACTUM224-1S |
| Serial No. | : | 0035106544 |
| ID. No. | : | - |
| Capacity | : | 220 g |
| Resolution | : | 0.0001 g |
| Instrument Condition | : | Good Condition |
| Location of Calibration | : | Customer Laboratory |
| Ambient Temperature | : | (30 ± 10) °C |
| Relative Humidity | : | (50 ± 20) % |
| Barometric Pressure | : | (1010 ±10) hPa |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |
| Date of Issued | : | 4-Mar-2025 |

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กรรมการบริษัทฯ

APPROVED BY :

APPROVED SIGNATORY
( / ) MR. PIYAPONG RATTANAKAN / Calibration Manager
( ) MR. BUNPOT SUWANNARAT / Technical Manager

Calibrated By : Mr. Bowornnan Langlea
( Mechanical Supervisor )

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

@PSE-CAL

| | | |
|---|---|---|
| Equipment | : | Electronic Balance |
| Manufacturer | : | Sartorius |
| Model | : | PRACTUM224-1S |
| Serial No. | : | 0035106544 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

**REFERENCE STANDARD INSTRUMENT :**

| Instrument Type | Norminal Value | Serial No. | Cert. No. | Due Date | Traceability |
|---|---|---|---|---|---|
| Standard Weight Set | 1 mg ~ 500 g | - | M2412021S | 02-12-2025 | TCS |

**CALIBRATION METHOD :**

In-house method : CA.WI.11.015 based on UKAS LAB 14 : 2022

**TRACEABILITY :**

This Calibration Certificate is traceable to national standards which realize the unit of measurment according to the International System of Unit ( SI ) through :
TCS : Thai Calibration Services Co.,Ltd. , (NSC-TISI-TIS 17025 CALIBRATION 0189)

**CALIBRATION RESULTS :**

( / ) Without Adjustment ( ) After Adjustment

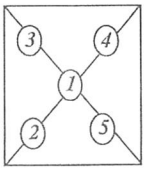
**DETERMINATION OF THE STANDARD DEVIATION OF WEIGHT MACHINE (N=10)**

| Nominal Value ( g ) | Standard Deviation ( g ) |
|---|---|
| 200 | 0.00013 |

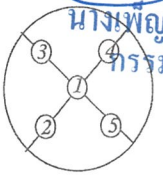
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**EFFECT OF OFF CENTER LOADING AT** 100 g

| Position | | | | | Maximum Difference ( g ) |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | |
| 99.9999 | 99.9997 | 100.0001 | 100.0002 | 100.0001 | 0.0003 |




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กรรมการบริษัทฯ

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

Equipment : Electronic Balance
Manufacturer : Sartorius
Model : PRACTUM224-1S
Serial No. : 0035106544
ID. No. : -
Date of Received : 1-Mar-2025
Date of Calibration : 1-Mar-2025

CALIBRATION RESULTS : ( Cont.)

( / ) Without Adjustment ( ) After Adjustment

EFFECT OF TARE AT 100 g

| Nominal Value (g) | UUC* Reading (g) | Correction (g) |
|---|---|---|
| 20 | 20.0002 | -0.00020 |
| 40 | 40.0001 | -0.00012 |
| 60 | 60.0001 | -0.00007 |
| 80 | 80.0001 | -0.00007 |
| 100 | 100.0001 | -0.00001 |

ERROR OF INDICATION FROM NOMINAL VALUE

| Nominal Value (g) | UUC* Reading (g) | Correction (g) | Uncertainty (±g) | Coverage Factor (k) |
|---|---|---|---|---|
| * Unload | 0.0000 | 0.00000 | 0.00031 | 2.28 |
| 0.01 | 0.0100 | 0.00000 | 0.00031 | 2.28 |
| 0.05 | 0.0500 | 0.00000 | 0.00031 | 2.28 |
| 0.1 | 0.1001 | -0.00009 | 0.00031 | 2.28 |
| 0.5 | 0.5001 | -0.00010 | 0.00032 | 2.28 |
| 1 | 1.0001 | -0.00011 | 0.00032 | 2.28 |
| 2 | 1.9997 | 0.00030 | 0.00032 | 2.28 |
| 5 | 4.9998 | 0.00021 | 0.00032 | 2.28 |
| 10 | 10.0000 | 0.00001 | 0.00032 | 2.28 |
| 20 | 20.0001 | -0.00010 | 0.00031 | 2.25 |
| 40 | 40.0000 | -0.00002 | 0.00032 | 2.23 |
| 60 | 60.0001 | -0.00007 | 0.00032 | 2.20 |
| 80 | 80.0000 | 0.00003 | 0.00033 | 2.18 |
| 100 | 99.9999 | 0.00019 | 0.00033 | 2.18 |
| 120 | 120.0000 | 0.00008 | 0.00034 | 2.14 |
| 140 | 139.9999 | 0.00017 | 0.00036 | 2.11 |
| 160 | 159.9999 | 0.00022 | 0.00037 | 2.10 |
| 180 | 180.0000 | 0.00011 | 0.00039 | 2.07 |
| 200 | 200.0001 | 0.00001 | 0.00039 | 2.07 |

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UUC : Unit Under Calibration
The table as per (*) marked are not NSC-ONSC accreditation scope.
The uncertainties are for a confidence probability of approximately 95 % .
The above results are valid exclusively for calibration sample as mentioned in the report
This result of calibration was found accurate as shown on date and place of calibration only.

-- End --

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NSC-TISI-TIS 17025
CALIBRATION 0024

# CALIBRATION CERTIFICATE

CERTIFICATE No. : M25-0360
CSR No. : 250252


| | | |
|---|---|---|
| Customer | : | Southern Thai Consulting Co., Ltd.<br>59/45 Moo5 Srisoontorn, Talang, Phuket<br>83110 |
| Equipment | : | Electronic Balance |
| Manufacturer | : | Sartorius |
| Model | : | PRACTUM2101-1S |
| Serial No. | : | 0033508410 |
| ID. No. | : | - |
| Capacity | : | 2100 g |
| Resolution | : | 0.1 g |
| Instrument Condition | : | Good Condition |
| Location of Calibration | : | Customer Laboratory |
| Ambient Temperature | : | (30 ± 10) °C |
| Relative Humidity | : | (50 ± 20) % |
| Barometric Pressure | : | (1010 ±10) hPa |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |
| Date of Issued | : | 4-Mar-2025 |

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APPROVED BY :

APPROVED SIGNATORY
( ) MR. PIYAPONG RATTANAKAN / Calibration Manager
( ) MR. BUNPOT SUWANNARAT / Technical Manager

Calibrated By : Mr. Bowornnan Langlea
(Mechanical Supervisor)

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

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| | | |
|---|---|---|
| Equipment | : | Electronic Balance |
| Manufacturer | : | Sartorius |
| Model | : | PRACTUM2101-1S |
| Serial No. | : | 0033508410 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

**REFERENCE STANDARD INSTRUMENT :**

| Instrument Type | Norminal Value | Serial No. | Cert. No. | Due Date | Traceability |
|---|---|---|---|---|---|
| Standard Weight Set | 1 mg ~ 500 g | - | M2412021S | 02-12-2025 | TCS |

**CALIBRATION METHOD :**

In-house method : CA.WI.11.015 based on UKAS LAB 14 : 2022

**TRACEABILITY :**

This Calibration Certificate is traceable to national standards which realize the unit of measurment according to the International System of Unit ( SI ) through :
TCS : Thai Calibration Services Co.,Ltd. , (NSC-TISI-TIS 17025 CALIBRATION 0189)

**CALIBRATION RESULTS :**

( / ) Without Adjustment ( ) After Adjustment

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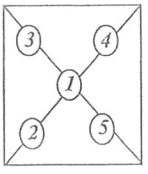
**DETERMINATION OF THE STANDARD DEVIATION OF WEIGHT MACHINE (N=10)**

| Nominal Value ( g ) | Standard Deviation ( g ) |
|---|---|
| 500 | 0.12 |

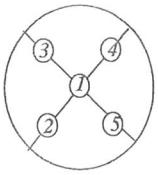
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**EFFECT OF OFF CENTER LOADING AT** 200 g

| Position | | | | | Maximum Difference ( g ) |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | |
| 199.6 | 200.4 | 197.4 | 195.9 | 202.0 | 3.7 |




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

| | | |
|---|---|---|
| Equipment | : | Electronic Balance |
| Manufacturer | : | Sartorius |
| Model | : | PRACTUM2101-1S |
| Serial No. | : | 0033508410 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

CALIBRATION RESULTS : ( Cont.)

( / ) Without Adjustment ( ) After Adjustment

EFFECT OF TARE AT 200 g

| Nominal Value (g) | UUC* Reading (g) | Correction ( g ) |
|---|---|---|
| 40 | 40.3 | -0.30 |
| 80 | 81.1 | -1.10 |
| 120 | 120.9 | -0.90 |
| 160 | 159.9 | 0.10 |
| 200 | 200.1 | -0.10 |

ERROR OF INDICATION FROM NOMINAL VALUE

| Nominal Value ( g ) | UUC* Reading ( g ) | Correction ( g ) | Uncertainty (± g) | Coverage Factor (k) |
|---|---|---|---|---|
| * Unload | 0.0 | 0.00 | 0.28 | 2.25 |
| 1 | 1.0 | 0.00 | 0.28 | 2.25 |
| 2 | 2.0 | 0.00 | 0.28 | 2.25 |
| 5 | 5.0 | 0.00 | 0.28 | 2.25 |
| 10 | 10.0 | 0.00 | 0.28 | 2.25 |
| 50 | 49.8 | 0.20 | 0.28 | 2.25 |
| 100 | 99.8 | 0.20 | 0.28 | 2.25 |
| 150 | 149.8 | 0.20 | 0.28 | 2.25 |
| 200 | 199.6 | 0.40 | 0.28 | 2.25 |
| 250 | 249.5 | 0.50 | 0.28 | 2.25 |
| 300 | 299.5 | 0.50 | 0.28 | 2.25 |
| 350 | 349.4 | 0.60 | 0.28 | 2.25 |
| 400 | 398.7 | 1.30 | 0.28 | 2.25 |
| 450 | 448.5 | 1.50 | 0.28 | 2.25 |
| 500 | 499.0 | 1.00 | 0.28 | 2.25 |

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UUC : Unit Under Calibration

The table as per (*) marked are not NSC-ONSC accreditation scope.

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

The above results are valid exclusively for calibration sample as mentioned in the report

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

-- End --

PREMIER SYSTEM ENGINEERING CO., LTD.
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NSC-TISI-TIS 17025
CALIBRATION 0024

# CALIBRATION CERTIFICATE

CERTIFICATE No. : T25-0655
CSR No. : 250252


| | | |
|---|---|---|
| Customer | : | Southern Thai Consulting Co., Ltd.<br>59/45 Moo5 Srisoontorn, Talang, Phuket<br>83110 |
| Equipment | : | Refrigerator |
| Manufacturer | : | SANDEN INTERCOOL |
| Model | : | SEA-0405 |
| Serial No. | : | SEA0405-191200194 |
| ID. No. | : | - |
| Resolution | : | 1 °C |
| Instrument Condition | : | Good Condition |
| Location of Calibration | : | Customer Laboratory |
| Ambient Temperature | : | (30 ± 15) °C |
| Relative Humidity | : | (60 ± 20) % |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |
| Date of Issued | : | 4-Mar-2025 |

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APPROVED BY :

Calibrated By : Mr. Attapol Juntasurat
( Calibration Engineer )

APPROVED SIGNATORY
( / ) MR. PIYAPONG RATTANAKAN / Calibration Manager
( ) MR. BUNPOT SUWANNARAT / Technical Manager

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

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| | | |
|---|---|---|
| Equipment | : | Refrigerator |
| Manufacturer | : | SANDEN INTERCOOL |
| Model | : | SEA-0405 |
| Serial No. | : | SEA0405-191200194 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

**REFERENCE STANDARD INSTRUMENT :**

| Instrument Type | Model | Serial No. | Cert. No. | Due Date | Traceability |
|---|---|---|---|---|---|
| Digital Thermometer with Sensor | 34970 A | MY 44042662 | DAT003/0824 | 01-08-2025 | PSE |

**CALIBRATION METHOD :**

In-house method : CA.WI.11.160 based on ASTM E145 : 94 (re-approved 2021)

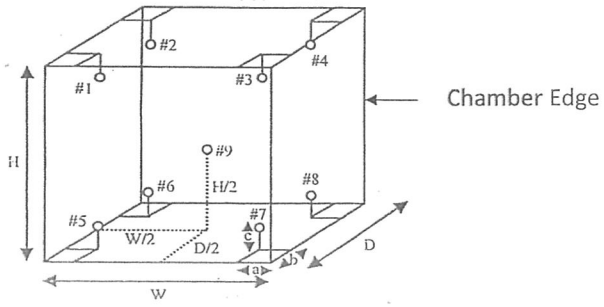
**TRACEABILITY :**

This Calibration Certificate is traceable to national standards which realize the unit of measurment according to the International System of Unit ( SI ) through :

PSE : Premier System Engineering Co., Ltd. ,(NSC-TISI-TIS 17025 CALIBRATION 0024)

**CALIBRATION RESULTS :**

Sensor Installation Diagram




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| | | | | |
|---|---|---|---|---|
| Dimension of the chamber | : | W x H x D | = | 53 x 130 x 43 cm |
| Sensor Installation | : | a x b x c | = | 5 x 5 x 5 cm |

The uncertainties are for a confidence probability of approximately 95 % .
The above results are valid exclusively for calibration sample as mentioned in the report.
This result of calibration was found accurate as shown on date and place of calibration only.

| | | |
|---|---|---|
| Equipment | : | Refrigerator |
| Manufacture | : | SANDEN INTERCOOL |
| Model | : | SEA-0405 |
| Serial No. | : | SEA0405-191200194 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

CALIBRATION RESULTS : ( Cont.)

( / ) Without Adjustment ( ) After Adjustment

Temperature Measurement Accuracy Test

The measurement results of the refrigerator and associates are reported in the manner as shown below

| Cal Point | Measured Standard Temperature (°C) at Spread Locations | | | | | | | | | Uncertainty |
|---|---|---|---|---|---|---|---|---|---|---|
| (°C) | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | Ref. 9 | (± °C) |
| 4 | 4.970 | 4.632 | 4.119 | 3.822 | 4.508 | 4.076 | 4.555 | 4.308 | 4.126 | 1.4 |

Refrigerator Performance Result

The performance of the refrigerator are reported as shown below

| Cal Point (°C) | UUC Setting (°C) | UUC Reading (°C) | Chamber Stability (± °C) | Chamber Uniformity (± °C) | Overall Variation (± °C) |
|---|---|---|---|---|---|
| 4 | 4 | 4 | 0.98 | 1.6 | 2.9 |

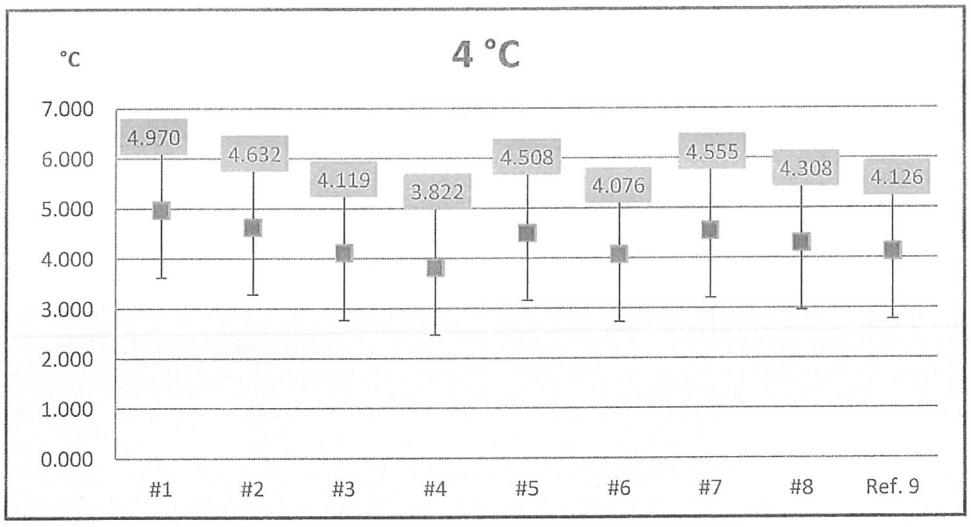
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UUC : Unit Under Calibration

The uncertainties are for a confidence probability of approximately 95 % .
The above results are valid exclusively for calibration sample as mentioned in the report.
This result of calibration was found accurate as shown on date and place of calibration only.

Report Graph




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The above results are valid exclusively for calibration sample as mentioned in the report.

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

-- End --

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123 Moo 8 Kanjanavanit Rd., Banpru, Hatyai, Songkhla 90250
E-mail : pse-cal@sritranggroup.com ,Fax. : (074)222912 Tel. : 084-2148162, 084-2148165, 074-222900-9

NSC-TISI-TIS 17025
CALIBRATION 0024

# CALIBRATION CERTIFICATE

CERTIFICATE No. : T25-0656
CSR No. : 250252


| | | |
|---|---|---|
| Customer | : | Southern Thai Consulting Co., Ltd.<br>59/45 Moo5 Srisoontorn, Talang, Phuket<br>83110 |
| Equipment | : | Incubator |
| Manufacturer | : | ACCUPLUS |
| Model | : | I250 |
| Serial No. | : | 0408-0415-0034 |
| ID. No. | : | - |
| Resolution | : | 0.1 °C |
| Instrument Condition | : | Good Condition |
| Location of Calibration | : | Customer Laboratory |
| Ambient Temperature | : | (30 ± 15) °C |
| Relative Humidity | : | (60 ± 20) % |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |
| Date of Issued | : | 4-Mar-2025 |

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APPROVED BY :

Calibrated By : Mr. Attapol Juntasurat
( Calibration Engineer )

APPROVED SIGNATORY
( / ) MR. PIYAPONG RATTANAKAN / Calibration Manager
( ) MR. BUNPOT SUWANNARAT / Technical Manager

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

@PSE-CAL

| | | |
|---|---|---|
| Equipment | : | Incubator |
| Manufacturer | : | ACCUPLUS |
| Model | : | I250 |
| Serial No. | : | 0408-0415-0034 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

REFERENCE STANDARD INSTRUMENT :

| Instrument Type | Model | Serial No. | Cert. No. | Due Date | Traceability |
|---|---|---|---|---|---|
| Digital Thermometer with Sensor | 34970 A | MY 44042662 | DAT003/0824 | 01-08-2025 | PSE |

CALIBRATION METHOD :

In-house method : CA.WI.11.160 based on ASTM E145 : 94 (re-approved 2021)

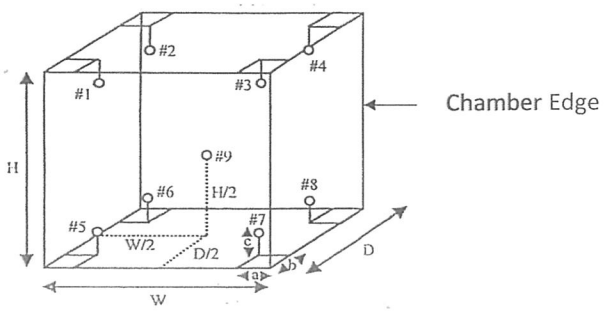
TRACEABILITY :

This Calibration Certificate is traceable to national standards which realize the unit of measurment according to the International System of Unit ( SI ) through :

PSE : Premier System Engineering Co., Ltd. ,(NSC-TISI-TIS 17025 CALIBRATION 0024)

CALIBRATION RESULTS :

Sensor Installation Diagram




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กรรมการบริษัทฯ

| | | | | | |
|---|---|---|---|---|---|
| Dimension of the chamber | : | W x H x D | = | 78 x 100 x 45 | cm |
| Sensor Installation | : | a x b x c | = | 5 x 5 x 5 | cm |

The uncertainties are for a confidence probability of approximately 95 % .
The above results are valid exclusively for calibration sample as mentioned in the report.
This result of calibration was found accurate as shown on date and place of calibration only.

| | | |
|---|---|---|
| Equipment | : | Incubator |
| Manufacture | : | ACCUPLUS |
| Model | : | I250 |
| Serial No. | : | 0408-0415-0034 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

CALIBRATION RESULTS : ( Cont.)

( / ) Without Adjustment ( ) After Adjustment

Temperature Measurement Accuracy Test

The measurement results of the incubator and associates are reported in the manner as shown below

| Cal Point | Measured Standard Temperature (°C) at Spread Locations | | | | | | | | | Uncertainty |
|---|---|---|---|---|---|---|---|---|---|---|
| (°C) | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | Ref. 9 | (± °C) |
| 20 | 20.204 | 20.344 | 20.218 | 20.310 | 19.964 | 20.077 | 20.086 | 19.786 | 20.102 | 0.36 |

Incubator Performance Result

The performance of the incubator are reported as shown below

| Cal Point (°C) | UUC Setting (°C) | UUC Reading (°C) | Chamber Stability (± °C) | Chamber Uniformity (± °C) | Overall Variation (± °C) |
|---|---|---|---|---|---|
| 20 | 20 | 20 | 0.16 | 0.47 | 0.79 |

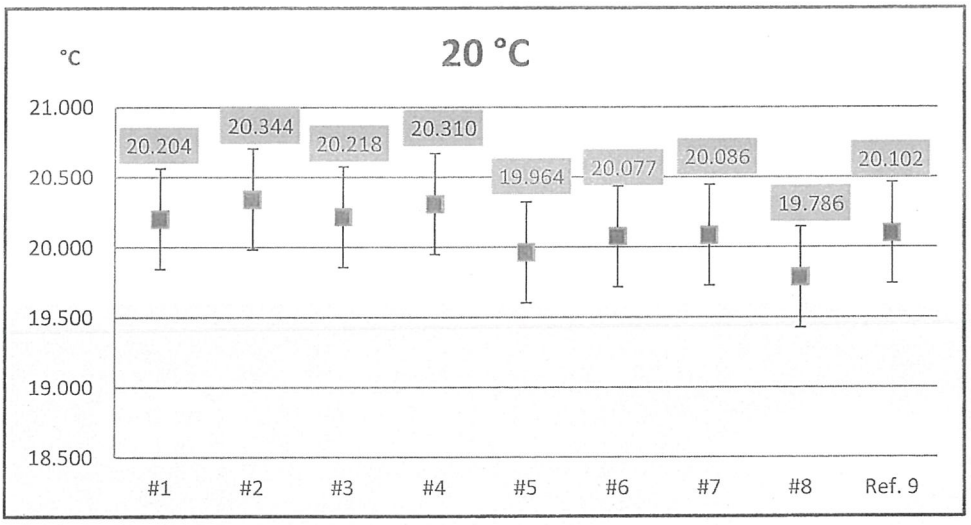
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UUC : Unit Under Calibration

The uncertainties are for a confidence probability of approximately 95 % .
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The above results are valid exclusively for calibration sample as mentioned in the report.

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

-- End --

PREMIER SYSTEM ENGINEERING CO., LTD.
123 Moo 8 Kanjanavanit Rd., Banpru, Hatyai, Songkhla 90250
E-mail : pse-cal@sritranggroup.com ,Fax. : (074)222912 Tel. : 084-2148162, 084-2148165, 074-222900-9

NSC-TISI-TIS 17025
CALIBRATION 0024

# CALIBRATION CERTIFICATE

CERTIFICATE No. : T25-0657
CSR No. : 250252


| | | |
|---|---|---|
| Customer | : | Southern Thai Consulting Co., Ltd.<br>59/45 Moo5 Srisoontorn, Talang, Phuket<br>83110 |
| Equipment | : | Water Bath |
| Manufacturer | : | Memmert |
| Model | : | WNB 22 |
| Serial No. | : | L522.1030 |
| ID. No. | : | - |
| Resolution | : | 0.1 °C |
| Instrument Condition | : | Good Condition |
| Location of Calibration | : | Customer Laboratory |
| Ambient Temperature | : | (30 ± 10) °C |
| Relative Humidity | : | (50 ± 20) % |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |
| Date of Issued | : | 4-Mar-2025 |

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APPROVED BY :

Calibrated By : Mr. Attapol Juntasurat
( Calibration Engineer )

APPROVED SIGNATORY
( / ) MR. PIYAPONG RATTANAKAN / Calibration Manager
( ) MR. BUNPOT SUWANNARAT / Technical Manager

This certificate may not be reproduced other than in full except with the prior written approval of PREMIER SYSTEM ENGINEERING CO., LTD.
The uncertainties are for a confidence probability of approximately 95 % .

@PSE-CAL

| | | |
|---|---|---|
| Equipment | : | Water Bath |
| Manufacturer | : | Memmert |
| Model | : | WNB 22 |
| Serial No. | : | L522.1030 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Calibration | : | 1-Mar-2025 |

**REFERENCE STANDARD INSTRUMENT :**

| Instrument Type | Model | Serial No. | Cert. No. | Due Date | Traceability |
|---|---|---|---|---|---|
| Digital Thermometer with Sensor | 34970 A | MY 44042662 | DAT003W/0824 | 02-08-2025 | PSE |

**CALIBRATION METHOD :**

In-house method : CA.WI.11.161 based on ASTM E715 : 80 (re-approved 2022)

**TRACEABILITY :**

This Calibration Certificate is traceable to national standards which realize the unit of measurment according to the International System of Unit ( SI ) through :

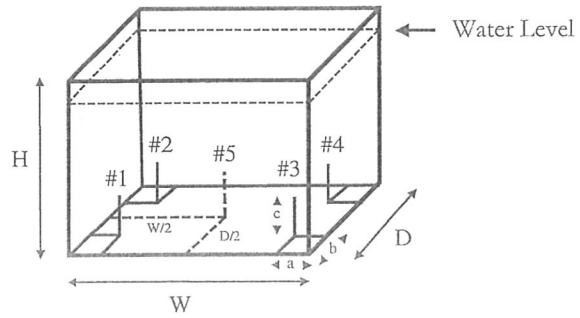
PSE : Premier System Engineering Co., Ltd. ,(NSC-TISI-TIS 17025 CALIBRATION 0024)

**CALIBRATION RESULTS :**

( / ) Without Adjustment ( ) After Adjustment

Sensor Installation Diagram

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| | | | | | |
|---|---|---|---|---|---|
| Dimension of the chamber | : | W x H x D | = | 35 x 29 x 22 | cm |
| Sensor Installation | : | a x b x c | = | 5 x 5 x 5 | cm |

The uncertainties are for a confidence probability of approximately 95 % .
The above results are valid exclusively for calibration sample as mentioned in the report.
This result of calibration was found accurate as shown on date and place of calibration only.

| | | |
|---|---|---|
| Equipment | : | Water Bath |
| Manufacture | : | Memmert |
| Model | : | WNB 22 |
| Serial No. | : | L522.1030 |
| ID. No. | : | - |
| Date of Received | : | 1-Mar-2025 |
| Date of Received | : | 1-Mar-2025 |

CALIBRATION RESULTS : ( Cont.)

( / ) Without Adjustment ( ) After Adjustment

Temperature Measurement Accuracy Test

The measurement results of the water bath and associates are reported in the manner as shown below

| Cal Point | Measured Standard Temperature (°C) at Spread Locations | | | | | Uncertainty |
|---|---|---|---|---|---|---|
| (°C) | #1 | #2 | #3 | #4 | #5 | (± °C) |
| 85 | 84.58 | 84.80 | 84.57 | 84.60 | 84.77 | 0.35 |
| 95 | 94.85 | 95.05 | 94.85 | 95.08 | 95.15 | 0.44 |

Water Bath Performance Result

The performance of the water bath are reported as shown below

| Cal Point (°C) | UUC Setting (°C) | UUC Reading (°C) | Water Bath Stability (± °C) | Water Bath Uniformity (± °C) | Overall Variation (± °C) |
|---|---|---|---|---|---|
| 85 | 85.0 | 85.0 | 0.11 | 0.26 | 0.40 |
| 95 | 95.0 | 95.0 | 0.25 | 0.37 | 0.69 |

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UUC : Unit Under Calibration

The uncertainty is not combine uniformity of the water bath

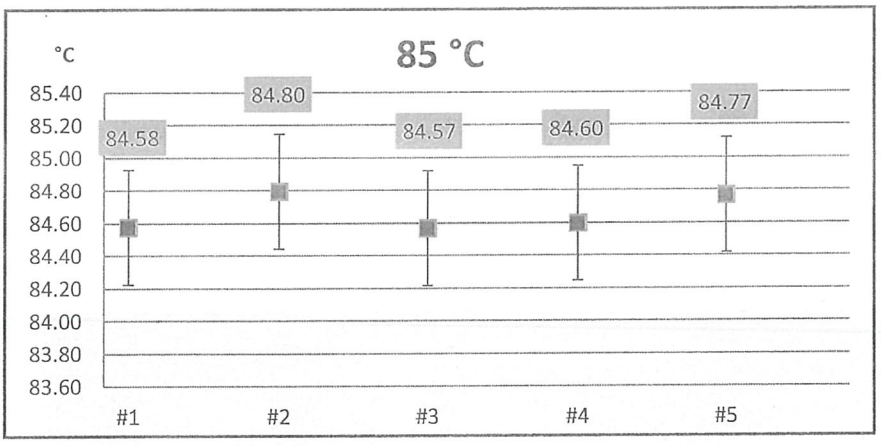
The uncertainties are for a confidence probability of approximately 95 % .

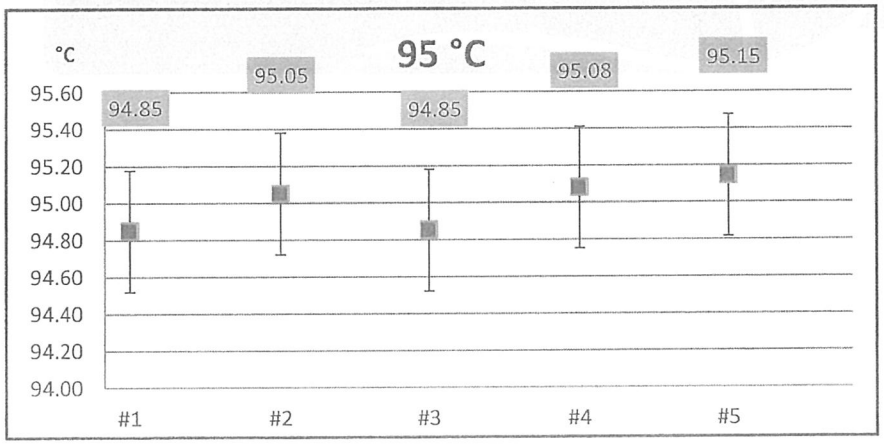
The above results are valid exclusively for calibration sample as mentioned in the report.

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Report Graph




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-- End --

**Bara Scientific Co., Ltd.**
968 U Chu Liang Building Floor7 Rama4 Road
Silom Bangrak Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com

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THAILAND
NSC-TISI-TIS 17025
CALIBRATION 0209

# Certificate of Calibration



| | |
|---|---|
| **Certificate No.** | BSCC-UV-081/25 |
| **Equipment** | UV/Vis Spectrophotometer |
| **Model** | UV-1800 |
| **Manufacturer** | SHIMADZU |
| **Serial No.** | A11635305233 CD |
| **ID No.** | UV-03 |
| **Date of receipt** | 5 March 2025 |
| **Date of calibration** | 5 March 2025 |
| **Date of issue** | 7 March 2025 |
| **Customer name** | Southern Thai Consulting Co.,Ltd. |
| **Address** | 59/45 Moo 5, Srisoontorn, Talang, Phuket 83110 |
| **Temperature** | (24.2-26.8) °C (On site) |
| **Humidity** | (54.6-64.0) %RH (On site) |
| **Equipment condition** | Good Operation |
| **Calibration Location** | Laboratory |
| **Calibration Procedure** | In-house method WI-UV-702-01 based on ASTM E275-01 |
| **Traceability** | Wavelength Accuracy is traceable to certificate No. 118114 and 118119<br>Photometric Accuracy is traceable to certificate No. 118970 and 119006<br>Stray Light is traceable to certificate No. 118111<br>The above certificate are traceble to SI unit through Starna Scientific Ltd.<br>(UKAS accredited calibration laboratory NO. 0659) |
| **Calibrated by** | Mr.Sarunkorn Pukaothong |

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Approved by

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กรรมการบริษัทฯ

**Mr.Pannaphong Phanmekakul**
Technical Manager

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www.barascientific.com

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CALIBRATION 0209

# Certificate of Calibration

**Certificate No.** **BSCC-UV-081/25** Number of Page(s) 2 of 3

**Calibration Results:**

**1.Wavelength Accuracy**

| Certified Wavelength (nm) | UUC (nm) | Error (nm) | Uncertainty (±nm) |
|---|---|---|---|
| 360.89 | 360.81 | -0.08 | 0.18 |
| 418.53 | 418.50 | -0.03 | 0.18 |
| 513.39 | 513.39 | 0.00 | 0.18 |
| 572.99 | 573.12 | 0.13 | 0.18 |
| 879.41 | 879.40 | -0.01 | 0.18 |

**2.Photometric Accuracy (UV)**

| Wavelength (nm) | Certified Absorbance (A) | UUC (A) | Error (A) | Uncertainty (±A) |
|---|---|---|---|---|
| 235 | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| 257 | 0.0000 | 0.0001 | 0.0001 | 0.0075 |
| | 0.8616 | 0.8587 | -0.0029 | 0.0075 |
| 313 | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| 350 | 0.0000 | 0.0001 | 0.0001 | 0.0075 |
| | 0.6393 | 0.6382 | -0.0011 | 0.0075 |

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*CNR = Customer not request

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# Certificate of Calibration

**Certificate No.** **BSCC-UV-081/25** Number of Page(s) 3 of 3

**Calibration Results:**

**3.Photometric Accuracy (Visible)**

| Wavelength (nm) | Certified Absorbance (A) | UUC (A) | Error (A) | Uncertainty (±A) |
|---|---|---|---|---|
| 420.0 | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| 440.0 | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| | CNR | CNR | CNR | CNR |
| 465.0 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5188 | 0.5186 | -0.0002 | 0.0042 |
| | 0.6627 | 0.6627 | 0.0000 | 0.0042 |
| | 0.9424 | 0.9425 | 0.0001 | 0.0042 |
| 546.1 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5199 | 0.5199 | 0.0000 | 0.0042 |
| | 0.6989 | 0.6988 | -0.0001 | 0.0042 |
| | 0.9972 | 0.9974 | 0.0002 | 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 |
| | 0.5611 | 0.5614 | 0.0003 | 0.0042 |
| | 0.7637 | 0.7636 | -0.0001 | 0.0042 |
| | 1.0942 | 1.0944 | 0.0002 | 0.0042 |

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*CNR = Customer not request

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**4.Stray Light***

| Standard cut-off wavelength (nm) | Unit Under Calibration(UUC) | | |
|---|---|---|---|
| | Wavelength (nm) | Transmission (%T) | Absorbance (A) |
| 201.15±0.11nm | 200.90 | 0.9820 | 2.0079 |

The Stray light transmission reference is less than 1.0%T and Stray light absorbance reference is greater than 2.00A
***Stray Light not NSC-ONSC Accredited.**

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

***End of Certificate***

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

Harikul Science Co.,Ltd.
694 Soi Ratchadanivet 24, Pracharatbamphen,
Samsaennok, Huaikhwang, Bangkok 10310
Tel: 0-2274-2456 Fax: 0-2274-2443
Email: info@harikul.com www.harikul.com

CERT.No.: HS-W037F

# Certificate of Calibration

Calibration Date : 18 Jun 25

Submitted by : SOUTHERN THAI CONSULTING CO.,LTD.
59/45 Moo 5 T.Srisoontorn, A.Talang Phuket 83110

Avg Room Temp 25 °C
Avg Water Temp 25 °C
Air Pressure : 760.00 mmHg
Salinity : 0 ppt

Model : YSI Pro20i
S/N : 23D101243
Probe : -
S/N : -
ID NO. : -
Air Temp ref : S/N. F8065C26
Barometric ref : S/N. F8065C26
Water Temp ref : -
ID NO. HS001
Technician : Kittipong M.

## Calibration Details

| Calibration Point | 100% air sat. (@25 °C, DO = 8.26 mg/l) | (status) | | (status) |
|---|---|---|---|---|
| Measurement 1 (mg/l) | 8.26 | (PASS) | - | - |
| Measurement 2 (mg/l) | 8.26 | (PASS) | - | - |
| Measurement 3 (mg/l) | 8.25 | (PASS) | - | - |
| Measurement 4 (mg/l) | 8.25 | (PASS) | - | - |
| Measurement 5 (mg/l) | 8.24 | (PASS) | - | - |
| Measurement 6 (mg/l) | 8.24 | (PASS) | - | - |
| Measurement 7 (mg/l) | 8.24 | (PASS) | - | - |
| Measurement 8 (mg/l) | 8.25 | (PASS) | - | - |
| Measurement 9 (mg/l) | 8.27 | (PASS) | - | |
| Measurement 10 (mg/l) | 8.29 | (PASS) | - | - |
| Mean Measurement | 8.25 | mg/l | - | - |
| Inaccuracy | 0.01 | mg/l | - | - |

Overall Status (PASS)

*Manufacturer Specification*

Accuracy = +/- 0.2 mg/l

1) This certificate is issued based on the result that are found as shown on date and place of test only.
2) The calibration procedure followed in accordance with Harikul Science Co., Ltd.
3) This result shall not be used for advertising purpose.

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Technician Signature
(Kittipong Maekwong)

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Supreecha Su.
Laboratory Manager
(Supreecha Sumaritam)