

ภาคผนวก ฉ

ใบรับรองการสอบเทียบเครื่องมือ



right solutions.
right partner.

รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

| Sample Name | Parameter | Equipment Name | ID No. | Calibrated Date | Next Cal | Freq. Calibrate (Months) |
|-------------|------------------------------|--------------------------------|------------|-----------------|-----------|--------------------------|
| Water Lab | pH at 25 °C | pH meter | BKK_EN0342 | 9-Oct-25 | 9-Oct-26 | 12 |
| Water Lab | Oil & Grease | Electronic Top-Loading Balance | BKK_EN0003 | 17-Jul-25 | 17-Jul-26 | 12 |
| Water Lab | Oil & Grease | Water Bath | BKK_EN0439 | 9-Oct-25 | 9-Oct-26 | 12 |
| Water Lab | Total Suspended Solids | Electronic Top-Loading Balance | BKK_EN0003 | 17-Jul-25 | 17-Jul-26 | 12 |
| Water Lab | Total Suspended Solids | Oven | BKK_EN0425 | 6-Oct-25 | 6-Oct-26 | 12 |
| Water Lab | Total Dissolved Solids 180°C | Electronic Top-Loading Balance | BKK_EN0003 | 17-Jul-25 | 17-Jul-26 | 12 |
| Water Lab | Total Dissolved Solids 180°C | Oven | BKK_EN0425 | 6-Oct-25 | 6-Oct-26 | 12 |
| Water Lab | BOD | DO Meter | BKK_EN0017 | 20-May-25 | 20-Nov-26 | 18 |
| Water Lab | BOD | Incubator | BKK_EN0304 | 4-Mar-25 | 4-Mar-26 | 12 |
| Water Lab | BOD | Burette | BKK_EN0422 | 3-Sep-25 | 3-Sep-26 | 12 |
| Water Lab | COD | Hot Block | BKK_EN0370 | 2-Jan-25 | 2-Jan-26 | 12 |
| Water Lab | COD | Spectrophotometer | BKK_EN0356 | 8-Oct-25 | 8-Oct-26 | 12 |
| Water Lab | Lead | ICP-MS | BKK_EL0043 | 4-Oct-24 | 3-Apr-26 | 18 |
| Water Lab | Lead | Hot Block | BKK_EL0054 | 4-Mar-25 | 4-Sep-26 | 18 |
| Water Lab | Lead | Chamber (Cooling Room) | BKK_EN0167 | 4-Jun-25 | 4-Dec-26 | 18 |



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.: 24CH1295

Page.: 1 of 3

Equipment : pH Meter
Manufacturer : Hach
Model : HQ411d
Serial No. : 200100031163
ID No. : BKK_EN0342
Condition As-Received: Used Item
Received Date : 16 October 2024
Calibration Date : 17 October 2024
Reference : 2410-0548DSC-5
Submitted by :

REVIEW BY

Jinda K

APPROVED BY

Siriluk P

NEXT CAL DATE

17/10/25

Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with temperature standard

Calibrated by : Warakorn Lerngagrakul

Approved by :

Saithip

Approved Signatory

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

Issue Date : 21 October 2024

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.



Cert.No.: 24CH1295

Page.: 2 of 3

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)Ref. Standard Thermometer | 2188080 | 130RC044 | 24I1022 | 16 Sep 2025 |

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

2. Certified Reference Materials :The measurement results are traceable to SI through Hach Lenge GmbH Ltd.
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00
: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 | 1034203 | 27 Sep 2026 |
| pH 6.999 | Hach Lenge GmbH | C03145 | 28 Feb 2026 |
| pH 10.010 | CPA chem | 1034205 | 27 Sep 2025 |

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

Calibration Results

Function : pH Measurement

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

| <u>Unit Under Calibration</u> | <u>Standard pH Buffer Solution</u> | <u>Actual pH Reading</u> | <u>Actual mV Reading (mV)</u> | <u>Uncertainty of pH Measurement (±)</u> | <u>Coverage factor k</u> |
|------------------------------------|------------------------------------|--------------------------|-------------------------------|--|--------------------------|
| pH Electrode S/N.: 230473042902 | 4.008 | 4.028 | 174.6 | 0.0044 | 2.00 |
| | 6.999 | 7.014 | 1.4 | 0.0084 | 2.05 |
| | 10.010 | 10.018 | -172.8 | 0.0066 | 2.00 |

Remark - Can not connect the BNC because the plug does not match with the socket.



Cert.No.: 24CH1295

Page.: 3 of 3

Calibration Results

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : PHC281

- Serial No. : 230473042902

Dimension of probe

- Length : 103 mm.

- Diameter : 12 mm.

- Immersion Depth : 90 mm.

| Calibration Point (°C) | Standard Temperature (°C) | UUC* Reading (°C) | Error (°C) | Uncertainty of measurement (± °C) | Coverage factor <i>k</i> |
|--------------------------------|-----------------------------------|---------------------------|-----------------|---|--------------------------------|
| 25.0 | 25.002 | 25.0 | -0.002 | 0.13 | 2.00 |

Remark : 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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TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert.No.: 25CH1162

Page.: 1 of 3

Equipment : pH Meter
Manufacturer : Hach
Model : HQ411d
Serial No. : 200100031163
ID No. : BKK_EN0342
Condition As-Received: Used Item
Received Date : 08 October 2025
Calibration Date : 09 October 2025
Reference : 2510-0271DSC-1
Submitted by :

Ambient Temperature : $(25 \pm 2.5) ^\circ\text{C}$
Relative Humidity : $(50 \pm 15) \%$
Calibration Procedure :
In - house method :
- CP-CH5 by direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with temperature standard

Calibrated by : Walalak Sirithean

Approved by :

Saithip

Approved Signatory

- () Chakrit Waewwanjua
() Ponpan Paipim
(✓) Saithip Meangmai

Issue Date : 10 October 2025

REVIEW BY *Jinda K*
APPROVED BY *Siriluk P*
NEXT CAL DATE.....09/10/26

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.



Cert.No.: 25CH1162

Page.: 2 of 3

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) Ref. Standard Thermometer | 4982054 | 110RC044 | 25I708 | 03 July 2026 |

- This measurement result 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 4.007 | CPA chem | 1114384 | 12 June 2027 |
| pH 6.965 | CPA chem | 1066667 | 18 Jan 2026 |
| pH 10.010 | CPA chem | 1135355 | 16 Aug 2026 |

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

Calibration Results

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 (\pm) | Coverage factor k |
|------------------------------------|------------------------------------|--------------------------|-------------------------------|---|---------------------------------------|
| pH Electrode S/N.: 252063043080 | 4.007 | 3.996 | 176.6 | 0.0046 | 2.00 |
| | 6.965 | 6.974 | 1.1 | 0.0084 | 2.00 |
| | 10.010 | 9.996 | -176.9 | 0.0070 | 2.00 |

Remark - Can not connect the BNC because the plug does not match with the socket.



Cert.No.: 25CH1162

Page.: 3 of 3

Calibration Results

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : PHC281

- Serial No. : 252063043080

Dimension of probe

- Length : 103 mm.

- Diameter : 12 mm.

- Immersion Depth : 90 mm.

| Calibration Point (°C) | Standard Temperature (°C) | UUC* Reading (°C) | Error (°C) | Uncertainty of measurement (± °C) | Coverage factor <i>k</i> |
|--------------------------------|-----------------------------------|---------------------------|-----------------|---|--------------------------------|
| 25.0 | 25.001 | 25.0 | -0.001 | 0.13 | 2.00 |

Remark - 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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Sartorius (Thailand) Co., Ltd.

129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310

Tel: +66 2643 8361-6 , e-mail: service.thailand@sartorius.com



NSC-TIS-TIS 17025

CALIBRATION 0426

SARTORIUSREVIEW BY finda KAPPROVED BY Siriluk PNEXT CAL DATE 02/08/25

Certificate

of Calibration

Model Number : MSE224S-100-DU
Description : Analytical Balance
Serial Number : 0027405555
ID No. : BKK_EN0003
Manufacturer : Sartorius

Certificate No. : 24BCI0270
Issued Date : Monday, August 05, 2024
Reference No. : 240942
Page No. : 1 of 2

Customer Name : ALS Laboratory Group (Thailand)Co., Ltd.
104 Phatthanakan 40,Phatthanakan Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250.

Calibrated Place : Lab Room

Calibrated By : Mr.Chonchai Inthana
Calibration Date : Friday, August 02, 2024

Calibration
Procedure No. : This calibration was conducted by
Using in-house calibration procedure number (WI-003)
Based on UKAS LAB 14 : 2019

Metrological data :

Capacity : 220 g Readability : 0.0001 g

Ambients Conditions:

Temperature : 23.0 °C ± 5.0 °C
Humidity : 55.0 % RH ± 10.0 % RH
Pressure : ±

Reasons for calibration

☐ New Installation ☐ Service / Repaired ☒ Re-calibration/ Maintenance

Equipment Condition: ☒ Good Operate ☐ Fair

Measurement Method UKAS Publication Ref :Lab 14

The measurement uncertainty stated is the expended 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). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came form list of Sartorius Metrological Specifications.

Traceability:

| Model Number | Description | Traceability | Certificate No. | Due Date |
|---------------|---|--------------|--------------------|-------------|
| YCS011-522-00 | Sartorius weight set 1mg - 5000g E2,YCS011-522-00 | TCS | M23081975 | 23-Aug-2025 |
| Testo 174 H | Thermo-Hygrometer , Testo 174H | ENTECH | H/T 661303,H661140 | 12-Nov-2024 |

This certificate relate and apply this equipment only.

This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division Sartorius (Thailand) Co., Ltd.

Mr.chonchai Inthana(Technical Manager)

S
T
A
M
P



Sartorius (Thailand) Co., Ltd.

129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310

Tel: +66 2643 8361-6 Fax: +66 2643-8367, e-mail: service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

Model Number : MSE224S-100-DU

Description : Analytical Balance

Serial Number : 0027405555

ID No. : BKK_EN0003

Manufacturer : Sartorius

Certificate No. : 24BCI0270

Issued Date : Monday, August 05, 2024

Reference No. : 240942

Page No. : 2 of 2

Calibration Results : Without Adjustment**Repeatability**

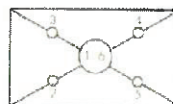
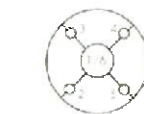
The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.

| | | |
|-----------------------------|---------|----------|
| Nominal Value : (Low Load) | 20.0000 | 200.0000 |
| 20 g | 20.0000 | 199.9999 |
| Tolerance | 20.0001 | 200.0000 |
| 0.0001 g | 20.0000 | 200.0000 |
| | 20.0000 | 200.0000 |
| Nominal Value : (High Load) | 20.0000 | 200.0000 |
| 200 g | 20.0001 | 200.0001 |
| Tolerance | 20.0000 | 200.0000 |
| 0.0001 g | 20.0000 | 199.9999 |
| | 20.0000 | 200.0000 |
| Standard Deviation | 0.00004 | 0.00006 |

Eccentricity (Off-center loading error)

The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).

Nominal value : 100 g
Tolerance 0.0004 g

**Difference**

| | |
|---|--------|
| 1 | - |
| 2 | 0.0000 |
| 3 | 0.0000 |
| 4 | 0.0000 |
| 5 | 0.0001 |
| 6 | - |

Linearity

The linearity, also called linearity error. Describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance 0.0002 g

| Nominal Value (g) | Conventional Mass Value (g) | Displayed Value (g) | Deviation (g) | Uncertainty (g) |
|----------------------|--------------------------------|------------------------|------------------|--------------------|
| 0.01 | 0.0100 | 0.0100 | 0.0000 | 0.00015 |
| 0.1 | 0.1000 | 0.1000 | 0.0000 | 0.00015 |
| 1 | 1.0000 | 1.0000 | 0.0000 | 0.00015 |
| 2 | 2.0000 | 2.0000 | 0.0000 | 0.00015 |
| 5 | 5.0000 | 5.0000 | 0.0000 | 0.00015 |
| 10 | 10.0000 | 10.0000 | 0.0000 | 0.00015 |
| 20 | 20.0000 | 20.0000 | 0.0000 | 0.00015 |
| 50 | 50.0000 | 50.0001 | 0.0001 | 0.00016 |
| 100 | 100.0000 | 100.0001 | 0.0001 | 0.00019 |
| 200 | 200.0000 | 200.0000 | 0.0000 | 0.00029 |

End of Report.

Accredited by

NSC-TISI-TIS 17025

Calibration 0426



NSC-TISI-TIS 17025

CALIBRATION 0426

Calibration certificate

Calibration Certificate No. 25BCI0265

| | | |
|------------------------|---|--|
| Object | Electronic non-automatic weighing instrument | This calibration certificate documents the traceability to national standards. |
| Manufacturer | Sartorius | Uncertainties of measurements are taken into account when only statements of compliance are made. |
| Type | MSE224S-100-DU | This certificate was prepared by Sartorius Corporation in accordance to the current ISO/IEC 17025:2017 standard and Sartorius Work Instruction (Method) SOP WI 08. |
| Serial QM Ident. no. | 27405555 BKK_EN0003 | This certificate relate and apply this equipment only. |
| Customer | ALS Laboratory Group (Thailand)Co., Ltd. 104 Phatthanakarn 40,Phattanakarn Rd.,Khwaeng Phatthanakarn ,Khet Suan Luang,Bangkok 10250 | <div>REVIEW BY <i>Linda K</i></div> <div>APPROVED BY <i>Siriluk P</i></div> <div>NEXT CAL DATE.....17/07/26</div> |
| Order no. | 265054 | |
| Number of pages | 4 | |
| Date of calibration | 17 Jul 2025 | |

This calibration certificate may not be reproduced other than in full except with the permission of NSC-TISI-TIS-17025 and the issuing laboratory. Calibration certificates without signature are not valid.

The user is obliged to have the object recalibrated at appropriate intervals.

| | | | |
|---------------|-------------|---|------------------|
| Date of issue | 17 Jul 2025 | Approval of the Calibration Certificate | Person in charge |
| | | | |
| | | Mr. Chonchai Inthana | Chonchai Inthana |

Calibration object

Single range instrument

| | |
|------------------------------|------------------|
| Model | MSE224S-100-DU |
| Serial Number | 27405555 |
| QM Ident. no Inventory no. | BKK_EN0003 --- |

| | |
|------------------------------|------------|
| Maximum capacity (Max. load) | 220.0000 g |
| Measured up to | 220.0000 g |
| Scale interval | 0.0001 g |

Place of calibration

| | |
|---|-----------------------|
| Address | According to page 1 |
| Department Cost center | ENVI Department --- |
| Building Floor | --- 1st Floor. |
| Room | Laboratory Room. |
| Maximum temperature variation at place of calibration | 5 K |

Calibration procedure

EURAMET Calibration Guide No. 18, Version 4.0 (11/2015) - Guidelines on the Calibration of Non-Automatic Weighing Instruments

Test equipment

| Test equipment type | Test equipment ID | Valid until |
|------------------------------|--|-------------|
| Thermometer | Testo 174(Traceable to Si unit through ENTECH) | 11 Nov 2025 |
| Test weight set OIML R111 E2 | Certificate No.M2308197S ,E2(Traceable to SI unit through TCS) | 23 Aug 2025 |

Adjustment Status

The measuring device was internally adjusted before the calibration.

Environmental and measuring conditions

| | |
|--|---|
| Date of calibration | 17 Jul 2025 |
| Temperature at place of calibration Temp. diff. <i>T</i> _{weights} - <i>T</i> _{place} | 22.5 °C 0.7 K |
| Measuring conditions | The installation site is suitable. The device is level. Balance was loaded up to Max before test. |
| Comments | Humidity 58.0 %RH. |

Measurement results | Measurement uncertainties

Repeatability

| Test load (nominal): 10 g 200 g | | |
|-----------------------------------|----------------------|----------------------|
| | 10 g | 200 g |
| 1 | 10.0000 g | 200.0000 g |
| 2 | 10.0000 g | 199.9999 g |
| 3 | 10.0000 g | 200.0000 g |
| 4 | 10.0000 g | 200.0000 g |
| 5 | 10.0001 g | 199.9999 g |
| 6 | 10.0000 g | 200.0000 g |
| 7 | 10.0000 g | 200.0000 g |
| 8 | 10.0001 g | 200.0000 g |
| 9 | 10.0000 g | 200.0000 g |
| 10 | 10.0000 g | 199.9999 g |
| | <i>s</i> = 0.00004 g | <i>s</i> = 0.00005 g |

Eccentricity

| Test load (nominal): 100 g | |
|---|------------|
| Center | 100.0000 g |
| Front left | 100.0001 g |
| Back left | 100.0000 g |
| Back right | 100.0001 g |
| Front right | 100.0001 g |
| Maximum deviation from centric loading indication $ \Delta_{ecc} _{max} = 0.0001\text{ g}$ | |

Error of indication

| Testload | Indication | Error | Expansion factor | Uncertainty | Uncertainty relative |
|-----------------------------|------------|-------------------------------|------------------|-----------------------|--------------------------------------|
| <i>L</i> | <i>I</i> | <i>E</i> | <i>k</i> | <i>U</i> (<i>E</i>) | <i>U</i> _{rel} (<i>E</i>) |
| 0.0100 g | 0.0100 g | 0.0000 g | 2.00 | 0.00012 g | 1.2 % |
| 0.1000 g | 0.1000 g | 0.0000 g | 2.00 | 0.00013 g | 0.13 % |
| 1.0000 g | 1.0000 g | 0.0000 g | 2.00 | 0.00013 g | 0.013 % |
| 2.0000 g | 2.0000 g | 0.0000 g | 2.00 | 0.00013 g | 0.0065 % |
| 5.0000 g | 5.0000 g | 0.0000 g | 2.00 | 0.00013 g | 0.0026 % |
| 10.0000 g | 10.0000 g | 0.0000 g | 2.00 | 0.00013 g | 0.0013 % |
| 20.0000 g | 20.0000 g | 0.0000 g | 2.00 | 0.00014 g | 0.00068 % |
| 50.0000 g | 50.0000 g | 0.0000 g | 2.00 | 0.00015 g | 0.00029 % |
| 100.0000 g | 100.0000 g | 0.0000 g | 2.00 | 0.00018 g | 0.00018 % |
| 200.0000 g | 200.0000 g | 0.0000 g | 2.00 | 0.00028 g | 0.00014 % |
| 220.0000 g | 220.0001 g | 0.0001 g | 2.00 | 0.00032 g | 0.00015 % |
| Maximum error of indication | | $ E _{max} = 0.0001\text{ g}$ | | | |

*U*_{rel}(*E*) is the quotient of *U*(*E*) and test load *L*. The uncertainty of measurement *U*(*E*) is valid only if error *E* is considered. You will find reference notes on the uncertainty of measurement in use under: Appendix to the calibration certificate | Interpretation of measurement results.
Reference note: The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the documented Expansion factor, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

End of calibration certificate

Uncertainty of measurement in use

| | |
|------------------------------------|----------------------------|
| Device adjusted before measurement | Yes |
| Temperature deviation considered | 1.5 K (isoCAL active) |
| Temperature coefficient considered | $1 \cdot 10^{-6}/\text{K}$ |

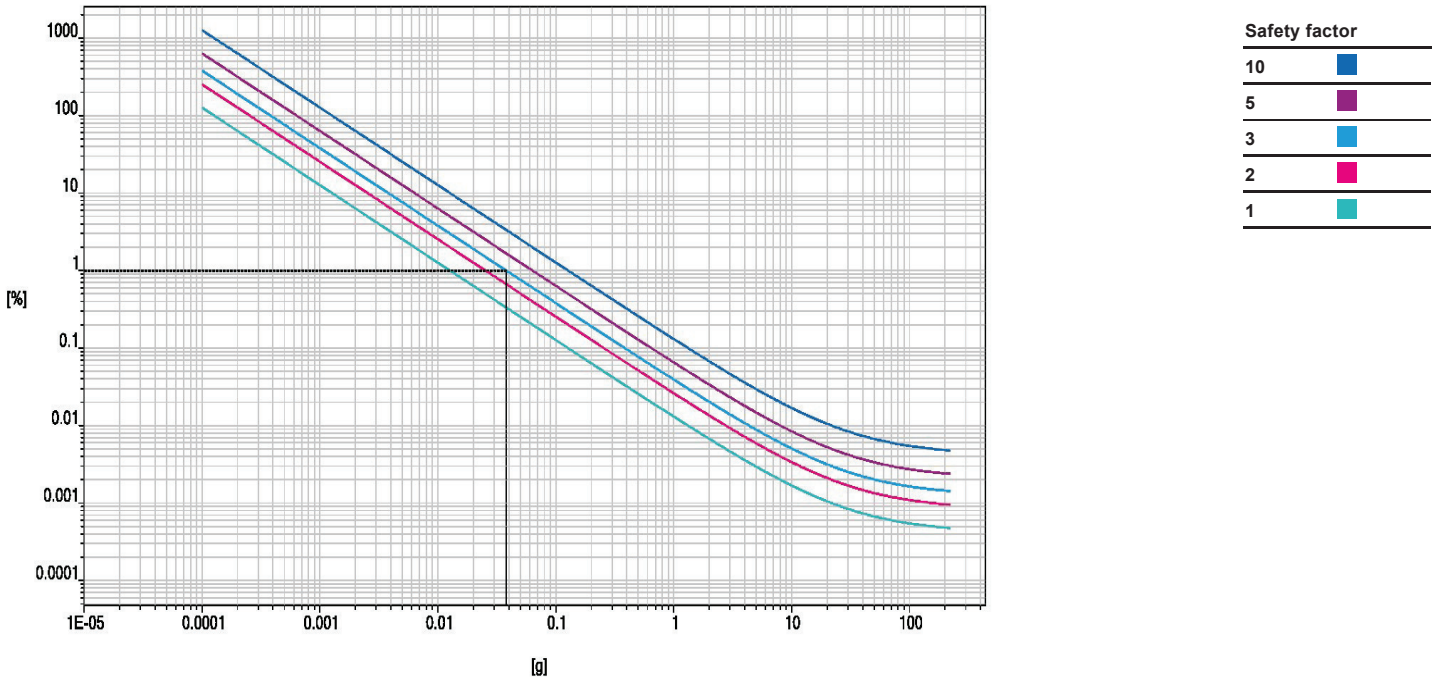
Uncertainty of the weighing result $U_{gl}(W)$

$U_{gl}(W) = 0.00013 \text{ g} + 4.19 \cdot 10^{-6} \cdot R$

Reference note: The current uncertainty of measurement is calculated by entering of the reading R into this formula. In relation to this, there is no need for a correction of the indication error. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied with an Expansion factor of 2, determined in accordance with the European Calibration Guideline EURAMET cg-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

| Indication in % from max load | Net indication R | Uncertainty $U_{gl}(W)$ | Uncertainty relative $U_{gl}(W)_{rel}$ |
|-------------------------------|--------------------|-------------------------|--|
| 1 % | 2.2000 g | 0.00014 g | 0.0063 % |
| 25 % | 55.0000 g | 0.00036 g | 0.00066 % |
| 50 % | 110.0000 g | 0.00059 g | 0.00054 % |
| 75 % | 165.0000 g | 0.00082 g | 0.00050 % |
| 100 % | 220.0000 g | 0.0011 g | 0.00048 % |

Graphic realization of the relative uncertainty of measurement | process accuracy



Displayed example

| | |
|-----------------------|----------|
| Process accuracy | 1.00 % |
| Safety factor | 3 |
| Minimum sample weight | 0.0380 g |



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.: 24TM1618

Page : 1 of 3

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE29
Serial No. : L622.0282
ID No. : BKK_EN0439

REVIEW BY *Jinda K*

APPROVED BY *Siriluk P*

NEXT CAL DATE *29/10/25*

Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Location : Organic Preparation Lab

Received Order : 29 October 2024

Calibration Date : 29 October 2024

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Man Pattanapongpaiboon

Approved by :

Kunchit

Approved Signatory

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

Issue Date : 30 October 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 : Water Bath
Condition As-Received : Used Item
Reference : 2410-0782OC-4

Cert. No.: 24TM1618

Page : 2 of 3

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT04 Based on ASTM E715 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

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) Data Acquisition | MY57013711 | 24LM115 | TPA | 13 Jul 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.

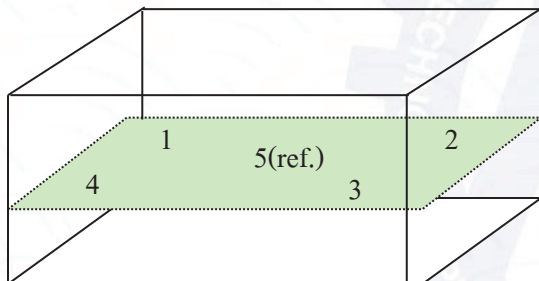
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

| | <u>Environmental</u> | | <u>AC Voltage Supply</u> |
|---------------------------------|----------------------|-----------|--------------------------|
| | (°C) | (%R.H.) | (Volt) |
| Beginning of Calibration | 25 | 54 | 222 |
| Finished of Calibration | 25 | 57 | 226 |



Front

| <u>Position :</u> | <u>Ref. Std. ID No.:</u> |
|-------------------|--------------------------|
| 1 | 4803988-001 |
| 2 | 4803988-002 |
| 3 | 4803988-003 |
| 4 | 4803988-004 |
| 5(ref.) | 4803988-005 |



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2410-0782OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 24TM1618

Page : 3 of 3

| Calibration point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Average* Standard Reading (°C) | | | | | Uncertainty |
|--------------------------------|---------------------------|---------------------------|----------------------------------|--------|--------|--------|----------|-------------|
| | | | Position | | | | | |
| | | | 1 | 2 | 3 | 4 | 5 (ref.) | (± °C) |
| 85.0 | 85.0 | 85.0 | 85.133 | 85.212 | 85.150 | 84.983 | 85.096 | 0.22 |

| Calibration point (°C) | Uniformity (°C) | Stability (± °C) | Coverage Factor k |
|--------------------------------|----------------------|-----------------------|--------------------------------|
| 85.0 | 0.21 | 0.13 | 2 |

Average* : The average of 30 values in each position.

Uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

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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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.: 25TM528

Page : 1 of 3

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 29
Serial No. : L622.0282
ID No. : BKK_EN0439

REVIEW BY

finda k

APPROVED BY

Siriluk P

NEXT CAL DATE

09/10/26

Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Location : Organic Preparation Lab

Received Order : 08 October 2025

Calibration Date : 09 October 2025

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

AC Line Voltage : (220 ± 22) V

Calibrated by : Kunchit Promprat

Kunchit Promprat

Approved by :

Approved Signatory

() Chakrit Waewwanjua

() Ponpan Paipim

(✓) Suwit Imjai

Issue Date : 28 October 2025

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 : Water Bath
Condition As-Received : Used Item
Reference : 2510-0042OC-13

Cert. No.: 25TM528

Page : 2 of 3

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT04 Based on ASTM E715 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

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) Data Acquisition | MY58041391 | 25LM20 | TPA | 08 Feb 2026 |

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

3. This measurement result is traceable to the International System of Unit maintained through :

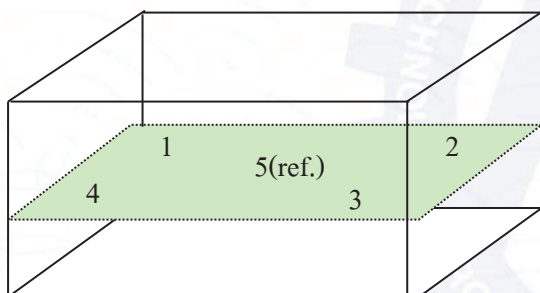
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

| | <u>Environmental</u> | | <u>AC Voltage Supply</u> (Volt) |
|---------------------------------|----------------------|-----------|--------------------------------------|
| | (°C) | (%R.H.) | |
| Beginning of Calibration | 24 | 63 | 224 |
| Finished of Calibration | 24 | 58 | 224 |



Front

| <u>Position :</u> | <u>Ref. Std. ID No.:</u> |
|-------------------|--------------------------|
| 1 | 70RC143 |
| 2 | 70RC144 |
| 3 | 70RC145 |
| 4 | 70RC146 |
| 5(ref.) | 70RC147 |



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2510-0042OC-13
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 25TM528

Page : 3 of 3

| Calibration point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Average* Standard Reading (°C) | | | | | Uncertainty (± °C) |
|--------------------------------|---------------------------|---------------------------|----------------------------------|--------|--------|--------|----------|-----------------------------|
| | | | Position | | | | | |
| | | | 1 | 2 | 3 | 4 | 5 (ref.) | |
| 85.0 | 85.0 | 85.0 | 84.863 | 84.748 | 84.869 | 84.990 | 84.966 | 0.21 |

| Calibration point (°C) | Uniformity (°C) | Stability (± °C) | Coverage Factor <i>k</i> |
|--------------------------------|----------------------|-----------------------|--------------------------------|
| 85.0 | 0.33 | 0.12 | 2 |

Average* : The average of 30 values in each position.

Uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

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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Metrology

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110, Thailand.

Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100

Bangkok Tel : +668 9205 6851 , +669 8247 2360
Website : www.scieco.co.th E-Mail : calibrate@scg.com



Certificate No. T241770

Page 1 of 3

Certificate of Calibration

Equipment : Chamber (Oven)

Manufacturer : Memmert

Model : UF 110

Serial No. : B423.1549

Customer Code : BKK_EN0425

ID No. : T4671A5

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanaka

Khet Suan Luang, Bangkok 10250

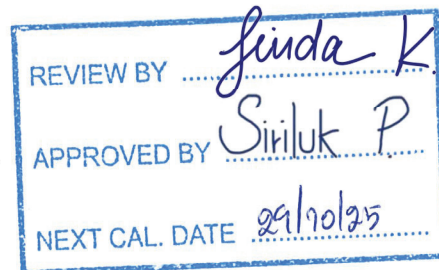
Customer Location : Oven Room

Date of Receipt : 22 October 2024

Calibrated By : Boonchai Suriyawong (Site Calibration Manager)

Approved By :  / Sujjar Naknakred (Site Calibration Manager)

Date of Issue : 11 NOV 2024



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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrology.

Certificate No. T241770

Page 2 of 3

Calibration Report

Equipment : Chamber (Oven)
Date of Calibration : 29 October 2024
Environment : Temperature : 22.4-27.7 °C
Line Voltage : 221.7-225.9 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine resistance thermometer detectors into its chamber , the other one resistance thermometer detector use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986).

All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

| Instrument | Model | Instrument No. | Certificate No. | Due Date |
|-------------|---------|----------------|-----------------|---------------|
| RTD | 100 ohm | 31-(CH1-10) | T240399 | 16 March 2025 |
| DATA LOGGER | 34970A | T193 | T240399 | 16 March 2025 |

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)

4. Condition of calibrated item : good

Equipment Description :

Time Constant 1 Hour 35 Minute At 104 °C
Fresh Air Damper ☐ Open ☒ Min ☐ Medium ☐ Max
☐ Close
☐ Not Available

5. Adjustment :

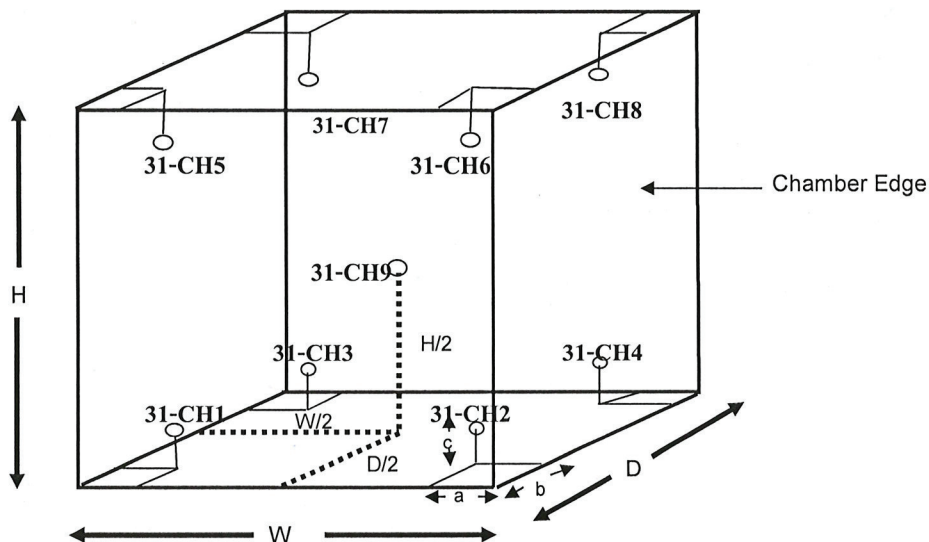
(X) without adjustment

() after adjustment

Approved By _____



Calibration Report



Remark :

Internal Dimensions of Chamber : W (Width) = 56 cm. , H(Height)=55 cm. and D(Depth)=41 cm.
 Size of Installed Standard sensor number31-CH1to number31-CH8 : a = 5 cm. ,b = 5 cm. and c = 5 cm.
 Size of Installed Standard sensor number31-CH9 : W/2=56 cm./2 , H/2=55 cm./2 and D/2=41 cm./2

Measurement Results

| Calibration Point | Average Standard Reading at each position (°C) | | | | | | | | |
|-------------------|--|--------|--------|--------|--------|--------|--------|--------|--------|
| | 31-CH1 | 31-CH2 | 31-CH3 | 31-CH4 | 31-CH5 | 31-CH6 | 31-CH7 | 31-CH8 | 31-CH9 |
| 104 | 104.19 | 104.50 | 103.83 | 104.26 | 104.02 | 104.34 | 103.76 | 104.42 | 103.96 |
| 180 | 180.39 | 180.40 | 179.84 | 180.15 | 179.27 | 180.23 | 180.36 | 180.68 | 180.73 |

| Chamber (Oven) | | | Temperature Distribution | | | | |
|------------------|--------------|---------|--------------------------|------------------|-----------------|--------------------|--------------------------|
| Setting (°C) | Reading (°C) | | Average (°C) | Stability (± °C) | Uniformity (°C) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
| | Min , Max | Average | | | | | |
| 104.0 | 103.9 , 104 | 104.0 | 104.14 | 0.14 | 0.60 | 0.42 | 2.00 |
| 180.0 | 179.9 , 180 | 180.0 | 180.23 | 0.27 | 0.76 | 0.63 | 2.00 |

* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k* which for a t-distribution, providing a level of confidence of approximately 95 % .

End of Certificate

Approved By. 



Metrology Center
SCI ECO Services Company Limited

51 Moo 8, Tubkwang, Kaeng Khoi, Saraburi, Thailand 18260

Bangkok Tel : +668 9205 6851 , +669 81924 0059

Saraburi Tel : +669 8247 2360

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T251785

Page 1 of 3

Certificate of Calibration

Equipment : Chamber (Oven)

Manufacturer : Memmert

Model : UF110

Serial No. : B423.1549

Customer Code : BKK_EN0425

ID No. : T4671A5

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : Oven Room

Date of Receipt : 1 October 2025

Calibrated By : Sujjar Naknakred (Site Calibration Manager)

Approved By : Don Zai Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 10 OCT 2025

| | |
|----------------|-------------------|
| REVIEW BY | <u>finda k</u> |
| APPROVED BY | <u>Siriluk P.</u> |
| NEXT CAL. DATE | <u>06/10/26</u> |

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

Certificate No. T251785

Page 2 of 3

Calibration Report

Equipment : Chamber (Oven)
Date of Calibration : 6 October 2025
Environment : Temperature : 24.4-25.8 °C
Line Voltage : 220.5-225.2 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine resistance thermometer detectors into its chamber , the other one resistance thermometer detector use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2019) and AS2853-1986).

All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

| Instrument | Model | Instrument No. | Certificate No. | Due Date |
|-------------|---------|----------------|-----------------|--------------|
| RTD | 100 ohm | 23-(CH1-10) | T250314 | 6 April 2026 |
| DATA LOGGER | 34970A | T195 | T250314 | 6 April 2026 |

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.

4. Condition of calibrated item : good

Equipment Description :

Time Constant 2 Hour 14 Minute At 104 °C
Fresh Air Damper ☒ Open ☒ Min ☐ Medium ☐ Max
☐ Close
☐ Not Available

5. Adjustment :

() without adjustment

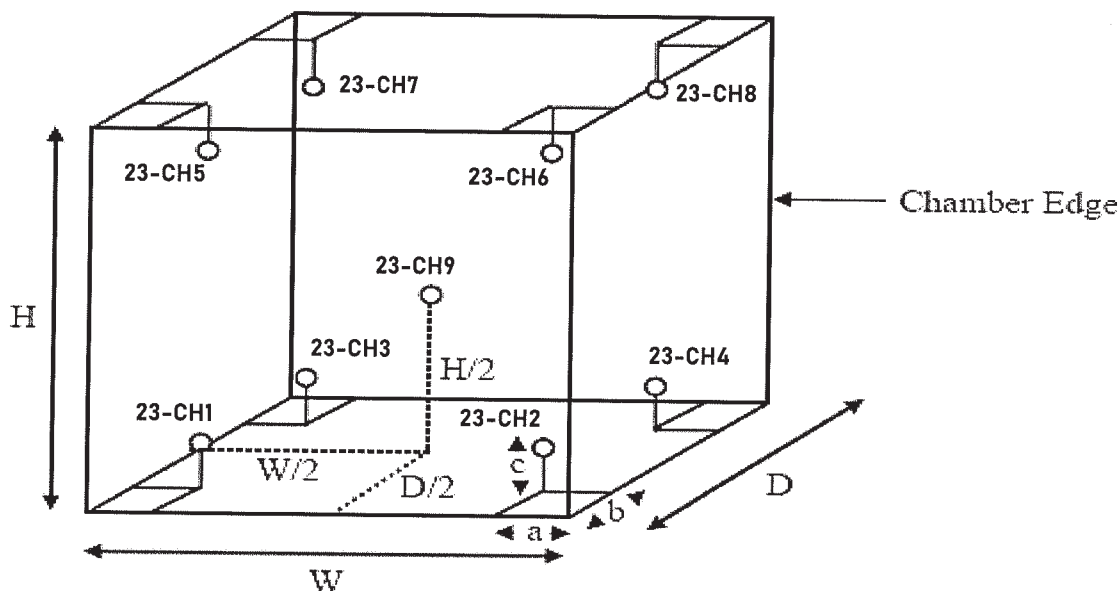
(X) after adjustment

Approved By. Donkai

Certificate No. T251785

Page 3 of 3

Calibration Report



Remark : Internal Dimensions of Chamber : W (Width) = 56 cm. , H (Height) = 48 cm. and D (Depth) = 40 cm.
 Size of Installed Standard sensor number 23-CH1 to number 23-CH8 : a = 5 cm. ,b = 5 cm. and c = 5 cm.
 Size of Installed Standard sensor number 23-CH9 : W/2 = 56 cm./2 , H/2 = 48 cm./2 and D/2 = 40cm./2

Measurement Results

| Average Standard Reading at each position (°C) | | | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Calibration Point | 23-CH1 | 23-CH2 | 23-CH3 | 23-CH4 | 23-CH5 | 23-CH6 | 23-CH7 | 23-CH8 | 23-CH9 |
| 104 | 104.13 | 103.54 | 103.92 | 104.37 | 104.40 | 104.51 | 104.18 | 103.86 | 103.80 |
| 180 | 180.05 | 179.82 | 179.64 | 179.52 | 181.20 | 180.29 | 180.19 | 179.35 | 179.89 |

| Chamber (Oven) | | | Temperature Distribution | | | | |
|------------------|---------------|---------|--------------------------|-------------------|-------------------|---------------------|-------------------|
| Setting °C | Reading (°C) | | Average (°C) | Stability (± °C) | Uniformity (°C) | Uncertainty (± °C) | Coverage Factor k |
| | Min , Max | Average | | | | | |
| 104.0 | - | 104.0 | 104.08 | 0.28 | 0.87 | 0.45 | 2.00 |
| 180.0 | 180.0 , 180.1 | 180.0 | 179.99 | 0.37 | 1.49 | 0.61 | 2.00 |

* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

End of Certificate.

Approved By. 



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 FAX. 0-2719-9484

Certificate of Testing

Cert.No.: 25TW101

Page.: 1 of 2

Equipment :

DO Meter

Manufacturer :

YSI

Model :

5000-230V

Serial No. :

09J101147

ID No. :

BKK_EN0017

Received Date :

19 May 2025

Test Date :

20 May 2025

Reference :

2505-0593DSC-1

Submitted by :

ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Laboratory Condition :

Temperature (25 ± 5) °C

Humidity (50 ± 20) %

Test Procedure :

In - house method : CP-CH9

by Comparison Technique with Azide Modification Method

Tested by :

Walalak Sirithean

Approved by :

Saithip

Approved Signatory

() Chakrit Waewwanjua

() Ponpan Paipim

(✓) Saithip Meangmai

Issue Date :

20 May 2025

| | |
|---------------|------------------|
| REVIEW BY | <i>finda k</i> |
| APPROVED BY | <i>Siriluk P</i> |
| NEXT CAL DATE | 20/11/26 |



Cert.No.: 25TW101

Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

This measurement result is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

| <u>Instruments</u> | <u>Serial No.</u> | <u>ID No.</u> | <u>Certificate No.</u> | <u>Due Date</u> |
|--------------------|-------------------|---------------|------------------------|-----------------|
| 1. Burette | - | 130BU10 | 25CG1126 | 18 Mar 2027 |
| 2. Balance | 14233821 | 110RC001 | 24MM131 | 04 July 2025 |

2. Standard Material :-

| <u>Material</u> | <u>Manufacturer</u> | <u>Lot.No.</u> | <u>Assay</u> |
|---------------------------------|---------------------|----------------|--------------|
| Sodium Thiosulfate 5-Hydrate AR | KEMAUS | 2203162447 | 99.6% |

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 16K100498

| Titration Method (Azide Modification Method) (mg/L) | DO Meter Reading (mg/L) | Standard Deviation (mg/L) |
|---|---------------------------------------|-------------------------------------|
| 8.20 | 8.21 | 0.0090 |

This report was certified only for the instrument we tested. It is allowable to use for study
Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced
other in full, without written approval of the laboratory

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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.: 25LM83

Page.: 1 of 2

Equipment : DO Meter with Sensor

Manufacturer : YSI

Model : 5000-230V

Serial No. : 09J101147

ID No. : BKK_EN0017

Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Location : TPA On Site Calibration Laboratory

Received Order : 19 May 2025

Calibrated Date : 20 May 2025

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

AC Line Voltage : (220 ± 22) V

Calibrated by : Warakorn Lerngagtrakul

Approved by :

Kunchit

Approved Signatory

- () Chakrit Waewwanjua
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date :

26 May 2025

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 : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2505-0593DSC-2

Cert. No.: 25LM83
Page.: 2 of 2

Procedure Used :-

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 | 2188080 | 2411022 | TPA | 17 Sep 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.: 16K100498

| <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> k |
|---|---|--|--------------------------------------|-------------------------------|---------------------------------------|---|
| 20.00 | 60 | 20.003 | 19.92 | -0.083 | 0.15 | 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 %.

-o0o-

Certificate No. T250356

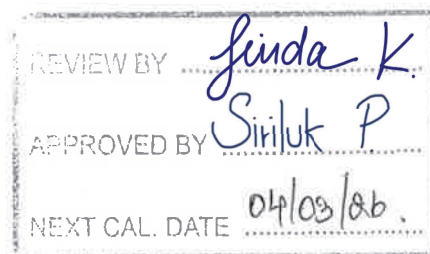
Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Incubator)**Manufacturer** : Memmert**Model** : ICP 750**Serial No.** : F819.0021**Customer Code** : BKK_EN0304**ID No.** : T9572A4**Customer** : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd.,

Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250

Customer Location : Wet Chemistry Lab 2**Date of Receipt** : 26 February 2025**Calibrated By** : Atiphong Rongrat (Technician)**Approved By** :  / Boonchai Suriyawong (Site Calibration Manager)**Date of Issue** : 17 MAR 2025**The uncertainties are for a confidence probability of approximately 95%.**

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrology.

Certificate No. T250356

Page 2 of 4

Calibration Report

Equipment : Chamber (Incubator)
Date of Calibration : 4 March 2025
Environment : Temperature : 24.5-24.7 °C
Line Voltage : 221.4-224.7 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert 12 resistance thermometer detectors into its chamber , the other one resistance thermometer detector use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2019) and AS2853-1986).

All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

| Instrument | Model | Instrument No. | Certificate No. | Due Date |
|-------------|---------|----------------|-----------------|---------------|
| RTD | 100 ohm | 31-(CH1-10) | T240399 | 16 March 2025 |
| RTD | 100 ohm | 32-(CH1-10) | T240399 | 16 March 2025 |
| DATA LOGGER | 34970A | T193 | T240399 | 16 March 2025 |

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)

4. Condition of calibrated item : good

Equipment Description :

Time Constant 2 Hour 10 Minute At 20 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

(X) without adjustment

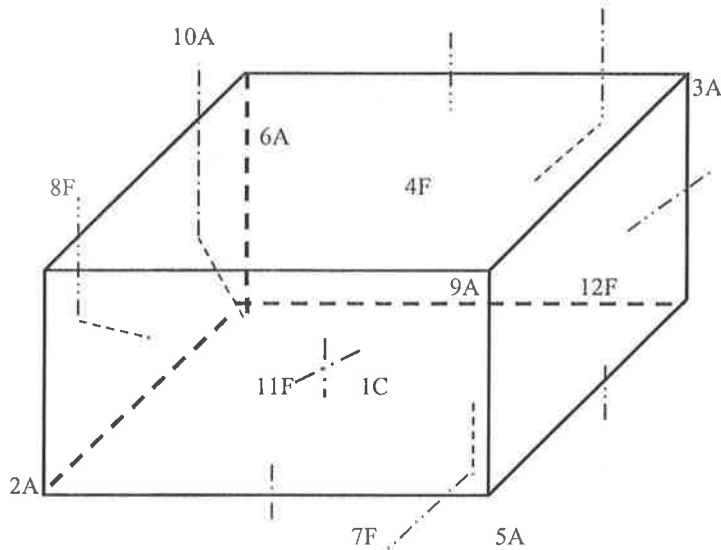
() after adjustment

Approved By. 

Certificate No. T250356

Page 3 of 4

Calibration Report



C = Centre , F = Centre of Face , A = Corner , E = Centre of Edge

| | | |
|-----|---|---------|
| 1C | = | 31-CH1 |
| 2A | = | 31-CH2 |
| 3A | = | 31-CH3 |
| 4F | = | 31-CH4 |
| 5A | = | 31-CH5 |
| 6A | = | 31-CH6 |
| 7F | = | 31-CH7 |
| 8F | = | 31-CH8 |
| 9A | = | 31-CH9 |
| 10A | = | 31-CH10 |
| 11F | = | 32-CH1 |
| 12F | = | 32-CH2 |

Approved By. _____



Certificate No. T250356

Page 4 of 4

Calibration Report

Measurement Results :

| Calibration Point | Average Standard Reading at each position (°C) | | | | | | | | | | | |
|-------------------|--|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|--------|
| | 31-CH1 | 31-CH2 | 31-CH3 | 31-CH4 | 31-CH5 | 31-CH6 | 31-CH7 | 31-CH8 | 31-CH9 | 31-CH10 | 32-CH1 | 32-CH2 |
| 20 | 20.02 | 20.42 | 19.96 | 20.23 | 19.83 | 19.44 | 19.71 | 20.01 | 20.06 | 20.04 | 20.13 | 19.98 |

| Chamber (Incubator) | | | Temperature Distribution | | | | |
|-----------------------|--------------|---------|--------------------------|------------------|-----------------|--------------------|-----------------------------|
| Setting (°C) | Reading (°C) | | Average (°C) | Stability (± °C) | Uniformity (°C) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
| | Min , Max | Average | | | | | |
| 20.0 | - | 20.0 | 19.99 | 0.10 | 0.43 | 0.38 | 2.02 |

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k* which for a t-distribution, providing a level of confidence of approximately 95 % .

End of Certificate

Approved By. 



Certificate of Calibration

Cert.No.: 24CG3401

Page.: 1 of 2

| | |
|-------------------------|--|
| Equipment : | Burette |
| Capacity : | 50 mL |
| Serial No. : | - |
| ID. No. : | BKK_EN0422 |
| Manufacturer : | Witeg |
| Made in : | Germany |
| Submitted by : | ALS Laboratory Group (Thailand) Co.,Ltd. 104 Phatthanakan 40, Phatthanakan Rd. Khwaeng Phatthanakan, Khet Suan Luang Bangkok 10250 Thailand |
| Ambient Temperature : | (20 ± 2.5) °C |
| Relative Humidity : | (50 ± 10) % |
| Barometric Pressure : | 756 mmHg |
| Calibration Procedure : | ASTM E 542 - 01 |
| Calibrated by : | Sa-ngeunkam Wongsai |

REVIEW BY *Linda K.*

APPROVED BY *Siriluk P.*

NEXT CAL DATE..... 03/09/25

Approved by :

Sa-ngeunkam Wongsai
Approved Signatory

(✓) Srisuda Khamtha
() Ponpan Paipim
() Unnophol Harachai

Issue Date :

3 September 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 : Burette
Received Date : 29 August 2024
Condition As-Received : Used Item
Calibration Date : 3 September 2024
Reference : 2408-0944DSC-2

Cert.No.: 24CG3401
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

| <u>Instruments</u> | <u>Model</u> | <u>Serial No.</u> | <u>ID. No.</u> | <u>Certificate No.</u> | <u>Traceability</u> | <u>Due date</u> |
|--------------------|--------------|-------------------|----------------|------------------------|---------------------|-----------------|
| 1) Balance | XP205 | B134206712 | 140RC007 | 24MM316 | TPA | 15 July 2025 |
| 2) Data Logger | HL-20D | 20683159 | 140EC012 | 23H2174 | TPA | 10 Oct 2024 |
| 3) Thermometer | - | 1594592 | 140EC010 | 24I175 | TPA | 22 Feb 2025 |

This certification is traceable to SI Unit

2. The certificate is valid only to the item calibrated on date and place of calibration.
3. True value is converted to true volume at the standard temperature of 20 °C

Calibration result :

| Nominal capacity (mL) | Reading (mL) | Uncertainty (± mL) | k Factor |
|------------------------------------|---------------------------|---------------------------------|---------------------|
| 50 | 49.9951 | 0.010 | 2.00 |

Remark mL = cm³

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 %.

-o0o-



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.: 25CG3385

Page.: 1 of 2

Equipment :

Burette

Capacity :

50 mL

Serial No. :

-

ID. No. :

BKK_EN0422

Manufacturer :

Witeg

Made in :

Germany

Submitted by :

ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Ambient Temperature :

(20 \pm 2.5) °C

Relative Humidity :

(50 \pm 10) %

Barometric Pressure :

753 mmHg

Calibration Procedure :

ASTM E 542 - 01

Calibrated by :

Srisuda Khamtha

Approved by :

Approved Signatory

() Ponpan Paipim

(✓) Chakrit Waewwanjua

Issue Date :

3 September 2025

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 : Burette
Received Date : 1 September 2025
Condition As-Received : Used Item
Calibration Date : 3 September 2025
Reference : 2509-0049DSC-1

Cert.No.: 25CG3385
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

| <u>Instruments</u> | <u>Model</u> | <u>Serial No.</u> | <u>ID. No.</u> | <u>Certificate No.</u> | <u>Traceability</u> | <u>Due date</u> |
|------------------------|--------------|-------------------|----------------|------------------------|---------------------|-----------------|
| 1) Balance | MS204TS | C226356983 | 140RC010 | 24MM603 | TPA | 10 Oct 2025 |
| 2) Data Logger | HL-20D | 20683159 | 140EC012 | 24H2129 | TPA | 15 Oct 2025 |
| 3) Digital Thermometer | HH376 | 230806555 | 140EC013 | 25I1740 | TPA | 17 Jan 2026 |

This measurement result is traceable to SI Unit

2. The certificate is valid only to the item calibrated on date and place of calibration.
3. True value is converted to true volume at the standard temperature of 20 °C

Calibration result :

| Nominal capacity (mL) | Reading (mL) | Uncertainty (± mL) | k Factor |
|------------------------------------|---------------------------|---------------------------------|---------------------|
| 10 | 9.9941 | 0.0082 | 2.00 |
| 25 | 24.9804 | 0.0087 | 2.00 |
| 50 | 49.9819 | 0.010 | 2.00 |

Remark mL = cm³

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 %.

-o0o-

Certificate No. T242116**Page 1 of 4****Certificate of Calibration**

Equipment : Hot Block

Manufacturer : Environmental Express

Model : B3000-240

Serial No. : 2021CODW148

Customer Code : BKK_EN0370


ID No. : T2940A5

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250

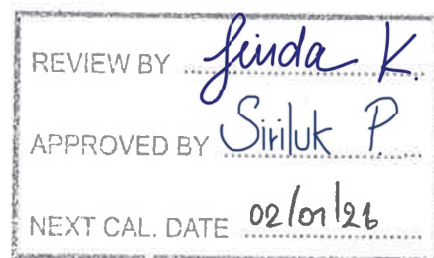
Customer Location : Wet Chemistry Lab 2

Date of Receipt : 25 December 2024

Calibrated By : Atiphong Rongrat (Technician)

Approved By :  / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 27 JAN 2025



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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

Certificate No. T242116

Page 2 of 4

Calibration Report

Equipment : Hot Block
Date of Calibration : 2 January 2025
Environment : Temperature : 20.1-23.4 °C
Line Voltage : 222.1-227.3 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert 29 standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20.

All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

| Instrument | Model | Instrument No. | Certificate No. | Due Date |
|-------------|--------|----------------|-----------------|---------------|
| TC | TYPE T | TN241-TN250 | T240401 | 16 March 2025 |
| TC | TYPE T | TN251-TN260 | T240401 | 16 March 2025 |
| TC | TYPE T | TN221-TN230 | T240712 | 19 April 2025 |
| TC | TYPE T | TN231-TN240 | T240712 | 19 April 2025 |
| DATA LOGGER | 34970A | T193 | T240401 | 16 March 2025 |

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)

4. Condition of calibrated item : good

Equipment Description :

Time Constant 2 Hour 30 Minute At 150 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

() without adjustment

(X) after adjustment

Approved By. _____





Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110

Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

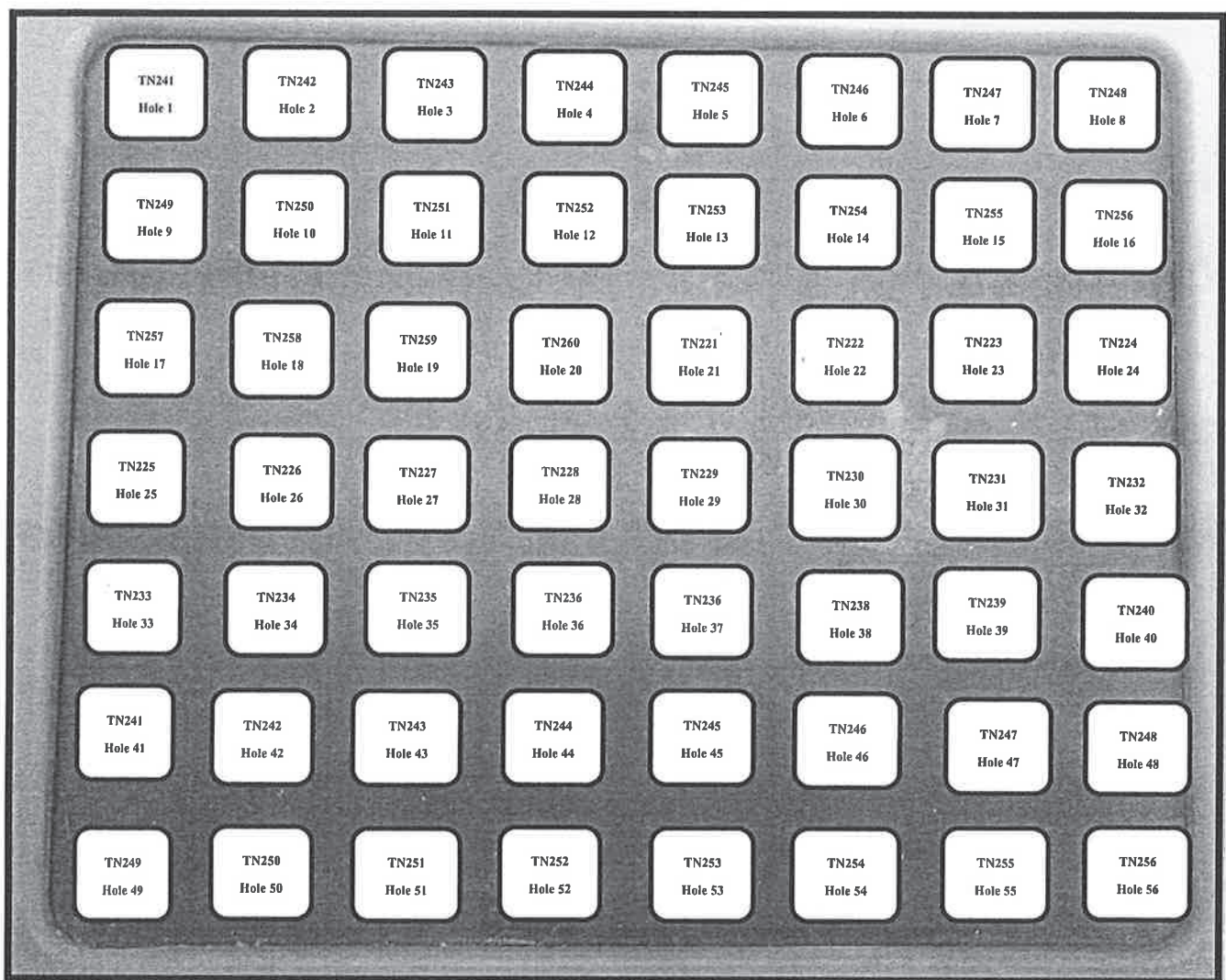
Website : www.scieco.co.th

E-Mail : calibrate@scg.co.th

Certificate No. T242116

Pa 3 of 4

Calibration Report



FRONT CONTROL

Approved By. _____

Certificate No. T242116

Pag 4 of 4

Calibration Report

Measurement Results

| | | Average Standard Reading at each position (°C) | | | | | | | | | |
|-----------|---------|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | | TN241 Hole 1 | TN242 Hole 2 | TN243 Hole 3 | TN244 Hole 4 | TN245 Hole 5 | TN246 Hole 6 | TN247 Hole 7 | TN248 Hole 8 | TN249 Hole 9 | TN250 Hole 10 |
| CAL POINT | Max | 149.78 | 150.72 | 150.64 | 150.94 | 150.79 | 151.11 | 149.77 | 150.20 | 150.18 | 150.28 |
| | Min | 149.57 | 150.52 | 150.47 | 150.79 | 150.65 | 150.99 | 149.59 | 150.06 | 150.03 | 150.15 |
| | Average | 150.15 | 150.71 | 150.71 | 150.58 | 150.40 | 150.52 | 150.76 | 150.57 | 150.49 | 150.21 |
| | | TN251 Hole 11 | TN252 Hole 12 | TN253 Hole 13 | TN254 Hole 14 | TN255 Hole 15 | TN256 Hole 16 | TN257 Hole 17 | TN258 Hole 18 | TN259 Hole 19 | TN260 Hole 20 |
| 150 | Max | 150.32 | 150.22 | 150.60 | 150.51 | 150.87 | 150.45 | 150.37 | 149.49 | 150.18 | 150.33 |
| | Min | 150.19 | 150.04 | 150.46 | 150.40 | 150.74 | 150.30 | 150.26 | 149.33 | 150.03 | 150.18 |
| | Average | 150.25 | 150.13 | 150.53 | 150.46 | 150.80 | 150.37 | 150.31 | 149.41 | 150.11 | 150.26 |
| | | TN221 Hole 21 | TN222 Hole 22 | TN223 Hole 23 | TN224 Hole 24 | TN225 Hole 25 | TN226 Hole 26 | TN227 Hole 27 | TN228 Hole 28 | TN229 Hole 29 | TN230 Hole 30 |
| | Max | 150.49 | 150.86 | 149.10 | 149.64 | 149.11 | 149.69 | 149.75 | 149.82 | 150.16 | 150.34 |
| | Min | 150.24 | 150.63 | 148.90 | 149.43 | 148.94 | 149.54 | 149.61 | 149.69 | 150.07 | 150.24 |
| | Average | 150.36 | 150.74 | 149.00 | 149.53 | 149.03 | 149.62 | 149.68 | 149.76 | 150.11 | 150.29 |
| | | TN231 Hole 31 | TN232 Hole 32 | TN233 Hole 33 | TN234 Hole 34 | TN235 Hole 35 | TN236 Hole 36 | TN236 Hole 37 | TN238 Hole 38 | TN239 Hole 39 | TN240 Hole 40 |
| | Max | 149.03 | 149.54 | 149.50 | 149.49 | 150.85 | 150.73 | 150.02 | 149.84 | 150.12 | 150.09 |
| | Min | 148.93 | 149.43 | 149.36 | 150.72 | 150.72 | 150.62 | 149.94 | 149.78 | 150.01 | 149.98 |
| | Average | 148.98 | 149.49 | 149.43 | 150.10 | 150.78 | 150.67 | 149.98 | 149.81 | 150.06 | 150.03 |
| | | TN241 Hole 41 | TN242 Hole 42 | TN243 Hole 43 | TN244 Hole 44 | TN245 Hole 45 | TN246 Hole 46 | TN247 Hole 47 | TN248 Hole 48 | TN249 Hole 49 | TN250 Hole 50 |
| | Max | 150.86 | 150.14 | 150.35 | 150.97 | 151.03 | 151.09 | 149.81 | 150.16 | 149.49 | 149.51 |
| | Min | 150.80 | 150.00 | 150.19 | 150.81 | 150.85 | 150.96 | 149.69 | 150.02 | 149.35 | 149.35 |
| | Average | 150.83 | 150.07 | 150.27 | 150.89 | 150.94 | 151.02 | 149.75 | 150.09 | 149.42 | 149.43 |
| | | TN251 Hole 51 | TN252 Hole 52 | TN253 Hole 53 | TN254 Hole 54 | TN255 Hole 55 | TN256 Hole 56 | | | | |
| | Max | 149.71 | 150.32 | 150.59 | 149.42 | 149.87 | 149.40 | | | | |
| | Min | 149.56 | 150.17 | 150.49 | 149.31 | 149.74 | 149.29 | | | | |
| | Average | 149.64 | 150.25 | 150.54 | 149.37 | 149.81 | 149.35 | | | | |

| Hot Block | | | Temperature Distribution | |
|--------------|---------------|---------|--------------------------|--------------------|
| Setting (°C) | Reading (°C) | | Stability (± °C) | Uncertainty (± °C) |
| | Min , Max | Average | | |
| 148.0 | 147.9 , 148.1 | 148.0 | 0.13 | 0.84 |

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

 The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 %.

Approved By.



FM-L13 I08/30-05-57



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.: 24CHO568

Page.: 1 of 3

| | |
|-------------------------|--|
| Equipment : | Spectrophotometer |
| Manufacturer : | HACH |
| Model : | DR3900 |
| Serial No. : | 2021559 |
| ID No. : | BKK_EN0356 |
| Condition As-Received: | Used Item |
| Received Date : | 29 October 2024 |
| Calibration Date : | 29 October 2024 |
| Reference : | 2410-07820C-1 |
| Submitted by : | ALS Laboratory Group (Thailand) Co.,Ltd. 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand |
| Calibration Place : | Wet Chemistry Lab 2 |
| Ambient Temperature : | (21.8 to 21.5) °C (On-Site) |
| Relative Humidity : | (58.2 to 59.3) % (On-Site) |
| Calibration Procedure : | In - house method : CP-OCH4 based on ASTM E 275-08 |
| Calibrated by : | Warakorn Lerngagtrakul  |
| Approved by : | Approved Signatory |
| () Unnopphol Harachai | |
| () Ponpan Paipim | |
| (✓) Saithip Meangmai | |
| Issue Date : | 30 October 2024 |

REVIEW BY 

APPROVED BY 

NEXT CAL DATE **29/10/25**

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. : 24CHO568

Page : 2 of 3

Condition of calibration result

1. Reference Standard Material :

| <u>Material</u> | <u>Serial No.</u> | <u>Certificate No.</u> | <u>Due date</u> |
|----------------------------|-------------------|------------------------|-----------------|
| 1. Absorbance Standard set | 44487 | 122584 | 31 May 2026 |
| 2. Wavelength Standard set | 36730 | 118120 | 15 Jan 2026 |
| 3. Wavelength Standard set | 36730 | 118121 | 15 Jan 2026 |

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

3. This certificate is traceable to the International System of Unit maintained through :

- Starna Scientific Ltd.

4. Spectral BandWidth : 5 nm
Scan Speed : - nm/min

Calibration Results : without adjustment

Wavelength Accuracy

| Certified Values of Reference Material (nm) | UUC Reading (nm) | Uncertainty of Measurement (\pm nm) | Coverage Factor <i>k</i> |
|--|-------------------------------|---|---|
| 418.40 | 418 | 0.59 | 2.00 |
| 479.88 | 480 | 0.59 | 2.00 |
| 513.75 | 514 | 0.59 | 2.00 |
| 537.00 | 536 | 0.59 | 2.00 |
| 638.00 | 638 | 0.59 | 2.00 |
| 747.61 | 748 | 0.59 | 2.00 |
| 807.04 | 808 | 0.72 | 2.05 |



Cert. No. : 24CHO568

Page : 3 of 3

Calibration Results : without adjustment

Photometric Accuracy

| Wavelength (nm) | Certified Values of Reference Material (Abs) | UUC Reading (Abs) | Uncertainty of Measurement (\pm Abs) | Coverage Factor <i>k</i> |
|--------------------|--|------------------------|--|--------------------------------|
| 420.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5750 | 0.575 | 0.0028 | 2.00 |
| | 0.7156 | 0.713 | 0.0028 | 2.00 |
| | 1.0176 | 1.015 | 0.0028 | 2.00 |
| 440.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5598 | 0.560 | 0.0028 | 2.00 |
| | 0.7037 | 0.701 | 0.0028 | 2.00 |
| | 1.0013 | 0.998 | 0.0028 | 2.00 |
| 465.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5222 | 0.524 | 0.0028 | 2.00 |
| | 0.6646 | 0.665 | 0.0028 | 2.00 |
| | 0.9444 | 0.945 | 0.0028 | 2.00 |
| 546.1 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5234 | 0.525 | 0.0029 | 2.00 |
| | 0.7007 | 0.701 | 0.0028 | 2.00 |
| | 0.9992 | 1.000 | 0.0028 | 2.00 |
| 590.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5573 | 0.558 | 0.0029 | 2.00 |
| | 0.7760 | 0.774 | 0.0028 | 2.00 |
| | 1.1104 | 1.108 | 0.0028 | 2.00 |
| 635.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5648 | 0.566 | 0.0029 | 2.00 |
| | 0.7654 | 0.765 | 0.0028 | 2.00 |
| | 1.0961 | 1.096 | 0.0028 | 2.00 |

Remark

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer
- * : Not NSC-ONSC Accredited
- 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 %.



Certificate of Calibration

Cert.No.: 25CHO537

Page.: 1 of 3

Equipment : Spectrophotometer
Manufacturer : HACH
Model : DR3900
Serial No. : 2021559
ID No. : BKK_EN0356
Condition As-Received: Used Item
Received Date : 08 October 2025
Calibration Date : 08 October 2025
Reference : 2510-0042OC-11
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand
Calibration Place : Wet Chemistry Lab 2
Ambient Temperature : (21.9 to 21.9) °C (On-Site)
Relative Humidity : (62 to 65) % (On-Site)
Calibration Procedure : In - house method :
CP-OCH4 based on ASTM E 275-08
Calibrated by : Uthen Kankawi
Approved by : 
() Chakrit Waewwanjua
() Ponpan Paipim
(✓) Saithip Meangmai
Issue Date : 9 October 2025

REVIEW BY



APPROVED BY



NEXT CAL DATE.....08/10/26

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. : 25CHO537

Page : 2 of 3

Condition of calibration result

1. Reference Standard Material :

| <u>Material</u> | <u>Serial No.</u> | <u>Certificate No.</u> | <u>Due date</u> |
|----------------------------|-------------------|------------------------|-----------------|
| 1. Absorbance Standard set | 44487 | 122584 | 31 May 2026 |
| 2. Wavelength Standard set | 36730 | 118120 | 15 Jan 2026 |
| 3. Wavelength Standard set | 36730 | 118121 | 15 Jan 2026 |

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

3. This certificate is traceable to the International System of Unit maintained through :

- Starna Scientific Ltd.

4. Spectral BandWidth : 5 nm
Scan Speed : - nm/min

Calibration Results : without adjustment

Wavelength Accuracy

| Certified Values of Reference Material (nm) | UUC Reading (nm) | Uncertainty of Measurement (\pm nm) | Coverage Factor <i>k</i> |
|--|-------------------------------|---|---|
| 418.40 | 418 | 0.59 | 2.00 |
| 479.88 | 480 | 0.59 | 2.00 |
| 513.75 | 513 | 0.59 | 2.00 |
| 537.00 | 536 | 0.59 | 2.00 |
| 638.00 | 638 | 0.59 | 2.00 |
| 747.61 | 748 | 0.59 | 2.00 |
| 807.04 | 807 | 0.59 | 2.00 |



Cert. No. : 25CHO537

Page : 3 of 3

Calibration Results : without adjustment

Photometric Accuracy

| Wavelength (nm) | Certified Values of Reference Material (Abs) | UUC Reading (Abs) | Uncertainty of Measurement (\pm Abs) | Coverage Factor <i>k</i> |
|--------------------|--|------------------------|--|--------------------------------|
| 420.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5750 | 0.573 | 0.0028 | 2.00 |
| | 0.7156 | 0.713 | 0.0028 | 2.00 |
| | 1.0176 | 1.014 | 0.0028 | 2.00 |
| 440.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5598 | 0.557 | 0.0028 | 2.00 |
| | 0.7037 | 0.700 | 0.0028 | 2.00 |
| | 1.0013 | 0.997 | 0.0028 | 2.00 |
| 465.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5222 | 0.522 | 0.0028 | 2.00 |
| | 0.6646 | 0.664 | 0.0028 | 2.00 |
| | 0.9444 | 0.945 | 0.0028 | 2.00 |
| 546.1 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5234 | 0.523 | 0.0028 | 2.00 |
| | 0.7007 | 0.700 | 0.0028 | 2.00 |
| | 0.9992 | 0.999 | 0.0028 | 2.00 |
| 590.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5573 | 0.556 | 0.0028 | 2.00 |
| | 0.7760 | 0.773 | 0.0028 | 2.00 |
| | 1.1104 | 1.108 | 0.0028 | 2.00 |
| 635.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5648 | 0.565 | 0.0028 | 2.00 |
| | 0.7654 | 0.765 | 0.0028 | 2.00 |
| | 1.0961 | 1.096 | 0.0028 | 2.00 |

Remark

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer
- 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 %.



Agilent Technologies

Agilent Technologies (Thailand) Limited
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Bangkok 10500 Thailand

Tel: +662 637 6363
Fax: +662 632 4334
Email: ccc-smt@agilent.com
Website: www.agilent.com/chem

Customer Contact:

ALS Laboratory Group (Thailand) Co
Ltd Head Office

104 Phatthanakan 40 Phatthanakan Rd
Khwaeng Phatthanakan Khet Suan

TAX ID : 0105540004859

chanattagarn.imchom@alsglobal.com
227158760

Invoice To:

ALS Laboratory Group (Thailand) Co
Ltd Head Office

104 Phatthanakan 40 Phatthanakan Rd
Khwaeng Phatthanakan Khet Suan

Delivery Site:

ALS Laboratory Group (Thailand) Co
Ltd Head Office

104 Phatthanakan 40 Phatthanakan Rd
Khwaeng Phatthanakan Khet Suan

Location:

Room
Bldg
Lab
Dept

SERVICE REPORT

| | |
|--|--|
| Customer Purchase Order Number: | Customer Number: 70371013 |
| Service Request: | Service Request Date: |
| Service Order: 6006676060 | Service Confirmation: 6905905441 |

| | |
|----------------|--------------|
| REVIEW BY | Tattaporn C. |
| APPROVED BY | Samtra N. |
| NEXT CAL. DATE | 3/4/2026 |

Direct Inquiries to:

Contact Name: Customer Contact Center
Contact E-mail: ccc-smt@agilent.com
Contact Telephone: +662 637 6363
Contact Fax: +662 632 4334

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Bangkok 10500 Thailand
Tax ID : 0105542068218

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399 Interchange 21 Building, Sukhumvit Road, Klongtoey Nau
Sub-district, Wattana District, Bangkok 10110 Thailand
Acc. No: 012-4452-007 ,
THB:Krung Thai Bank PCL
Siam Square Br.,416/1-2 Rama I Rd.,Pathumwan, BKK 10330
Thailand

ORIGINAL

Service Confirmation Number: 6905905441

Service Confirmation Date: 08.10.2024

Service Instrument:

| Model Number | Model Description | Serial Number | System Handle | Parent Asset |
|--------------|-----------------------------------|---------------|---------------|--------------|
| SYS-IM-7900 | ICPMS 7900 System | | | |
| G8410A | SPS 4 Autosampler | AU15430722 | ICP MS 7900 | SYS-IM-7900 |
| G8411A | ISIS 3 for Agilent 7850/7900/8900 | JP15510227 | ICP MS 7900 | SYS-IM-7900 |
| G3292A | PSC 6106T Chiller | 2U15A1948 | ICP MS 7900 | SYS-IM-7900 |
| G8403A | Agilent 7900 ICP-MS | JP15471169 | ICP MS 7900 | SYS-IM-7900 |

Service Items:



| Item | Service/Part # | Description | Qty | Entitlement | Service Start | Service End |
|------|----------------|--------------------------------------|------|-------------------------------------|---------------|-------------|
| 1000 | EOQ | Enterprise Operational Qualification | 1.00 | Agreement Entitlement 100 % covered | 04.10.2024 | 04.10.2024 |
| 1010 | 5185-5850 | ICP-MS Checkout Solutions | 1.00 | Agreement Entitlement 100 % covered | | |

Additional Information:

Service Confirmation Number: 6905905441

Service Confirmation Date: 08.10.2024

Service Information:

| | | |
|---|--|-----------------------------|
| Problem Description: *WU-EQQ-IM-7900-5001253655 | | |
| Service Provided: Perform OQ Hardware. Test CDS logon, auto sampler, Auto tune, BG and 20 Min stability. I calibrate the instrument No BKK_EL0043 test all pass. | | |
| Service Overview Code: Reason Code: Scheduled Service Diagnosis Code: Scheduled Service Resolution Code: Scheduled Service | | |
| Reported Hours: 7.0 | Travel Hours: 2.0 | |
| Customer Field Service Representative Name: Panthep Kurasathain | Customer Field Service Representative Signature:  | Date: 08 Oct 2024 |
| Customer Name: Supakwan Mak | Customer Signature:  | Date: 08 Oct 2024 |
| Additional Comments: | | |



Metrological Center

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E-Mail : calibrate@scg.co.th

Certificate No. T250355

Page 1 of 6

Certificate of Calibration

Equipment : HEATING BLOCK

Manufacturer : Environmental Express

Model : SC 196

Serial No. : 6974CECW3285

Customer Code : BKK_EL0054

ID No. : T5306A3

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250

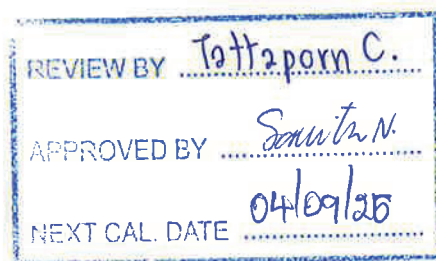
Customer Location : Acid Digestion Lab

Date of Receipt : 26 February 2025

Calibrated By : Atiphong Rongrat (Technician)

Approved By :  / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 17 MAR 2025



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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.



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Certificate No. T250355

Page 2 of 6

Calibration Report

Equipment : HEATING BLOCK
Date of Calibration : 4 March 2025
Environment : Temperature : 24.4-24.9 °C
Line Voltage : 221.6-226.3 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20.

All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

| Instrument | Model | Instrument No. | Certificate No. | Due Date |
|-------------|--------|----------------|-----------------|---------------|
| TC | TYPE T | TN221-TN230 | T240712 | 19 April 2025 |
| TC | TYPE T | TN231-TN240 | T240712 | 19 April 2025 |
| TC | TYPE T | TN241-TN250 | T240401 | 16 March 2025 |
| TC | TYPE T | TN251-TN260 | T240401 | 16 March 2025 |
| DATA LOGGER | 34970A | T193 | T240401 | 16 March 2025 |

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)

4. Condition of calibrated item : good

Equipment Description :

Time Constant 2 Hour 40 Minute At 95 °C

Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max

☐ Close

☒ Not Available

5. Adjustment :

() without adjustment

(X) after adjustment

Approved By.



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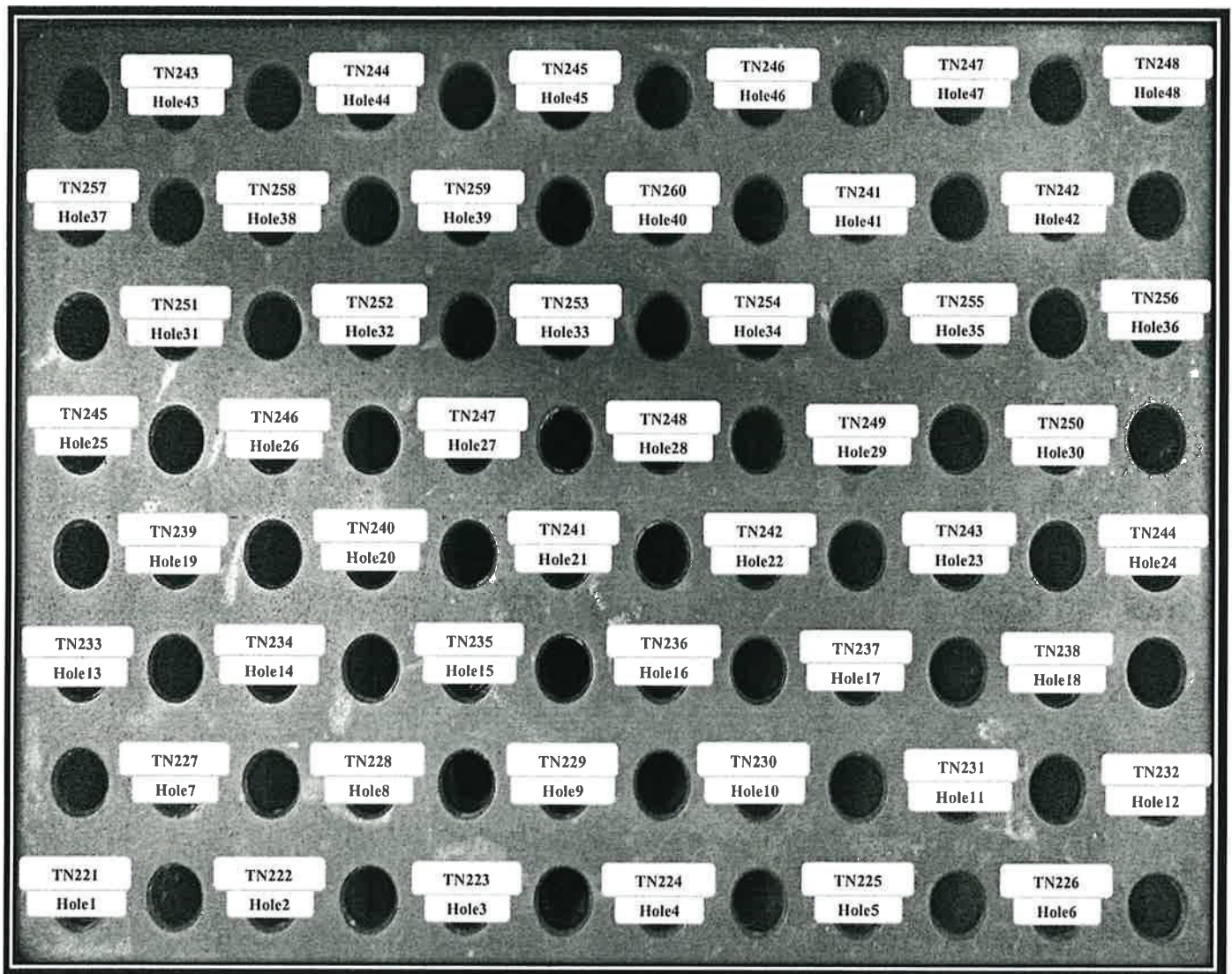
Website : www.scieco.co.th

E-Mail : calibrate@scg.co.th

Certificate No. T250355

Page 3 of 6

Calibration Report



FRONT CONTROL

Approved By. Don Lai

Calibration Report

Measurement Results

| Calibration Point | | Average Standard Reading at each position (°C) | | | | | |
|-------------------------|---------|--|--------------|--------------|--------------|--------------|--------------|
| R1 Hole1-Hole6 | | TN221 | TN222 | TN223 | TN224 | TN225 | TN226 |
| CAL POINT | Max | 94.85 | 95.37 | 95.03 | 95.25 | 95.52 | 94.75 |
| 95 | Min | 94.17 | 94.66 | 94.38 | 94.63 | 94.87 | 94.12 |
| | Average | 94.51 | 95.02 | 94.70 | 94.94 | 95.20 | 94.43 |
| R2 Hole7-Hole12 | | TN227 | TN228 | TN229 | TN230 | TN231 | TN232 |
| | Max | 94.71 | 94.56 | 94.79 | 95.32 | 95.44 | 95.06 |
| | Min | 94.05 | 93.88 | 94.10 | 94.65 | 94.90 | 94.65 |
| | Average | 94.38 | 94.22 | 94.44 | 94.99 | 95.17 | 94.85 |
| R3 Hole13-Hole18 | | TN233 | TN234 | TN235 | TN236 | TN237 | TN238 |
| | Max | 95.26 | 95.43 | 95.40 | 95.71 | 95.41 | 95.06 |
| | Min | 94.54 | 94.64 | 94.71 | 95.10 | 94.86 | 94.42 |
| | Average | 94.90 | 95.03 | 95.06 | 95.41 | 95.13 | 94.74 |
| R4 Hole19-Hole24 | | TN239 | TN240 | TN241 | TN242 | TN243 | TN244 |
| | Max | 95.13 | 95.06 | 95.68 | 96.16 | 95.35 | 95.80 |
| | Min | 94.39 | 94.43 | 94.86 | 95.51 | 94.88 | 95.12 |
| | Average | 94.76 | 94.75 | 95.27 | 95.83 | 95.12 | 95.46 |
| R5 Hole25-Hole30 | | TN245 | TN246 | TN247 | TN248 | TN249 | TN250 |
| | Max | 94.95 | 95.81 | 95.39 | 95.82 | 95.66 | 95.66 |
| | Min | 94.47 | 95.03 | 94.67 | 94.99 | 94.84 | 94.87 |
| | Average | 94.71 | 95.42 | 95.03 | 95.41 | 95.25 | 95.27 |
| R6 Hole31-Hole36 | | TN251 | TN252 | TN253 | TN254 | TN255 | TN256 |
| | Max | 96.07 | 95.34 | 96.28 | 95.39 | 94.95 | 95.12 |
| | Min | 95.28 | 94.55 | 95.51 | 94.62 | 94.13 | 94.35 |
| | Average | 95.67 | 94.95 | 95.90 | 95.00 | 94.54 | 94.73 |
| R7 Hole37-Hole42 | | TN257 | TN258 | TN259 | TN260 | TN241 | TN242 |
| | Max | 95.15 | 95.63 | 96.11 | 95.09 | 95.34 | 95.51 |
| | Min | 94.38 | 94.88 | 95.32 | 94.28 | 94.54 | 94.72 |
| | Average | 94.76 | 95.25 | 95.71 | 94.69 | 94.94 | 95.11 |
| R8 Hole43-Hole48 | | TN243 | TN244 | TN245 | TN246 | TN247 | TN248 |
| | Max | 95.84 | 95.87 | 95.44 | 95.72 | 95.65 | 95.75 |
| | Min | 95.06 | 95.10 | 94.60 | 94.95 | 94.87 | 94.98 |
| | Average | 95.45 | 95.48 | 95.02 | 95.34 | 95.26 | 95.36 |

Approved By.



Calibration Report

Measurement Results

| Calibration Point | | Average Standard Reading at each position (°C) | | | | | |
|-------------------------|---------|--|--------------|--------------|--------------|--------------|--------------|
| R1 Hole1-Hole6 | | TN221 | TN222 | TN223 | TN224 | TN225 | TN226 |
| CAL POINT | Max | 104.48 | 104.40 | 104.60 | 105.27 | 105.24 | 105.19 |
| 105 | Min | 104.15 | 104.02 | 104.25 | 104.94 | 104.91 | 104.93 |
| | Average | 104.32 | 104.21 | 104.42 | 105.10 | 105.08 | 105.06 |
| R2 Hole7-Hole12 | | TN227 | TN228 | TN229 | TN230 | TN231 | TN232 |
| | Max | 105.20 | 105.45 | 105.58 | 105.96 | 105.81 | 106.03 |
| | Min | 104.92 | 105.14 | 105.29 | 105.64 | 105.53 | 105.79 |
| | Average | 105.06 | 105.29 | 105.43 | 105.80 | 105.67 | 105.91 |
| R3 Hole13-Hole18 | | TN233 | TN234 | TN235 | TN236 | TN237 | TN238 |
| | Max | 106.09 | 106.14 | 105.83 | 106.25 | 105.97 | 105.88 |
| | Min | 105.80 | 105.89 | 105.57 | 106.00 | 105.69 | 105.65 |
| | Average | 105.94 | 106.01 | 105.70 | 106.13 | 105.83 | 105.77 |
| R4 Hole19-Hole24 | | TN239 | TN240 | TN241 | TN242 | TN243 | TN244 |
| | Max | 105.87 | 105.75 | 105.30 | 105.07 | 105.22 | 105.66 |
| | Min | 105.62 | 105.52 | 105.13 | 104.90 | 105.05 | 105.49 |
| | Average | 105.74 | 105.63 | 105.21 | 104.98 | 105.14 | 105.57 |
| R5 Hole25-Hole30 | | TN245 | TN246 | TN247 | TN248 | TN249 | TN250 |
| | Max | 105.62 | 105.54 | 105.52 | 105.75 | 105.97 | 105.69 |
| | Min | 105.45 | 105.35 | 105.31 | 105.57 | 105.81 | 105.49 |
| | Average | 105.53 | 105.44 | 105.41 | 105.66 | 105.89 | 105.59 |
| R6 Hole31-Hole36 | | TN251 | TN252 | TN253 | TN254 | TN255 | TN256 |
| | Max | 106.19 | 106.34 | 106.47 | 105.96 | 105.76 | 105.35 |
| | Min | 106.02 | 106.16 | 106.31 | 105.77 | 105.58 | 105.18 |
| | Average | 106.10 | 106.25 | 106.39 | 105.87 | 105.67 | 105.27 |
| R7 Hole37-Hole42 | | TN257 | TN258 | TN259 | TN260 | TN241 | TN242 |
| | Max | 106.21 | 105.59 | 105.45 | 105.36 | 106.08 | 106.09 |
| | Min | 106.04 | 105.42 | 105.28 | 105.20 | 105.90 | 105.92 |
| | Average | 106.12 | 105.51 | 105.37 | 105.28 | 105.99 | 106.00 |
| R8 Hole43-Hole48 | | TN243 | TN244 | TN245 | TN246 | TN247 | TN248 |
| | Max | 106.54 | 106.33 | 105.78 | 105.38 | 105.42 | 105.69 |
| | Min | 106.38 | 106.16 | 105.60 | 105.20 | 105.25 | 105.52 |
| | Average | 106.46 | 106.25 | 105.69 | 105.29 | 105.33 | 105.61 |

Approved By.





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Certificate No. T250355

Page 6 of 6

Calibration Report

Measurement Results:

| HEATING BLOCK | | | Temperature Distribution | |
|---------------|--------------|---------|--------------------------|-------------------------|
| Setting (°C) | Reading (°C) | | Stability (\pm °C) | Uncertainty (\pm °C) |
| | Min , Max | Average | | |
| 102.0 | - | 102.0 | 0.43 | 0.83 |
| 107.0 | - | 107.0 | 0.20 | 0.70 |

* The quoted uncertainty exclude " uniformity "

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By. Jon Zai

Certificate No. T250873

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cooling Room)**Manufacturer** : KOLDTECH**Model** : KM 320**Serial No.** : TBN-1012061/05**Customer Code** : BKK_EN0167**ID No.** : T2463A3**Customer** : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : Laboratory Room**Date of Receipt** : 28 May 2025**Calibrated By** : Atiphong Rongrat (Technician)**Approved By** :  / Boonchai Suriyawong (Site Calibration Manager)**Date of Issue** : 19 JUN 2025REVIEW BY APPROVED BY 

NEXT CAL DATE.....04/12/26

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

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Certificate No. T250873

Page 2 of 4

Calibration Report

Equipment : Chamber (Cooling Room)
Date of Calibration : 4 June 2025
Environment : Temperature : 23.4-24.9 °C
Line Voltage : 221.4-230.2 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert 16 standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986).
All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

| Instrument | Model | Instrument No. | Certificate No. | Due Date |
|-------------|--------|----------------|-----------------|-----------------|
| TC | TYPE T | TN91-TN100 | T242036 | 3 December 2025 |
| TC | TYPE T | TN101-TN110 | T242036 | 3 December 2025 |
| DATA LOGGER | 34970A | T121 | T242036 | 3 December 2025 |

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)

4. Condition of calibrated item : good

Equipment Description :

Time Constant 2 Hour 20 Minute At 3 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

(X) without adjustment

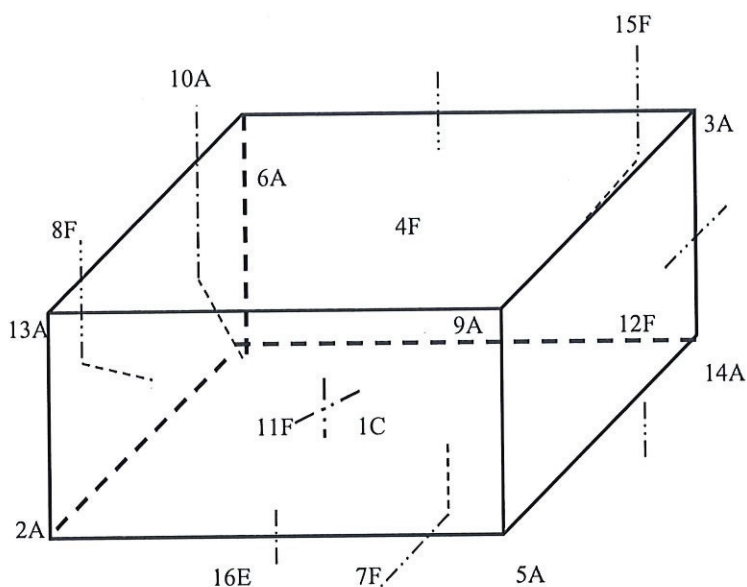
() after adjustment

Approved By. Bum Sri

Certificate No. T250873

Page 3 of 4

Calibration Report



C = Centre , F = Centre of Face , A = Corner , E = Centre of Edge

| | |
|-------------|-------------|
| 1C = TN91 | 12F = TN102 |
| 2A = TN92 | 13A = TN103 |
| 3A = TN93 | 14A = TN104 |
| 4F = TN94 | 15F = TN105 |
| 5A = TN95 | 16E = TN106 |
| 6A = TN96 | |
| 7F = TN97 | |
| 8F = TN98 | |
| 9A = TN99 | |
| 10A = TN100 | |
| 11F = TN101 | |

Approved By. _____



Certificate No. T250873

Page 4 of 4

Calibration Report

Measurement Results

| Calibration Point | Average Standard Reading at each position (°C) | | | | | | | | | | | |
|-------------------|--|-------|-------|-------|------|------|------|------|------|-------|-------|-------|
| | TN91 | TN92 | TN93 | TN94 | TN95 | TN96 | TN97 | TN98 | TN99 | TN100 | TN101 | TN102 |
| 3.0 | 2.95 | 2.92 | 3.09 | 2.92 | 3.16 | 3.50 | 3.40 | 3.03 | 3.14 | 2.98 | 3.44 | 3.13 |
| | TN103 | TN104 | TN105 | TN106 | | | | | | | | |
| | 3.19 | 3.06 | 3.46 | 2.92 | | | | | | | | |

| Chamber (Cooling Room) | | | Temperature Distribution | | | | |
|--------------------------|--------------|---------|--------------------------|------------------|-----------------|--------------------|--------------------------|
| Setting (°C) | Reading (°C) | | Average (°C) | Stability (± °C) | Uniformity (°C) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
| | Min , Max | Average | | | | | |
| 3.0 | 2.8 , 3.9 | 3.4 | 3.14 | 1.20 | 1.30 | 1.90 | 2.04 |

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k* which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By. 