# ภาคผนวกที่ 4

## สรุปเอกสารสอบเทียบอุปกรณ์เครื่องมือ

# เอกสารการสอบเทียบเครื่องมือตรวจวัดคุณภาพน้ำ

DKSH

NSC-TISI-TIS 17025
Calibration 0087

# Certificate of Calibration

| | | | |
|---|---|---|---|
| **Equipment:** | Electronic Balance | Certificate No.: | C01261658 |
| Manufacturer: | Sartorius | Job No.: | WO-00124610 |
| Model: | QUINTIX 224-1S | Issued Date: | 12 June 2026 |
| Serial No.: | 0035009070 | Page: | 1 of 2 |
| ID No.: | CI-01-002 | | |
| Condition of the item: | Normal | | |

**Customer:** C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road, Omnoi,
Krathum Baen, Samut Sakhon 74130 Thailand

**Environment Condition:** Temperature 21 °C ± 0.5 °C
Relative Humidity 44 % ± 1.7 %

**Calibration Place:** C.E.M Technology (Thailand) Co., Ltd. ( ห้องเครื่องชั่ง )
219/43 Moo 12 Petchkasem Road, Omnoi,
Krathum Baen, Samut Sakhon 74130 Thailand

**Calibration By:** Mr. Wasan Nuchnabee

**Calibration Date:** 11 June 2026

**The Method Used:** In-house method, CAL-WI-47, based on UKAS Lab 14

**Traceability:** This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Co., Ltd. Certificate No. C02260345

(Mr. Wasan Nuchnabee)
Person in charge

(Mr. Adisai Maknoi)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with Evaluation of measurement data - Guide to the expression of uncertainty in measurement (JCGM 100).

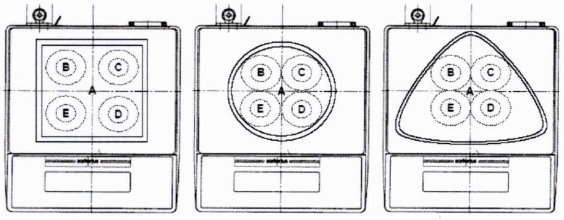
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

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2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

## Calibration Results:

### Without Adjustment

**Eccentric Error:** Weight to be 1/3 or 1/2 of Maximum capacity, taken from the center of the pan as a zero reference.




**Nominal Test Value** 100000 (mg)

| Reference Points (mg) | | | | |
|---|---|---|---|---|
| A | B | C | D | E |
| - | 0.0 | 0.0 | -0.1 | -0.1 |

**Repeatability:** Determination of the standard deviation of weighing balance., Readability 0.1 (mg)

| Nominal test value (mg) | Standard Deviation |
|---|---|
| 20000 | 0.04 |
| 200000 | 0.04 |

**Error of indication from nominal or conventional mass value.,** Readability 0.1 (mg)

| Nominal Value (mg) | Conventional Mass (mg) | Displayed Value (mg) | Error of indication (mg) | Uncertainty (± mg) | k |
|---|---|---|---|---|---|
| Unload | 0.00 | 0.0 | 0.0 | 0.096 | 2.02 |
| 100 | 100.00 | 100.0 | 0.0 | 0.096 | 2.02 |
| 200 | 200.00 | 200.0 | 0.0 | 0.096 | 2.02 |
| 500 | 500.00 | 500.0 | 0.0 | 0.097 | 2.02 |
| 1000 | 1000.01 | 1000.0 | 0.0 | 0.097 | 2.02 |
| 2000 | 2000.02 | 2000.0 | 0.0 | 0.098 | 2.02 |
| 5000 | 5000.01 | 5000.0 | 0.0 | 0.099 | 2.02 |
| 10000 | 10000.01 | 10000.0 | 0.0 | 0.10 | 2.02 |
| 20000 | 20000.00 | 20000.0 | 0.0 | 0.11 | 2.01 |
| 50000 | 50000.00 | 50000.0 | 0.0 | 0.12 | 2.01 |
| 100000 | 99999.91 | 100000.0 | 0.1 | 0.17 | 2.00 |
| 200000 | 199999.87 | 200000.0 | 0.1 | 0.29 | 2.00 |

**The End of Certificate**

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# ใบตรวจสอบสภาพเครื่องชั่ง

## Electronic Balance Checklist

Equipment: Electronic Balance

Model: QUINTIX 224-1S

Serial No.: 0035009070

Certificate No.: C01261658

Job No.: WO-00124610

| Check date | | รายการตรวจเช็ค (Description) | Check before delivery | | หมายเหตุ (Remark) |
|---|---|---|---|---|---|
| 11 Jun 2026 | | | 11 Jun 2026 | | |
| (Normal) | (Defective) | | (Normal) | (Defective) | |
| | | ***General*** | | | |
| ☑ | ☐ | 1. สายไฟ/ อะแดปเตอร์ (Electrical wire/ Adaptor) | ☑ | ☐ | |
| ☑ | ☐ | 2. ความสมบูรณ์ชุดกระจกกันลม (Cover) | ☑ | ☐ | |
| ☑ | ☐ | 3. ความสมบูรณ์ของระดับน้ำ (Bubble spirit level) | ☑ | ☐ | |
| ☑ | ☐ | 4. ความสมบูรณ์ของชุดขาตั้งเครื่อง (Leveling foot) | ☑ | ☐ | |
| ☑ | ☐ | 5. การตอบสนองของปุ่มกด (Keys) | ☑ | ☐ | |
| ☑ | ☐ | 6. ความสมบูรณ์ของหน้าจอ (Display) | ☑ | ☐ | |
| ☑ | ☐ | 7. การแสดงผลของหน้าจอ (Screen display) | ☑ | ☐ | |
| ☑ | ☐ | 8. ชุดรองจานชั่ง (Stopper/ Pan support) | ☑ | ☐ | |
| ☑ | ☐ | 9. การทำงานของฟังค์ชั่น (Internal/ External Function) | ☑ | ☐ | |
| ☑ | ☐ | 10. ความสะอาดของตัวเครื่องภายนอก (External cleanliness of the balance) | ☑ | ☐ | |
| ☑ | ☐ | 11. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่องชั่ง (Environment at the location of the balance) | ☑ | ☐ | |

ข้อแนะนำ/ Note : _____

_____

_____

Mr. Wasan Nuchnabee

Service Engineer

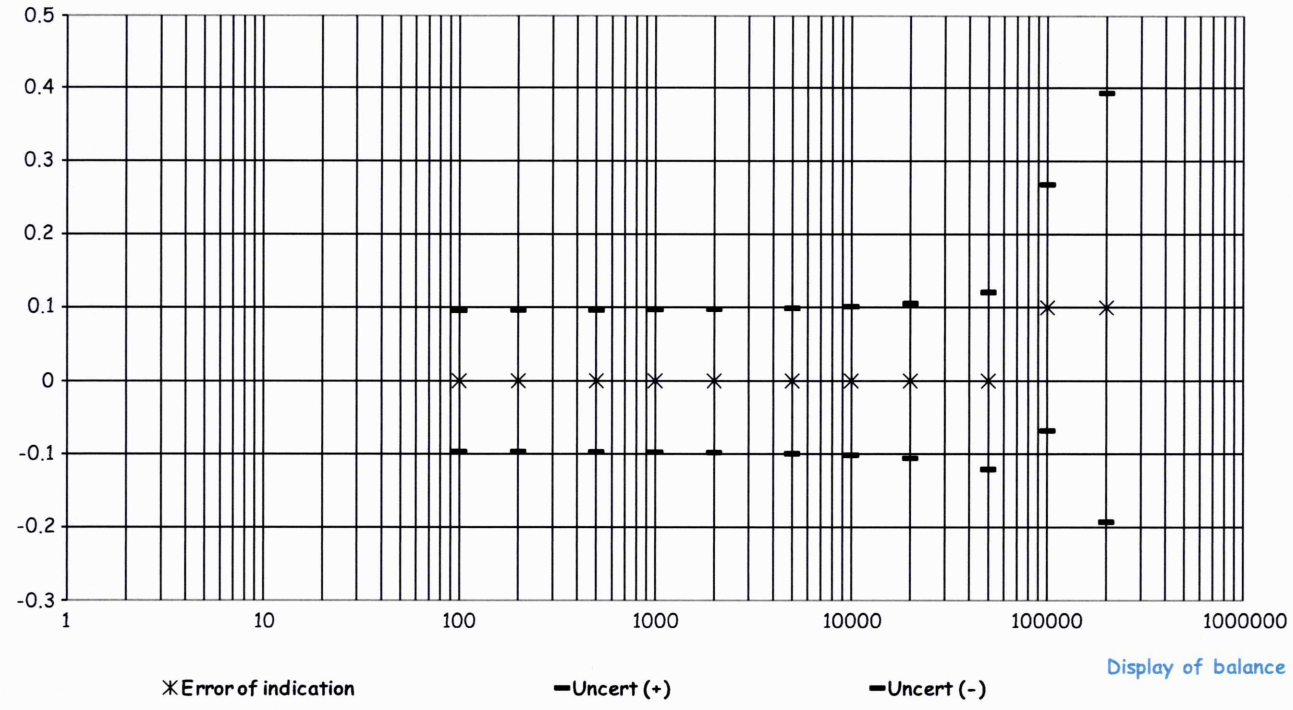
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DKSH Technology Limited
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**Without Adjustment**

**Job No.WO-00124610**

**Readability:0.1mg**




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19/8 Moo 9 Soi Raikhing 30, Phutthamonthon 5 Rd., Raikhing,
Samphran, Nakhonpathom 73210 Tel. 0-3439-7682-5, 08-6341-8613
www.thaical.com E-mail : sales@thaicalibration.com, lab@thaicalibration.com

NSC-TISI-TIS 17025
CALIBRATION 0189

# CALIBRATION CERTIFICATE

Certificate No.S2602960S



**Customer :** C.E.M TECHNOLOGY (THAILAND) CO., LTD.
219/43 Moo 12 Petchkasem Road, Omnoi,
Krathumban, Samutsakorn 74130

**Equipment :** Non-automatic weighing instrument (Electronic instrument)

| | | | |
|---|---|---|---|
| **Manufacturer :** | Sartorius | **Order No. :** | 69S0915-1 |
| **Model :** | BSA224S-CW | **Ambient temperature :** | (25.1 ± 5.0) °C |
| **Accuracy class :** | - | **Relative humidity :** | (52.5 ± 10.0) % |
| **Capacity :** | 220 g | **Received date :** | 27-Feb-2026 |
| **Resolution :** | 0.0001 g | **Date of calibration :** | 27-Feb-2026 |
| **Serial No. :** | 3139614148 | **Date of issue :** | 02-Mar-2026 |
| **ID No. :** | CI-01-003 | **Condition of the balance :** | Good working conditions |
| **Place of calibration :** | ห้องเครื่องชั่ง | | |

## Calibration method

This instrument was calibrated according to the EURAMET Calibration Guide No. 18.

## Condition of reference standard weight

| Instrument | Nominal value | Serial No. | Certificate No. | Due-date | Density (kg/m$^3$) |
|---|---|---|---|---|---|
| 1 Standard weight set | 1 mg to 2 kg | 10003101+0694 | M2512001S | 10-Dec-2026 | 7950 |

## Traceability of the reference standard weight

The measurement results are traceable to the International System of Units (SI) through Mass Calibration Laboratory Thai Calibration Services Co., Ltd., NSC-ONSC accredited no. Calibration 0189.

Calibrated By : Sathaporn Rueangpluppla
Technician

Approved Signatory : Somwang Wongduang

**This calibration certificate may not be reproduced other than in full,
except with the prior written approval of the head of TCS calibration laboratory.**

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Samphran, Nakhonpathom 73210 Tel. 0-3439-7682-5, 08-6341-8613
www.thaical.com E-mail : sales@thaicalibration.com, lab@thaicalibration.com

NSC-TISI-TIS 17025
CALIBRATION 0189

# CALIBRATION CERTIFICATE

Certificate No.S2602960S

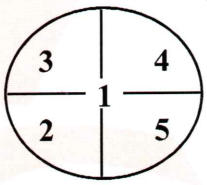


## The repeatability of indication

| Nominal Value ( g ) | Standard Deviation of reading ( g ) | Maximum difference between suscessive reading ( g ) | n |
|---|---|---|---|
| 200 | 0.00004 | 0.0001 | 5 |

## The effect of eccentric application of a load on the indication (test load : 100 g)

| Position | Balance Reading ( g ) |
|---|---|
| Point 1 | 100.0000 |
| Point 2 | 100.0001 |
| Point 3 | 100.0001 |
| Point 4 | 99.9999 |
| Point 5 | 100.0000 |
| Eccentric Value | 0.0001 |




## The error of indication

| Nominal Value ( g ) | Value of Reference Standard Weight ( g ) | Balance Reading ( g ) | Correction ( g ) | Uncertainty (±) ( g ) | *k* |
|---|---|---|---|---|---|
| Unload | 0.0000 | 0.0000 | 0.0000 | 0.00013 | 2.37 |
| 1 | 1.0000 | 1.0000 | 0.0000 | 0.00014 | 2.20 |
| 2 | 2.0000 | 2.0000 | 0.0000 | 0.00014 | 2.20 |
| 5 | 5.0000 | 4.9999 | +0.0001 | 0.00014 | 2.18 |
| 10 | 10.0000 | 9.9999 | +0.0001 | 0.00014 | 2.17 |
| 20 | 20.0000 | 20.0000 | 0.0000 | 0.00015 | 2.14 |
| 50 | 50.0000 | 50.0001 | -0.0001 | 0.00015 | 2.11 |
| 100 | 100.0000 | 100.0000 | 0.0000 | 0.00018 | 2.04 |
| 120 | 120.0000 | 120.0001 | -0.0001 | 0.00022 | 2.00 |
| 150 | 150.0001 | 150.0003 | -0.0002 | 0.00024 | 2.00 |
| 200 | 200.0001 | 200.0003 | -0.0002 | 0.00027 | 2.00 |

Remark : Adjustment, Internal weight

## Uncertainty of measurement

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor (*k*), which for a normal distribution corresponds to a coverage probability of approximately 95% (confidence level).

**This report will certify of the calibrated equipment only.**

--End--

# Certificate of Calibration

| | | | |
|---|---|---|---|
| **Equipment:** | Electronic Thermo-Hygrometer | Certificate No. : | C19262637 |
| Manufacturer: | testo | Job No.: | WO-00122789 |
| Model: | testo 608-H1 | Issued Date: | 28 May 2026 |
| Serial No.: | 45186322 | Page: | 1 of 2 |
| ID No.: | CI-02-003 | | |
| Condition of the item: | Normal | | |

**Customer:** C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

| | | | | |
|---|---|---|---|---|
| **Environment Condition:** | Temperature: | 22 °C | ± | 3 °C |
| | Relative Humidity: | 50 % | ± | 20 % |
| | Voltage: | 220 VAC | ± | 10 % |

**Calibration Place:** Thermo-Hygro Laboratory, DKSH Technology Limited.
2533 Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260 Thailand

**Calibration By:** Mr. Tweewong Thaithiang

**Calibration Date:** 26 May 2026

**The Method Used:** In house method, CAL-WI-42, by comparison with standard thermometer and standard hygrometer

**Traceability:** This certificate is traceable to the International System of Unit maintained by:
DKSH Technology Limited and Quality Reborn Co., LTD.

(Mr. Tweewong Thaithiang)
Person in charge

(Mr. Pramote Ramrong)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with Evaluation of measurement data - Guide to the expression of uncertainty in measurement (JCGM 100).

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2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

**Reference Standard Equipment:**

| Equipment Name | Certificate No. | Cal. Date | Next Cal. Date |
|---|---|---|---|
| Digital Thermometer With Probe | C15251384 | 24 December 2025 | 24 December 2026 |
| Digital Thermo Hygrometer With Probe | QR26-0370 | 21 January 2026 | 21 January 2027 |

**Calibration Results:**

**Function Temperature:** Without adjustment

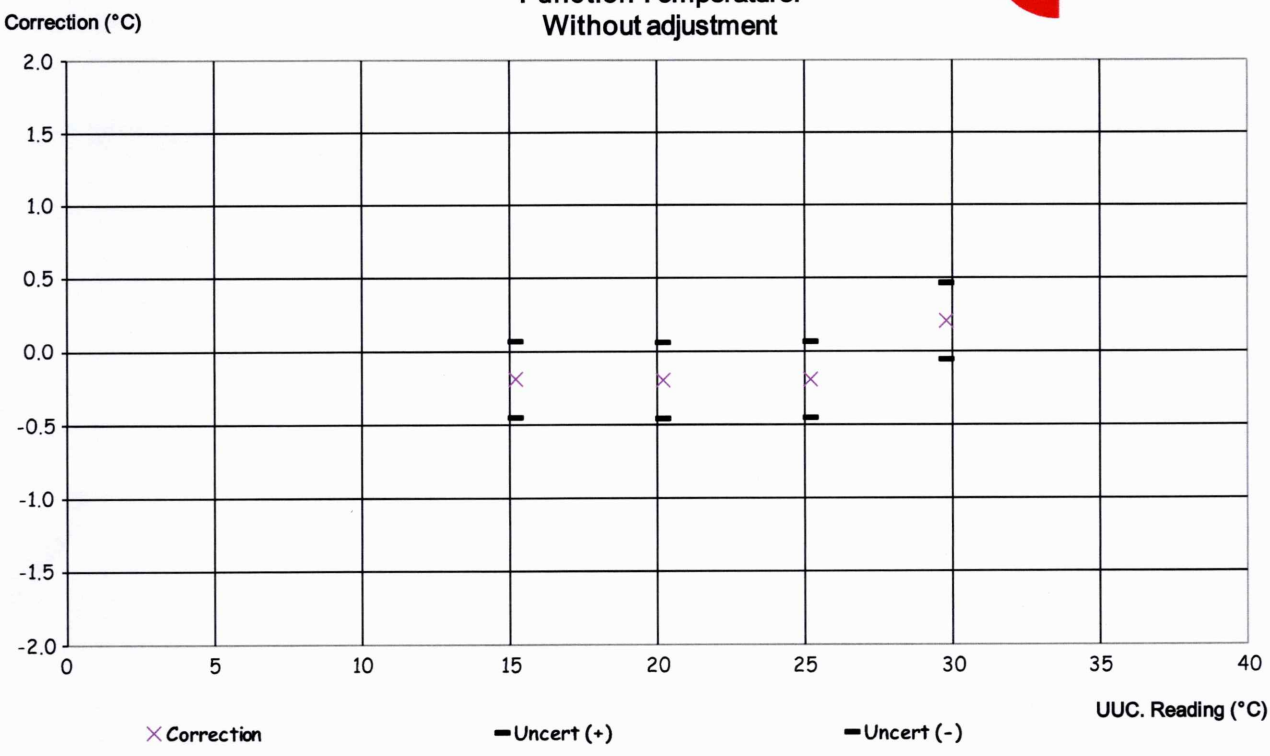
| Calibrate Point. (°C) | STD. Reading (°C) | UUC. Reading (°C) | Correction (°C) | Uncertainty (± °C) |
|---|---|---|---|---|
| 15.0 | 15.011 | 15.2 | -0.189 | 0.26 |
| 20.0 | 20.003 | 20.2 | -0.197 | 0.26 |
| 25.0 | 25.008 | 25.2 | -0.192 | 0.26 |
| 30.0 | 30.006 | 29.8 | 0.206 | 0.26 |

**Function Relative Humidity:** Without adjustment

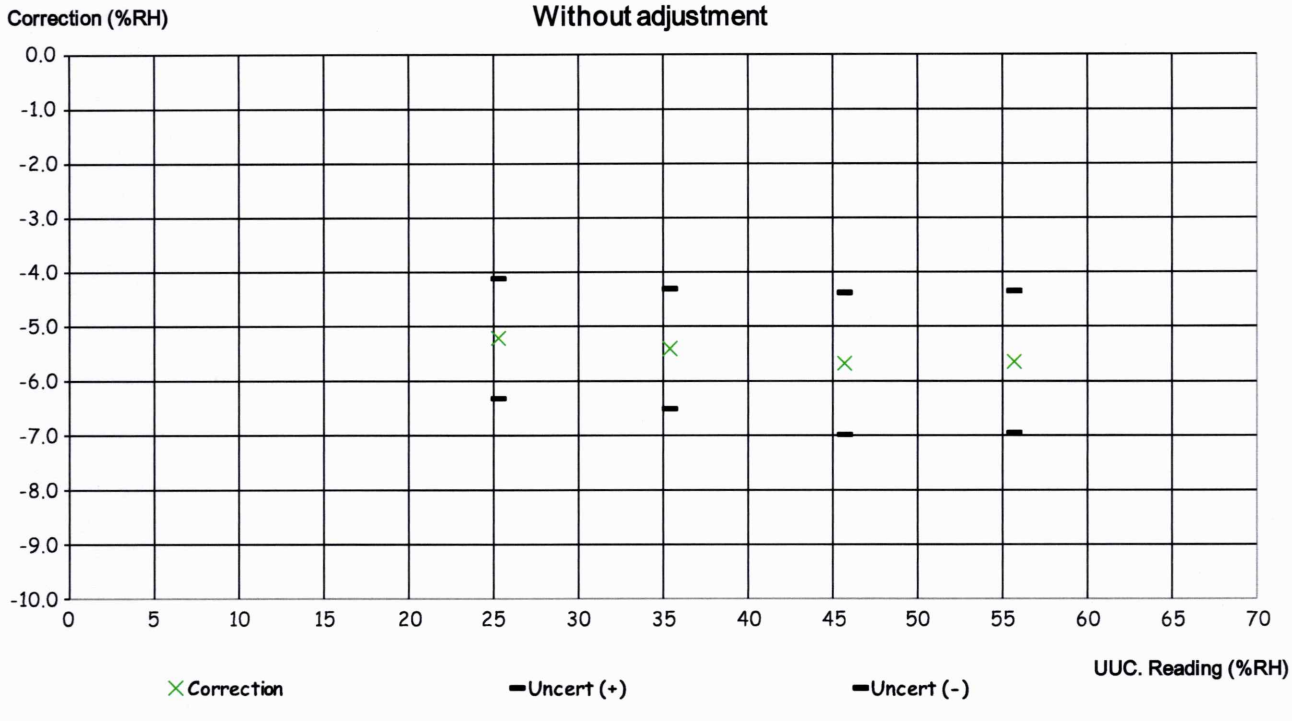
| Reference Temp. (°C) | Calibrate Point. (%RH) | STD. Reading (%RH) | UUC. Reading (%RH) | Correction (%RH) | Uncertainty (± %RH) |
|---|---|---|---|---|---|
| 25.00 | 20.0 | 20.08 | 25.3 | -5.22 | 1.1 |
| 25.00 | 30.0 | 29.99 | 35.4 | -5.41 | 1.1 |
| 25.00 | 40.0 | 40.02 | 45.7 | -5.68 | 1.3 |
| 25.00 | 50.0 | 50.05 | 55.7 | -5.65 | 1.3 |

**The End of Certificate**

C19262637
Function Temperature:
Without adjustment




C19262637
Function Relative Humidity:
Without adjustment



# ใบตรวจสอบสภาพเครื่องมือวัดอุณหภูมิ
## (Thermo-Hygrometer Checklist)

Equipment : Electronic Thermo-Hygrometer

Certificate No. : C19262637

Serial No. : 45186322

Model : testo 608-H1

| Check Date | | รายการตรวจเช็ค | Check before delivery | | หมายเหตุ (Remark) |
|---|---|---|---|---|---|
| 26 May 2026 | | | 26 May 2026 | | |
| Normal | Defective | | Normal | Defective | |
| | | **General** | | | |
| ☐ | ☐ | 1. สายไฟ (Electric wire) | ☐ | ☐ | ไม่มี |
| ☐ | ☐ | 2. การทำงาน (On/Off Switch) | ☐ | ☐ | ไม่มี |
| ☑ | ☐ | 3. การทำงานปุ่มกดต่างๆ (Selector Key) | ☑ | ☐ | |
| ☑ | ☐ | 4. การแสดงผลหน้าจอ (Display) | ☑ | ☐ | |
| ☑ | ☐ | 5. แบตเตอรี่ (Battery) | ☑ | ☐ | |
| ☑ | ☐ | 6. สภาพตัวเครื่อง (Equipment Body) | ☑ | ☐ | |
| ☐ | ☐ | 7. หัววัดเซ็นเซอร์ (Sensor External ) | ☐ | ☐ | ไม่มี |
| ☑ | ☐ | 8. ฝาปิดแบตเตอรี่ (Battery cover) | ☑ | ☐ | |

Note : _____

_____

_____

Mr. Tweewong Thaithiang

Service Engineer

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Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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# Certificate of Calibration

NSC-TISI-TIS 17025
Calibration 0087

| | | | |
|---|---|---|---|
| **Equipment:** | Electronic Thermo-Hygrometer | Certificate No. : | C19262638 |
| Manufacturer: | testo | Job No.: | WO-00122789 |
| Model: | testo 608-H1 | Issued Date: | 28 May 2026 |
| Serial No.: | 45186324 | Page: | 1 of 2 |
| ID No.: | CI-02-004 | | |
| Condition of the item: | Normal | | |

**Customer:** C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

| | | | | |
|---|---|---|---|---|
| **Environment Condition:** | Temperature: | 22 °C | ± | 3 °C |
| | Relative Humidity: | 50 % | ± | 20 % |
| | Voltage: | 220 VAC | ± | 10 % |

**Calibration Place:** Thermo-Hygro Laboratory, DKSH Technology Limited.
2533 Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260 Thailand

**Calibration By:** Mr. Tweewong Thaithiang

**Calibration Date:** 26 May 2026

**The Method Used:** In house method, CAL-WI-42, by comparison with standard thermometer and standard hygrometer

**Traceability:** This certificate is traceable to the International System of Unit maintained by:
DKSH Technology Limited and Quality Reborn Co., LTD.

(Mr. Tweewong Thaithiang)
Person in charge

(Mr. Pramote Ramrong)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with Evaluation of measurement data - Guide to the expression of uncertainty in measurement (JCGM 100).

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Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

**Reference Standard Equipment:**

| Equipment Name | Certificate No. | Cal. Date | Next Cal. Date |
|---|---|---|---|
| Digital Thermometer With Probe | C15251384 | 24 December 2025 | 24 December 2026 |
| Digital Thermo Hygrometer With Probe | QR26-0370 | 21 January 2026 | 21 January 2027 |

**Calibration Results:**

**Function Temperature:** Without adjustment

| Calibrate Point. (°C) | STD. Reading (°C) | UUC. Reading (°C) | Correction (°C) | Uncertainty (± °C) |
|---|---|---|---|---|
| 15.0 | 15.011 | 15.1 | -0.089 | 0.26 |
| 20.0 | 20.003 | 20.2 | -0.197 | 0.26 |
| 25.0 | 25.008 | 25.2 | -0.192 | 0.26 |
| 30.0 | 30.006 | 29.9 | 0.106 | 0.26 |

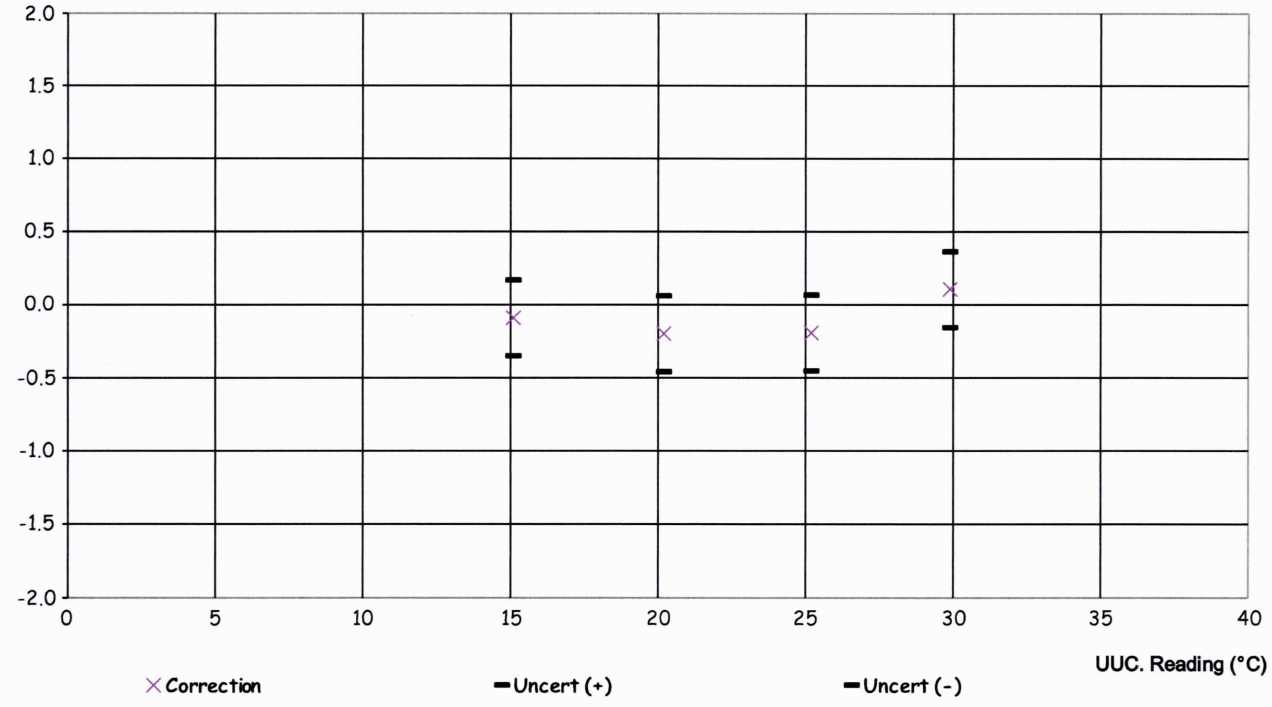
**Function Relative Humidity:** Without adjustment

| Reference Temp. (°C) | Calibrate Point. (%RH) | STD. Reading (%RH) | UUC. Reading (%RH) | Correction (%RH) | Uncertainty (± %RH) |
|---|---|---|---|---|---|
| 25.00 | 20.0 | 20.08 | 25.7 | -5.62 | 1.1 |
| 25.00 | 30.0 | 29.99 | 35.7 | -5.71 | 1.1 |
| 25.00 | 40.0 | 40.02 | 45.7 | -5.68 | 1.3 |
| 25.00 | 50.0 | 50.05 | 55.6 | -5.55 | 1.3 |

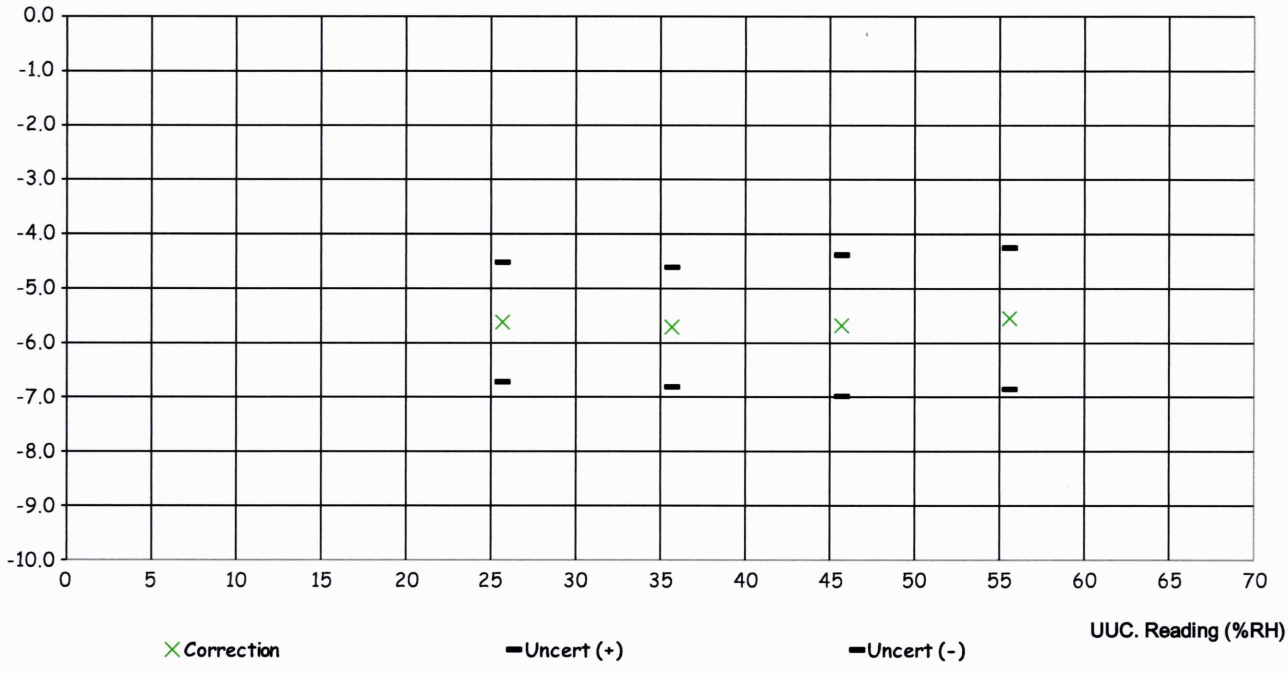
**The End of Certificate**

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Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

C19262638
Function Temperature:
Without adjustment




C19262638
Function Relative Humidity:
Without adjustment



# ใบตรวจสอบสภาพเครื่องมือวัดอุณหภูมิ
## (Thermo-Hygrometer Checklist)

Equipment : Electronic Thermo-Hygrometer

Certificate No. : C19262638

Serial No. : 45186324

Model : testo 608-H1

| Check Date | | รายการตรวจเช็ค | Check before delivery | | หมายเหตุ (Remark) |
|---|---|---|---|---|---|
| 26 May 2026 | | | 26 May 2026 | | |
| Normal | Defective | | Normal | Defective | |
| | | **General** | | | |
| ☐ | ☐ | 1. สายไฟ (Electric wire) | ☐ | ☐ | ไม่มี |
| ☐ | ☐ | 2. การทำงาน (On/Off Switch) | ☐ | ☐ | ไม่มี |
| ☑ | ☐ | 3. การทำงานปุ่มกดต่างๆ (Selector Key) | ☑ | ☐ | |
| ☑ | ☐ | 4. การแสดงผลหน้าจอ (Display) | ☑ | ☐ | |
| ☑ | ☐ | 5. แบตเตอรี่ (Battery) | ☑ | ☐ | |
| ☑ | ☐ | 6. สภาพตัวเครื่อง (Equipment Body) | ☑ | ☐ | |
| ☐ | ☐ | 7. หัววัดเซ็นเซอร์ (Sensor External ) | ☐ | ☐ | ไม่มี |
| ☑ | ☐ | 8. ฝาปิดแบตเตอรี่ (Battery cover) | ☑ | ☐ | |

Note : _____

_____

_____

Mr. Tweewong Thaithiang

Service Engineer

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NSC-TISI-TIS17025
CALIBRATION 0030

# Certificate of Calibration

**Certificate No. :** **69-430003-1** 

**Submitted by :** C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo.12 Petchkasem Rd, Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

**Equipment :** Digital Conductivity meter with probe
Manufacturer : Apera Model : PC 910
Serial No. : PC910X1220811001 ID No. : WW-03-002
Electrode
Model : N/A Serial No. : N/A
ID No. : WW-03-002

**Environment :** On site calibration was carried out at the Laboratory,
C.E.M Technology (Thailand) Co., Ltd.
Ambient Temperature (26.0 to 27.0) °C
Relative Humidity (55 to 60) %

**Date of Received :** 17 February 2026

**Date of Calibration :** 17 February 2026

**Date of Issue :** 24 February 2026

**Calibrated by :** Permpon Chanpu

**Calibration Method :** In-house method CAL-M4301 direct measurement by conductivity buffer solution

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

Standard Buffer Solution

| Material | Lot No. | Exp. Date | Traceability |
|---|---|---|---|
| 84 µS/cm | 0300 | 01 June 2027 | National Institute of Standards and Technology (NIST), U.S.A., S.R.M |
| 1413.1 µS/cm | 1081106 | 28 February 2026 | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |
| 12.881 mS/cm | 1081107 | 11 March 2026 | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |

Approved by :
( Permpon Chanpu )
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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# Certificate of Calibration

**Certificate No. : 69-430003-1**



**Result of Calibration :**

**UUC Condition As-Received :** Good

**Function :** Conductivity measurement

Before Adjustment

| Standard Conductivity Solution | UUC Reading | Correction | Uncertainty ( ± ) | Unit |
|---|---|---|---|---|
| 84* | 84.2 | -0.2 | 1.1 | µS/cm |
| 1413 | 1416 | -3 | 9.0 | µS/cm |
| 12.88 | 13.02 | -0.14 | 0.082 | mS/cm |

After Adjustment : at 84, 1413 µS/cm 12.880 mS/cm

| Standard Conductivity Solution | UUC Reading | Correction | Uncertainty ( ± ) | Unit |
|---|---|---|---|---|
| 84* | 84.0 | 0.0 | 1.1 | µS/cm |
| 1413 | 1413 | 0 | 9.0 | µS/cm |
| 12.88 | 12.88 | 0.00 | 0.082 | mS/cm |

Remark

UUC : Unit Under Calibration

* This parameter are out of accreditation's scope.

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

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

- o0o -

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NSC-TISI-TIS17025
CALIBRATION 0030

# Certificate of Calibration

**Certificate No. :** **69-420017-1** **Page : 1 of 2**

**Submitted by :** C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo.12 Petchkasem Rd, Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

**Equipment :** pH Meter with electrode
pH meter
Manufacturer : Apera Model : PC 910
Range : N/A pH Resolution : 0.01 pH
Serial No. : PC910X1220811001 ID No. : WW-03-002
Electrode
Model : N/A Serial No. : VV1-15843
ID No. : WW-03-002

**Environment :** On site calibration was carried out at the Laboratory,
C.E.M Technology (Thailand) Co., Ltd.
Ambient Temperature : (26.0 to 27.0)° C
Relative Humidity : (50 to 55) %

**Date of Received :** 17 February 2026

**Date of Calibration :** 17 February 2026

**Date of Issue :** 24 February 2026

**Calibrated by :** Permpon Chanpu

**Calibration Method :** In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)

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

1. Multiproduct Calibrator

| ID No. | Cert. No. | Due Date | Traceability |
|---|---|---|---|
| 400005 | SG-E-00231/68 | 20 Aug 2027 | National Institute of Metrology Thailand (NIMT) |

2. Standard Buffer Solution

| pH | Cert. No. | Lot No. | Exp. Date | Traceability |
|---|---|---|---|---|
| 4.008 | 61340084 | 1146794 | 30 Oct 2027 | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |
| 6.988 | 61328150 | 1146796 | 25 Oct 2026 | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |
| 10.010 | 61323674 | 1146795 | 30 Oct 2026 | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |

Approved by :
( Permpon Chanpu )
Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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# Certificate of Calibration

**Certificate No. : 69-420017-1**



**Result of Calibration :**

**UUC Condition As-Received :** Good

**Function :** Electrical measurement

pH meter

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

| Adjustment Curve at nominal pH | Applied Voltage ( mV ) | Nominal Value ( pH ) | UUC Reading ( pH ) | UUC Reading ( mV ) | Correction ( mV ) | Uncertainty ( ± mV ) |
|---|---|---|---|---|---|---|
| 4, 7, 10 | 177.4800 | 4 | 4.00 | 177 | 0 | 0.59 |
| | 0.0000 | 7 | 7.00 | 0 | 0 | 0.58 |
| | -177.4800 | 10 | 10.00 | -178 | 1 | 0.59 |

**Function :** pH meter with electrode

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

| Adjustment Curve at nominal pH | Standard Buffer ( pH ) | UUC Reading ( pH ) | Correction ( pH ) | Uncertainty ( ± pH ) |
|---|---|---|---|---|
| 4, 7, 10 | 4.008 | 4.00 | 0.01 | 0.0097 |
| | 6.988 | 7.00 | -0.01 | 0.011 |
| | 10.010 | 10.01 | 0.00 | 0.014 |

Remark

UUC : Unit Under Calibration

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

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

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NSC-TISI-TIS17025
CALIBRATION 0030

# Certificate of Calibration

**Certificate No. :** **69-400074-1** **Page : 1 of 2**

**Submitted by :** C.E.M Technology (Thailand) Co.,Ltd.
219/43 Moo.12 Petchkasem Rd, Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

**Equipment :** Temperature Indicator with Thermistor Probe

Temperature Indicator

| | | | |
|---|---|---|---|
| Manufacturer : | Apera | Model : | PC 910 |
| Range : | N/A °C | Resolution : | 0.1 °C |
| Serial No. : | PC910X1220811001 | ID No. : | WW-03-002 |

Thermistor probe

| | | | |
|---|---|---|---|
| Model : | N/A | Sheath Material : | Stainless |
| Diameter : | 4.8 mm. | Length : | 95 mm. |
| Serial No. : | N/A | ID No. : | WW-03-002 |

**Environment :** On site calibration was carried out at the Laboratory,
C.E.M Technology (Thailand) Co., Ltd.

| | | |
|---|---|---|
| Ambient Temperature : | (26.0 to 27.0) | °C |
| Relative Humidity : | (55 to 60) | % |
| Line Voltage : | (224.5 to 226.0) | VAC |

**Date of Received :** 17 February 2026
**Date of Calibration :** 17 February 2026
**Date of Issue :** 24 February 2026
**Calibrated by :** Permpon Chanpu

**Calibration Method :** This instrument was calibrated by In-house method comparison technique CAL-M4003 by compared with PRT in the liquid bath at the constant controlled temperature.
The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

| ID No. | Cert. No. | Due Date | Traceability |
|---|---|---|---|
| 400016 | TT-1019-25 | 13 May 2027 | National Institute of Metrology Thailand (NIMT) |

2. Standard Digital Thermometer

| ID No. | Cert. No. | Due Date | Traceability |
|---|---|---|---|
| 400033 | 24E633 | 21 Feb 2026 | National Institute of Metrology Thailand (NIMT) |

Approved by :

( Permpon Chanpu )

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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# Certificate of Calibration

**Certificate No. : 69-400074-1**



**Result of Calibration :** Without Adjustment

**UUC Condition As-Received :** Good

**Function :** Temperature measurement

| Immersion Depth ( mm. ) | Standard Reading ( °C ) | UUC Reading ( °C ) | Correction ( °C ) | Uncertainty ( ±°C ) |
|---|---|---|---|---|
| 95 | 25.004 | 25.1 | -0.1 | 0.19 |

Remark

UUC : Unit Under Calibration

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

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

- o0o -

CAL

# Certificate of Calibration

NSC-TISI-TIS 17025
Calibration 0087

| | | | |
|---|---|---|---|
| **Equipment:** | Hot Air Oven | Certificate No.: | C31260296 |
| Manufacturer: | Memmert | Issued Date: | 11 February 2026 |
| Model: | UF 55 | Job No.: | WO-00105449 |
| Serial No.: | B219.0142 | Ventilation Valve: | Closed |
| ID No.: | WW-05-002 | Page: | 1 of 4 |
| Shelves(pc.): | 2 | | |
| Condition of the item: | Normal | | |

**Customer:** C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

**Environment Condition:**

| | | | | |
|---|---|---|---|---|
| Temperature: | 30 °C | ± | 1.1 | °C |
| Relative Humidity: | 53 % | ± | 4.6 | % |
| Voltage: | 227 VAC | ± | 1.8 | VAC |

**Calibration Place:** C.E.M Technology (Thailand) Co., Ltd. ( Laboratory Room )
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

**Calibration By:** Mr. Sittiphong Lekfu

**Calibration Date:** 09 February 2026

**The Method Used:** In house method, CAL-WI-16, base on TLAS-G20

**Traceability:** This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Certificate No. C10250013

(Mr.Sittiphong Lekfu)
Person in charge

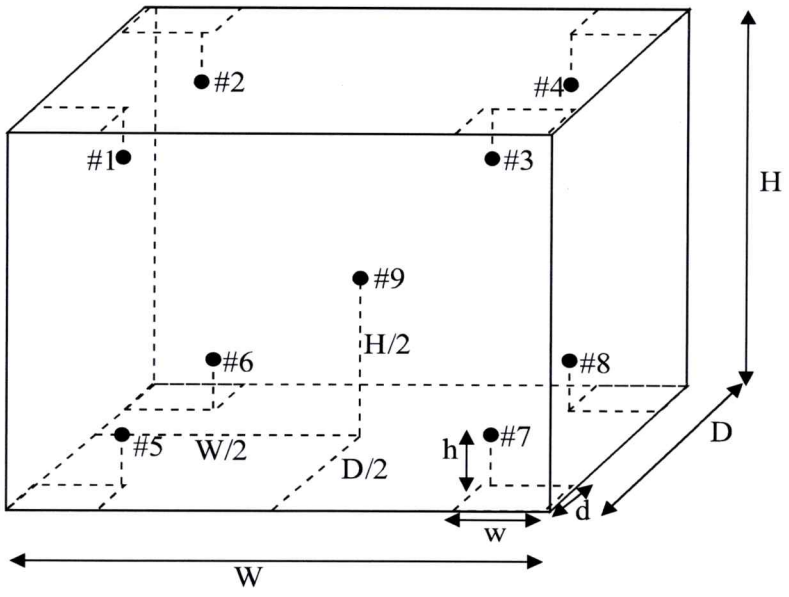
(Mr. Pramote Ramrong)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with Evaluation of measurement data - Guide to the expression of uncertainty in measurement (JCGM 100).

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

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## Standard Installation Locations

Volume (Calibration Zone)= 21 (Liters)

| | | | |
|---|---|---|---|
| Inside chamber: | W = 40 (cm) | D = 33 (cm) | H = 40 (cm) |
| Standard Locations (#1, #2, #3, #4): | w = 5 (cm) | d = 5 (cm) | h = 5 (cm) |
| Standard Locations (#5, #6, #7, #8): | w = 5 (cm) | d = 5 (cm) | h = 5 (cm) |

#9: Geometric center of the chamber

| Position of Std | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 |
|---|---|---|---|---|---|---|---|---|---|
| Channel of Logger | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 |

## Definitions

***Indicating Temperature***: The average reading of indicating device which forms the integral part of the enclosure.

***Measured Temperature***: The average reading of standards at any positions or location.

***Measured Uniformity***: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

***Measured Stability***: The one-half of greatest maximum difference of measured temperatures at any one probe.

***Overall Variation***: The difference of maximum and minimum measured temperatures throughout observation time.

## Calibration Results:

### Before adjustment

| Setting: | Indicating: | #1: | #2: | #3: | #4: | #5: | #6: | #7: | #8: | #9: |
|---|---|---|---|---|---|---|---|---|---|---|
| 180.0 | 180.0 | 179.68 | 179.97 | 180.88 | 180.46 | 180.66 | 180.07 | 180.16 | 180.55 | 180.64 |

### After adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

| Locations | Measured Temperature (°C) | Correction of UUC. (°C) | Uncertainty (± °C) |
|---|---|---|---|
| #1 | 103.89 | -0.11 | 0.38 |
| #2 | 103.90 | -0.10 | 0.38 |
| #3 | 104.20 | 0.20 | 0.38 |
| #4 | 104.07 | 0.07 | 0.38 |
| #5 | 104.13 | 0.13 | 0.38 |
| #6 | 103.89 | -0.11 | 0.38 |
| #7 | 103.90 | -0.10 | 0.38 |
| #8 | 104.06 | 0.06 | 0.38 |
| #9 | 104.17 | 0.17 | 0.38 |

Temperature Distribution

| Desired (°C) | Setting (°C) | Indicating (°C) | Measured Temperature at Spread Locations (°C) | | | | | | | | | Uncertainty (± °C)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 | |
| 104.0 | 104.0 | 104.0 | 103.89 | 103.90 | 104.20 | 104.07 | 104.13 | 103.89 | 103.90 | 104.06 | 104.17 | 0.38 |

Chamber Characterization

| Indicating (°C) | Measured Uniformity (°C) | Measured Stability (± °C) | Overall Variation (°C) |
|---|---|---|---|
| 104.0 | 0.36 | 0.07 | 0.42 |

Note: * Maximum uncertainty of the each position

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## Without adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 180.0 °C

| Locations | Measured Temperature (°C) | Correction of UUC. (°C) | Uncertainty (± °C) |
|---|---|---|---|
| #1 | 179.47 | -0.53 | 0.42 |
| #2 | 179.77 | -0.23 | 0.42 |
| #3 | 180.72 | 0.72 | 0.42 |
| #4 | 180.19 | 0.19 | 0.42 |
| #5 | 180.42 | 0.42 | 0.42 |
| #6 | 179.87 | -0.13 | 0.42 |
| #7 | 179.94 | -0.06 | 0.42 |
| #8 | 180.42 | 0.42 | 0.42 |
| #9 | 180.42 | 0.42 | 0.42 |

Temperature Distribution

| Desired (°C) | Setting (°C) | Indicating (°C) | Measured Temperature at Spread Locations (°C) | | | | | | | | | Uncertainty (± °C)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 | |
| 180.0 | 180.0 | 180.0 | 179.47 | 179.77 | 180.72 | 180.19 | 180.42 | 179.87 | 179.94 | 180.42 | 180.42 | 0.42 |

Chamber Characterization

| Indicating (°C) | Measured Uniformity (°C) | Measured Stability (± °C) | Overall Variation (°C) |
|---|---|---|---|
| 180.0 | 1.03 | 0.07 | 1.38 |

Note: * Maximum uncertainty of the each position

**The End of Certificate**

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## Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, TLAS-G20. Therefore, those parameters have not been assessed separately.

**Tolerance and Decision rules:**

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

**Decision rule :**

- ☐ Choice A — Binary Statement for Simple Acceptance Rule (w = 0), Specific Risk < 50% PFA.
- ☑ Choice B — Non-binary statement with guard band (w = 1 U), Pass or Fail Specific Risk < 2.5% PFA and Condition Pass or Condition Fail Specific Risk < 50% PFA.
- ☐ Choice C — Customer defined, Customers may define arbitrary multiple of r to have applied as guard band (w = r U) .

; PFA – Probability of False Accept

(Mr. Pramote Ramrong)
Authorized signatory

### After adjustment

**Desired Temperature : 104.0°C** **Tolerances : 1.0 °C**

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

| Locations | Measured (°C) | Correction* (°C) | Guard band (W) (± °C) | Tolerance (± °C) | Conformity |
|---|---|---|---|---|---|
| #1 | 103.89 | -0.11 | 0.38 | 1.0 | Pass |
| #2 | 103.90 | -0.10 | 0.38 | 1.0 | Pass |
| #3 | 104.20 | 0.20 | 0.38 | 1.0 | Pass |
| #4 | 104.07 | 0.07 | 0.38 | 1.0 | Pass |
| #5 | 104.13 | 0.13 | 0.38 | 1.0 | Pass |
| #6 | 103.89 | -0.11 | 0.38 | 1.0 | Pass |
| #7 | 103.90 | -0.10 | 0.38 | 1.0 | Pass |
| #8 | 104.06 | 0.06 | 0.38 | 1.0 | Pass |
| #9 | 104.17 | 0.17 | 0.38 | 1.0 | Pass |

Correction* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

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DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

## Statements of conformity:(Cont.)

### Without adjustment (Cont.)

**Desired Temperature : 180.0°C Tolerances : 2.0 °C**

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 180.0 °C

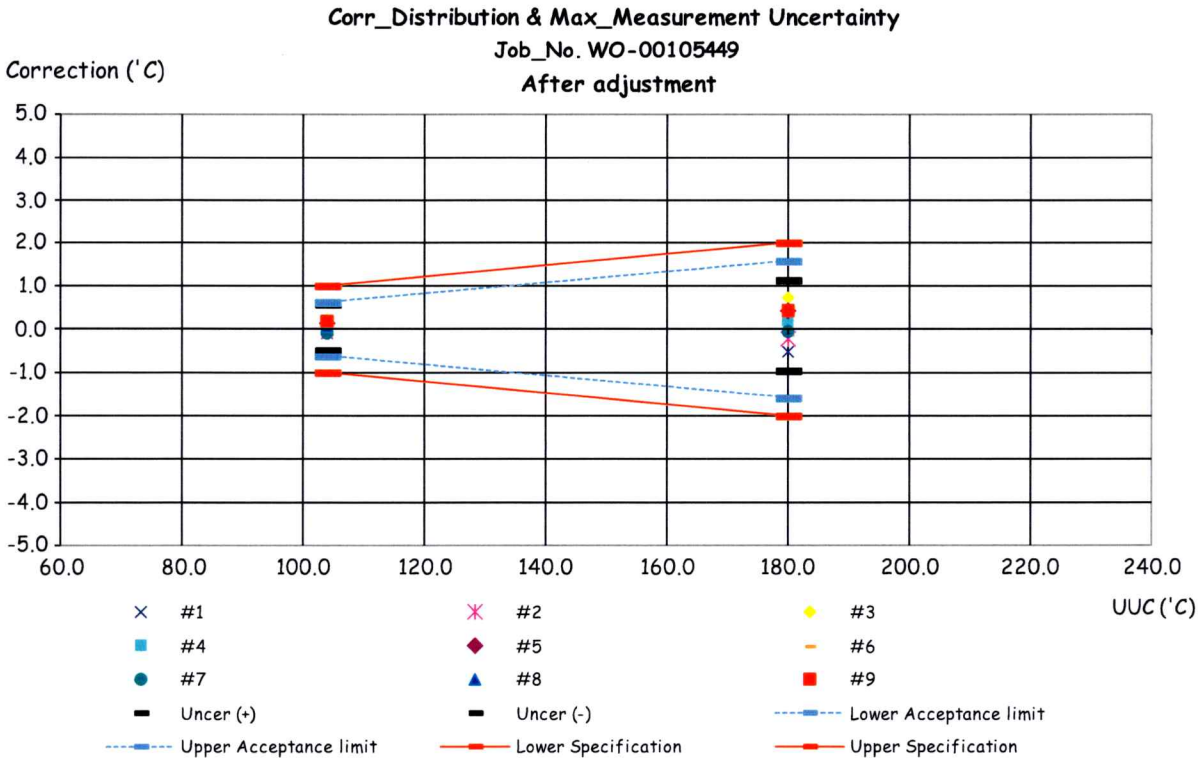
| Locations | Measured (°C) | Correction* (°C) | Guard band (W) (± °C) | Tolerance (± °C) | Conformity |
|---|---|---|---|---|---|
| #1 | 179.47 | -0.53 | 0.42 | 2.0 | Pass |
| #2 | 179.77 | -0.23 | 0.42 | 2.0 | Pass |
| #3 | 180.72 | 0.72 | 0.42 | 2.0 | Pass |
| #4 | 180.19 | 0.19 | 0.42 | 2.0 | Pass |
| #5 | 180.42 | 0.42 | 0.42 | 2.0 | Pass |
| #6 | 179.87 | -0.13 | 0.42 | 2.0 | Pass |
| #7 | 179.94 | -0.06 | 0.42 | 2.0 | Pass |
| #8 | 180.42 | 0.42 | 0.42 | 2.0 | Pass |
| #9 | 180.42 | 0.42 | 0.42 | 2.0 | Pass |

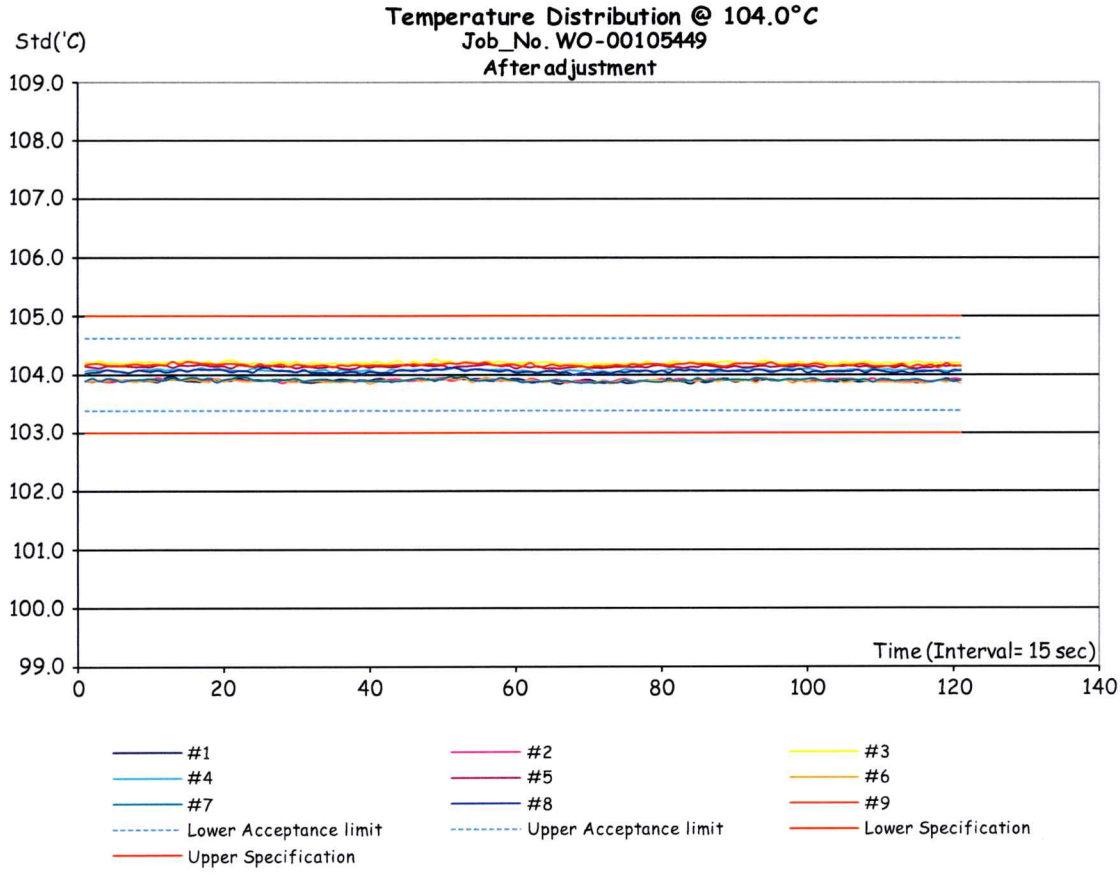
Correction* = Measured Temperature - Desired Temperature

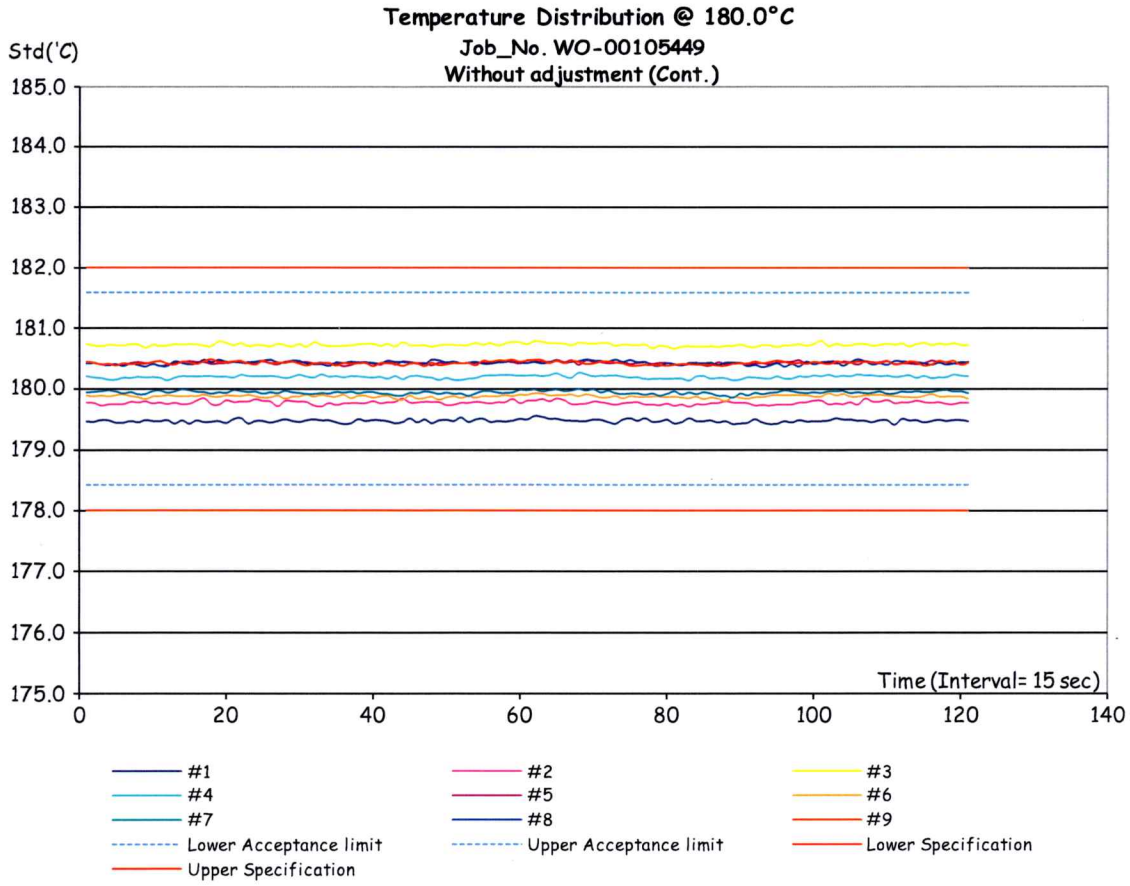
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

**The End of Statements of Conformity**

บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร 10260
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Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand


Corr_Distribution & Max_Measurement Uncertainty
Job_No. WO-00105449
After adjustment
Correction ('C)
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
60.0
80.0
100.0
120.0
140.0
160.0
180.0
200.0
220.0
240.0
UUC ('C)
#1
#2
#3
#4
#5
#6
#7
#8
#9
Uncer (+)
Uncer (-)
Lower Acceptance limit
Upper Acceptance limit
Lower Specification
Upper Specification


Temperature Distribution @ 104.0°C
Job_No. WO-00105449
After adjustment
Std('C)
109.0
108.0
107.0
106.0
105.0
104.0
103.0
102.0
101.0
100.0
99.0
0
20
40
60
80
100
120
140
Time (Interval= 15 sec)
#1
#2
#3
#4
#5
#6
#7
#8
#9
Lower Acceptance limit
Upper Acceptance limit
Lower Specification
Upper Specification


Temperature Distribution @ 180.0°C
Job_No. WO-00105449
Without adjustment (Cont.)
Std('C)
185.0
184.0
183.0
182.0
181.0
180.0
179.0
178.0
177.0
176.0
175.0
0
20
40
60
80
100
120
140
Time (Interval= 15 sec)
#1
#2
#3
#4
#5
#6
#7
#8
#9
Lower Acceptance limit
Upper Acceptance limit
Lower Specification
Upper Specification

# ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00105449

ชนิดเครื่องมือ: Hot Air Oven รุ่น: UF 55

หมายเลขเครื่อง: B219.0142

| ตรวจสอบ (รับ) 09 Feb 2026 | | รายการตรวจเช็ค | ตรวจสอบ (ส่ง) 09 Feb 2026 | | หมายเหตุ |
|---|---|---|---|---|---|
| ปกติ | ไม่ปกติ | | ปกติ | ไม่ปกติ | |
| | | ***General*** | | | |
| ☑ | ☐ | 1. สายไฟ | ☑ | ☐ | |
| ☑ | ☐ | 2. การทำงาน Main Switch | ☑ | ☐ | |
| ☑ | ☐ | 3. การทำงาน Selector Key | ☑ | ☐ | |
| ☑ | ☐ | 4. การแสดงผล Display | ☑ | ☐ | |
| ☑ | ☐ | 5. การทำงาน พัดลม | ☑ | ☐ | |
| ☑ | ☐ | 6. สภาพ Lever of Ventilation valve | ☑ | ☐ | |
| ☑ | ☐ | 7. สภาพ Lever door open / close | ☑ | ☐ | |
| ☑ | ☐ | 8. สภาพ Door seal | ☑ | ☐ | |
| ☑ | ☐ | 9. การทำงานของระบบ Safety | ☑ | ☐ | |
| ☐ | ☐ | 10. การทำงานของระบบทำความเย็น | ☐ | ☐ | ไม่มี |
| ☐ | ☐ | 11. การทำงานของระบบทำความชื้น | ☐ | ☐ | ไม่มี |
| ☑ | ☐ | 12. สภาพตัวเครื่อง | ☑ | ☐ | |
| ☑ | ☐ | 13. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง | ☑ | ☐ | |

ข้อแนะนำ : _____

_____

Mr. Sittiphong Lekfu

Service Engineer

บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร 10260
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# Certificate of Calibration

NSC-TISI-TIS 17025
Calibration 0087

| | | | |
|---|---|---|---|
| **Equipment:** | Cooled Incubator | Certificate No.: | C31260297 |
| Manufacturer: | Binder | Issued Date: | 11 February 2026 |
| Model: | KB 240 | Job No.: | WO-00105449 |
| Serial No.: | 20180000012164 | Ventilation Valve: | None |
| ID No.: | WW-16-001 | Page: | 1 of 3 |
| Shelves(pc.): | 3 | | |
| Condition of the item: | Normal | | |

**Customer:** C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

**Environment Condition:**

| | | | | |
|---|---|---|---|---|
| Temperature: | 24 °C | ± | 0.6 | °C |
| Relative Humidity: | 49 % | ± | 5.4 | % |
| Voltage: | 227 VAC | ± | 1.7 | VAC |

**Calibration Place:** C.E.M Technology (Thailand) Co., Ltd. ( Laboratory Room )
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

**Calibration By:** Mr. Sittiphong Lekfu

**Calibration Date:** 09 February 2026

**The Method Used:** In house method, CAL-WI-16, base on TLAS-G20

**Traceability:** This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Certificate No. C10250013

(Mr.Sittiphong Lekfu)
Person in charge

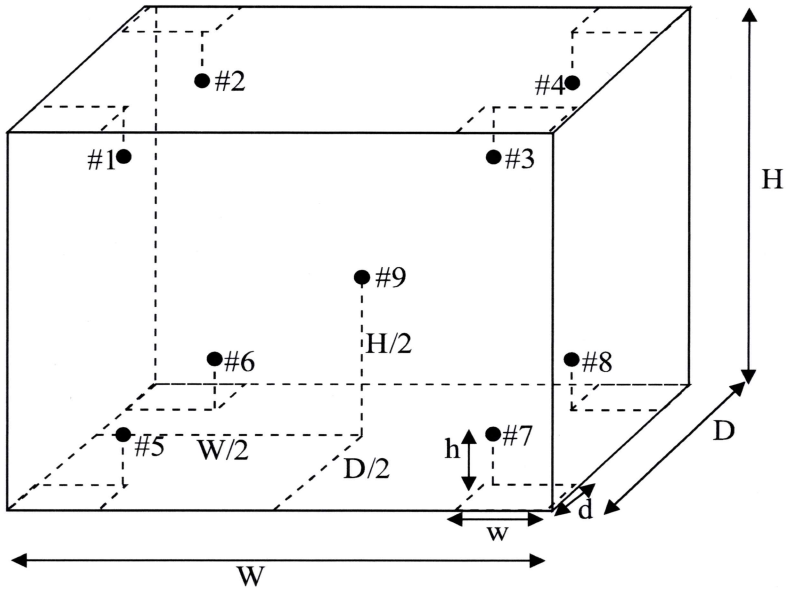
(Mr. Pramote Ramrong)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with Evaluation of measurement data - Guide to the expression of uncertainty in measurement (JCGM 100).

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

บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด
DKSH Technology Limited
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2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand




## Standard Installation Locations

Volume (Calibration Zone)= 122 (Liters)

| | | | |
|---|---|---|---|
| Inside chamber: | W = 65 (cm) | D = 50 (cm) | H = 76 (cm) |
| Standard Locations (#1, #2, #3, #4): | w = 7 (cm) | d = 5 (cm) | h = 8 (cm) |
| Standard Locations (#5, #6, #7, #8): | w = 7 (cm) | d = 5 (cm) | h = 8 (cm) |

#9: Geometric center of the chamber

| Position of Std | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 |
|---|---|---|---|---|---|---|---|---|---|
| Channel of Logger | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 |

## Definitions

***Indicating Temperature***: The average reading of indicating device which forms the integral part of the enclosure.

***Measured Temperature***: The average reading of standards at any positions or location.

***Measured Uniformity***: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

***Measured Stability***: The one-half of greatest maximum difference of measured temperatures at any one probe.

***Overall Variation***: The difference of maximum and minimum measured temperatures throughout observation time.

## Calibration Results:

### Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 20.0 °C

| Locations | Measured Temperature (°C) | Correction of UUC. (°C) | Uncertainty (± °C) |
|---|---|---|---|
| #1 | 20.06 | 0.06 | 0.64 |
| #2 | 19.96 | -0.04 | 0.82 |
| #3 | 19.87 | -0.13 | 0.78 |
| #4 | 20.03 | 0.03 | 0.66 |
| #5 | 20.18 | 0.18 | 0.62 |
| #6 | 19.89 | -0.11 | 0.69 |
| #7 | 19.97 | -0.03 | 0.62 |
| #8 | 20.03 | 0.03 | 0.56 |
| #9 | 20.21 | 0.21 | 0.60 |

Temperature Distribution

| Desired (°C) | Setting (°C) | Indicating (°C) | Measured Temperature at Spread Locations (°C) | | | | | | | | | Uncertainty (± °C)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 | |
| 20.0 | 20.0 | 20.0 | 20.06 | 19.96 | 19.87 | 20.03 | 20.18 | 19.89 | 19.97 | 20.03 | 20.21 | 0.82 |

Chamber Characterization

| Indicating (°C) | Measured Uniformity (°C) | Measured Stability (± °C) | Overall Variation (°C) |
|---|---|---|---|
| 20.0 | 0.62 | 0.68 | 1.51 |

Note: * Maximum uncertainty of the each position

**The End of Certificate**

บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด
DKSH Technology Limited
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2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

# Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, TLAS-G20. Therefore, those parameters have not been assessed separately.

**Tolerance and Decision rules:**

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

**Decision rule :**

- ☐ Choice A — Binary Statement for Simple Acceptance Rule (w = 0), Specific Risk < 50% PFA.
- ☑ Choice B — Non-binary statement with guard band (w = 1 U), Pass or Fail Specific Risk < 2.5% PFA and Condition Pass or Condition Fail Specific Risk < 50% PFA.
- ☐ Choice C — Customer defined, Customers may define arbitrary multiple of r to have applied as guard band (w = r U) .

; PFA – Probability of False Accept

(Mr. Pramote Ramrong)
Authorized signatory

## Without adjustment

**Desired Temperature : 20.0°C** **Tolerances : 1.0 °C**

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 20.0 °C

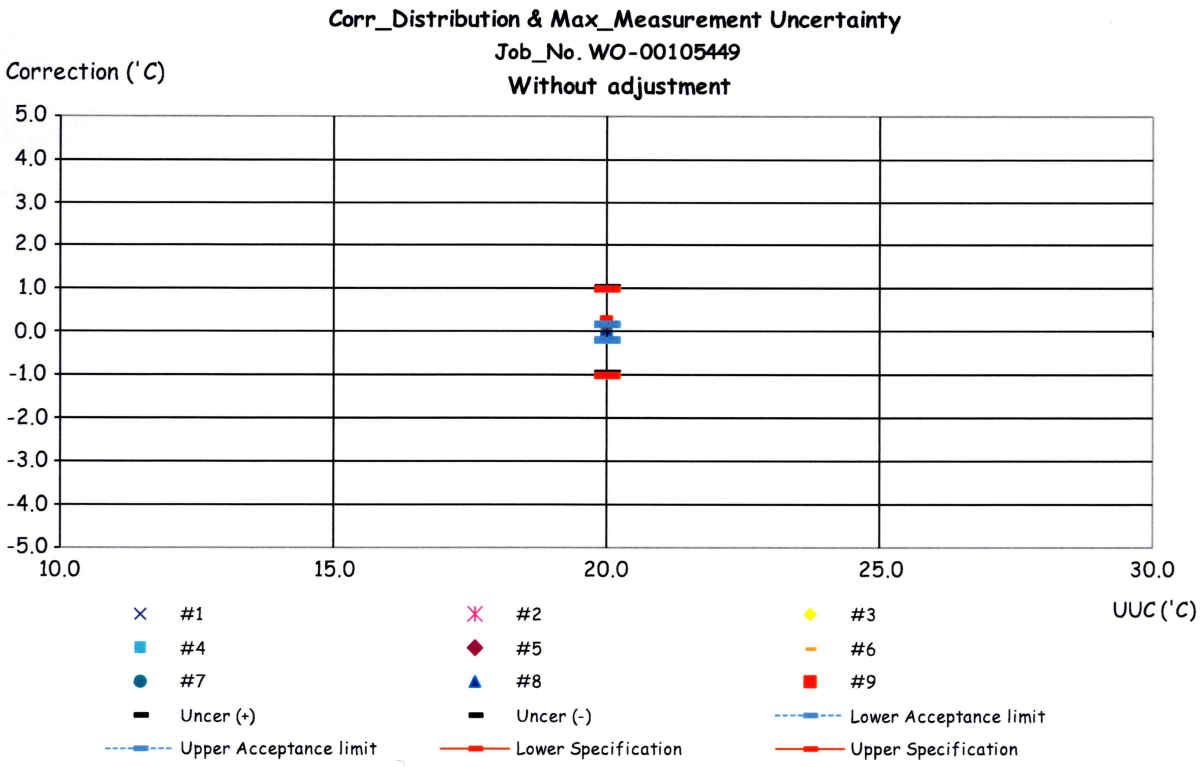
| Locations | Measured (°C) | Correction* (°C) | Guard band (W) (± °C) | Tolerance (± °C) | Conformity |
|---|---|---|---|---|---|
| #1 | 20.06 | 0.06 | 0.64 | 1.0 | Pass |
| #2 | 19.96 | -0.04 | 0.82 | 1.0 | Pass |
| #3 | 19.87 | -0.13 | 0.78 | 1.0 | Pass |
| #4 | 20.03 | 0.03 | 0.66 | 1.0 | Pass |
| #5 | 20.18 | 0.18 | 0.62 | 1.0 | Pass |
| #6 | 19.89 | -0.11 | 0.69 | 1.0 | Pass |
| #7 | 19.97 | -0.03 | 0.62 | 1.0 | Pass |
| #8 | 20.03 | 0.03 | 0.56 | 1.0 | Pass |
| #9 | 20.21 | 0.21 | 0.6 | 1.0 | Pass |

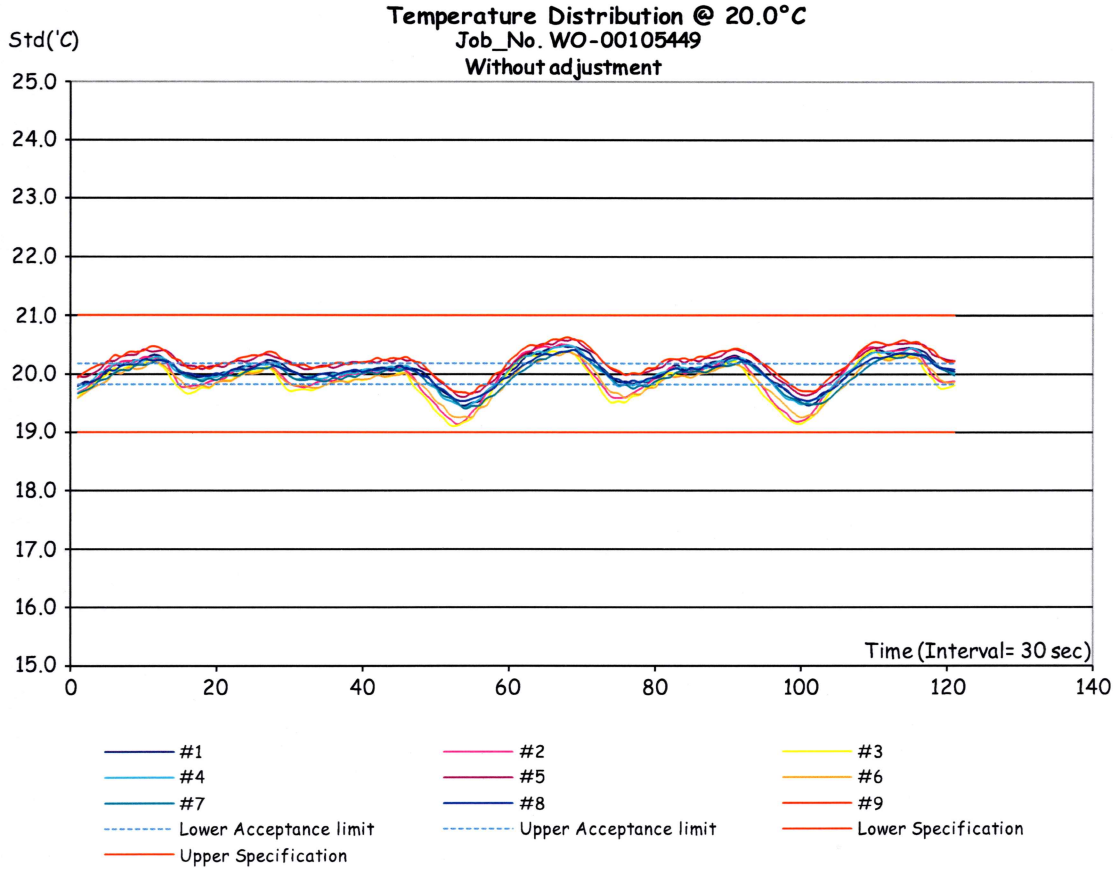
Correction* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

**The End of Statements of Conformity**

บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand


Corr_Distribution & Max_Measurement Uncertainty
Job_No. WO-00105449
Without adjustment
Correction ('C)
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
10.0
15.0
20.0
25.0
30.0
UUC ('C)
#1
#2
#3
#4
#5
#6
#7
#8
#9
Uncer (+)
Uncer (-)
Lower Acceptance limit
Upper Acceptance limit
Lower Specification
Upper Specification


Temperature Distribution @ 20.0°C
Job_No. WO-00105449
Without adjustment
Std('C)
25.0
24.0
23.0
22.0
21.0
20.0
19.0
18.0
17.0
16.0
15.0
0
20
40
60
80
100
120
140
Time (Interval= 30 sec)
#1
#2
#3
#4
#5
#6
#7
#8
#9
Lower Acceptance limit
Upper Acceptance limit
Lower Specification
Upper Specification

# ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00105449

ชนิดเครื่องมือ: Cooled Incubator รุ่น: KB 240

หมายเลขเครื่อง: 20180000012164

| ตรวจสอบ (รับ) 09 Feb 2026 | | รายการตรวจเช็ค | ตรวจสอบ (ส่ง) 09 Feb 2026 | | หมายเหตุ |
|---|---|---|---|---|---|
| ปกติ | ไม่ปกติ | | ปกติ | ไม่ปกติ | |
| | | ***General*** | | | |
| ☑ | ☐ | 1. สายไฟ | ☑ | ☐ | |
| ☑ | ☐ | 2. การทำงาน Main Switch | ☑ | ☐ | |
| ☑ | ☐ | 3. การทำงาน Selector Key | ☑ | ☐ | |
| ☑ | ☐ | 4. การแสดงผล Display | ☑ | ☐ | |
| ☑ | ☐ | 5. การทำงาน พัดลม | ☑ | ☐ | |
| ☐ | ☐ | 6. สภาพ Lever of Ventilation valve | ☐ | ☐ | ไม่มี |
| ☑ | ☐ | 7. สภาพ Lever door open / close | ☑ | ☐ | |
| ☑ | ☐ | 8. สภาพ Door seal | ☑ | ☐ | |
| ☑ | ☐ | 9. การทำงานของระบบ Safety | ☑ | ☐ | |
| ☑ | ☐ | 10. การทำงานของระบบทำความเย็น | ☑ | ☐ | |
| ☐ | ☐ | 11. การทำงานของระบบทำความชื้น | ☐ | ☐ | ไม่มี |
| ☑ | ☐ | 12. สภาพตัวเครื่อง | ☑ | ☐ | |
| ☑ | ☐ | 13. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง | ☑ | ☐ | |

ข้อแนะนำ : _____

_____

Mr. Sittiphong Lekfu

Service Engineer

บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร 10260
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WK Electric Co.,Ltd.

68/242 Moo 5, Sawaipracharaj Rd., Tumbol Ladsawai, Amphur Lamlukka, Pathumthani 12150 AC-2487

Tel. +66 2993 4773, +66 2153 7132-3 Fax. +66 2994 5509 E-mail : wk.calibrations@gmail.com www.wk-etc.com

# Certificate of Calibration

**Certificate No.:** WK2606-412-976 

**Customer** : C.E.M Technology (Thailand) Co., Ltd
219/43 Moo 12 Phet Kasem Rd, Om Noi,
Krathum Baen District, Samut Sakhon 74130

| | | | |
|---|---|---|---|
| **Instrument** | : Portable Turbidity Meter | **Ambient Temperature** | : (25 ± 2) °C |
| **Manufacturer** | : BANTE | **Humidity** | : (50 ± 15) %RH |
| **Model** | : TB100 | **Received Date** | : 09-Jun-26 |
| **Serial No.** | : 210128-023 | **Calibrated Date** | : 11-Jun-26 |
| **Identity No.** | : N/A | **Issued Date** | : 12-Jun-26 |
| **Range** | : 0 NTU to 1100 NTU | **Calibrated Location** | : In Lab |
| **Resolution** | : 0.01 NTU, 0.1 NTU, 1 NTU | | |
| **Calibration Method** | : CP-WK-C07 | | |

**Reference Standard Instrument :**

| Instrument | Serial No. | Certificate No. | Due Date | Traceability to |
|---|---|---|---|---|
| Turbidity Solution | TD10NTU.L5 | 1202697 | 17-Mar-27 | CPAchem Ltd. |
| Turbidity Solution | TD20NTU.L5 | 1202698 | 17-Mar-27 | CPAchem Ltd. |
| Turbidity Solution | TD100NTU.L5 | 1202699 | 17-Mar-27 | CPAchem Ltd. |
| Turbidity Solution | TD500NTU.L5 | 1202700 | 17-Mar-27 | CPAchem Ltd. |
| Turbidity Solution | TD800NTU.L5 | 1202701 | 17-Mar-27 | CPAchem Ltd. |
| Turbidity Solution | TD1000NTU.L5 | 1202702 | 17-Mar-27 | CPAchem Ltd. |
| Platinum Resistance Thermometer | 4507 | PSL-T 0494/69 | 06-Mar-27 | TISTR |

TISTR : Thailand Institute of Scientific and Technological Research.
This result calibrate was found accurate as shown on date and place of calibrate only
This certificate is traceability to the International System of Unit (SI)

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

**Calibrated by :** Ms. Usa Phuangphiphat **Approved by :**

Mr. Ratchadawut Rungravee

Authorized Signatory

This certificate may not be reproduced except in full unless permission for the reproduction has been obtained in writing from the laboratory.

WK Electric Co.,Ltd.
68/242 Moo 5, Sawaipracharaj Rd., Tumbol Ladsawai, Amphur Lamlukka, Pathumthani 12150
Tel. +66 2993 4773, +66 2153 7132-3 Fax. +66 2994 5509 E-mail : wk.calibrations@gmail.com www.wk-etc.com

# Calibration Results

Certificate No. : WK2606-412-976



**Calibration Result of the Accuracy**

Function : Turbidity Measurement at 25 °C

Resolution : 0.01 NTU, 0.1 NTU, 1 NTU

Unit : NTU

| Standard Solution | UUC Reading | Error | Uncertainty (±) |
|---|---|---|---|
| 10.00 | 10.03 | 0.03 | 0.051 |
| 20.00 | 20.03 | 0.03 | 0.10 |
| 100.0 | 100.2 | 0.2 | 0.80 |
| 500.0 | 500.2 | 0.2 | 3.0 |
| 800.0 | 800.1 | 0.1 | 4.0 |
| 1000 | 1000 | 0 | 7.0 |

( X ) Without Adjustment ( ) After Adjustment

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**** End of Certificate****

ARCHEMICA

# Certificate of Calibration

## Aquion RFIC: Anion (ID#1084)

This certificate is to verify that instrument below are calibrated

by Archemica Lab Co.,Ltd.

| | |
|---|---|
| **Aquion** | **S/N: 221280114** |
| **AS-DV** | **S/N: 2205880126** |

**For**

## C.E.M Technology (Thailand) Co., Ltd.

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ARCHEMICA LAB CO.,LTD.

**Operator Signature:** Teerapat B. **Date: Feb 19-20 ,2026**

**(Mr.Teerapat Boonla)**

**Applications Chemist**

# Qualification Report

**PM Check list, CM_OQ and PQ**

## Aquion RFIC: Anion (ID#1084)

**(2nd (PM,PQ) / Contact) For**

## For C.E.M Technology (Thailand) Co., Ltd.

# PM

## Preventive Maintenance

## Check List

# Dionex Ion Chromatography
# Preventive Maintenance Report

| **Customer Organization** | **Name/ Department** |
|---|---|
| C.E.M Technology (Thailand) Co., Ltd | |
| **Engineer** | **Date** |
| Mr. Teerapat Boonla | 19-20/Feb/26 |

## Instrument Detail

| **Instrument Model** | **Application** |
|---|---|
| Aquion RFIC: Anion (ID#1084) | Anion |
| **Instrument components** | **Serial Number** |
| Aquion | 221280114 |
| AS-DV | 2205880126 |
| | |
| | |
| | |

## Consumable Detail

| Columns | Guard Columns | Suppressors | Concentrators | Etc. |
|---|---|---|---|---|
| AS18 | AG18 | ADRS 600 | | EGC III |
| | | | | |
| | | | | |

**Remark:**

**Perform By Archemica**

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ARCHEMICA LAB CO.,LTD.

Teerapat B.

Archemica

19/Feb/26

Date

Customer

Date

## General ICS Maintenance Checklist

| No. | Description | Result | | | |
|---|---|---|---|---|---|
| **Power on & Connection** | | **Checked** | **Cleaned** | **Replaced** | **N.A.** |
| 1 | Instrument power on | ☒ | - | - | ☐ |
| 2 | Instrument connection | ☒ | - | - | ☐ |
| **Injection Valve Rebuild** | | **Checked** | **Cleaned** | **Replaced** | **N.A.** |
| 3 | Rebuilt injection valve 6 port | ☒ | ☐ | ☐ | ☐ |
| 4 | - Rotor seal | ☒ | ☐ | ☐ | ☐ |
| 5 | - Stator face | ☒ | ☐ | ☐ | ☐ |
| **(Optional) Auxiliary Valve Rebuild** | | **Checked** | **Cleaned** | **Replaced** | **N.A.** |
| 6 | Rebuilt auxiliary valve 0 port | ☒ | ☐ | ☐ | ☐ |
| 7 | - Rotor seal | ☒ | ☐ | ☐ | ☐ |
| 8 | - Stator face | ☒ | ☐ | ☐ | ☐ |
| **Check Valve Cartridge** | | **Checked** | **Cleaned** | **Replaced** | **N.A.** |
| 9 | Inlet check valve assembly | ☒ | ☐ | ☐ | ☐ |
| 10 | Outlet check valve assembly | ☒ | ☐ | ☐ | ☐ |
| 11 | Verified correct flow orientation | ☒ | - | - | ☐ |
| **Pump Piston Rinse Seal, Piston Seal and Piston** | | **Checked** | **Cleaned** | **Replaced** | **N.A.** |
| 12 | Piston rinse seal in *primary* pump head | ☒ | ☐ | ☐ | ☐ |
| 13 | Piston seal in *primary* pump head | ☒ | ☐ | ☐ | ☐ |
| 14 | Piston in *primary* pump head | ☒ | ☐ | ☐ | ☐ |
| 15 | Piston rinse seal in *secondary* pump head | ☒ | ☐ | ☐ | ☐ |
| 16 | Piston seal in *secondary* pump head | ☒ | ☐ | ☐ | ☐ |
| 17 | Piston in *secondary* pump head | ☒ | ☐ | ☐ | ☐ |
| **Waste Valve and Priming Valve** | | **Checked** | **Cleaned** | **Replaced** | **N.A.** |
| 18 | Waste valve | ☒ | ☐ | ☐ | ☐ |
| 19 | Priming valve | ☒ | ☐ | ☐ | ☐ |
| **Cell Detector** | | **Checked** | **Cleaned** | **Replaced** | **N.A.** |
| 20 | Check conductivity cell | ☒ | ☐ | ☐ | ☐ |
| 21 | Check electrochemical cell | ☐ | ☐ | ☐ | ☒ |
| 22 | - Working electrode | ☐ | ☐ | ☐ | ☒ |
| 23 | - Reference electrode | ☐ | ☐ | ☐ | ☒ |
| 24 | - Gasket | ☐ | ☐ | ☐ | ☒ |
| 25 | - Cell body | ☐ | ☐ | ☐ | ☒ |
| **Other** | | **Checked** | **Cleaned** | **Replaced** | **N.A.** |
| 26 | Sample Loop Size 25 ul | ☐ | ☒ | ☐ | ☐ |
| 27 | End-line filter | ☒ | - | ☐ | ☐ |
| 28 | Leak sensor | ☒ | ☐ | ☐ | ☐ |
| 29 | Lubricate pump mechanic | ☐ | ☒ Lubricated | - | ☐ |
| 30 | Reconnected liquid lines to the valve | ☒ | - | - | ☐ |
| 31 | Reconnected liquid lines to pump heads | ☒ | - | - | ☐ |
| 32 | Primed pump | ☒ | - | - | ☐ |
| 33 | Checked pump for leaks | ☒ | - | - | ☐ |
| 34 | Checked gas for leaks | ☒ | - | - | ☐ |

# CM OQ

## Chromeleon

## Operation Qualification

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# Chromeleon Operational Qualification

## General Information

| | Computer Name | Version Number: |
|---|---|---|
| **Instrument Controller:** | DESKTOP-32T6H3B | 7.3.1 Build 6535 |
| **Client:** | DESKTOP-32T6H3B | 7.3.1.6535 |
| **Operator:** | IC-User | |

***Overall Test Result:*** ***Passed***

**Comparison Format:**

| | | |
|---|---|---|
| All Parameters: | Significant Digits: | 10 |

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ARCHEMICA LAB CO.,LTD.

Reviewer's Signature // Date

Teerapat R. M 19/Feb/26
Operator's Signature // Date

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# Chromeleon Operational Qualification, Part 1

## Verification of Selected Results

| | |
|---|---|
| Detection Algorithm: | Cobra |
| Calibration Type: | Lin, WithOffset |
| Evaluation Type: | Area |
| Standard Method: | External |
| Calibration Mode: | Total |

| *Report Variable* | *Peak Name* | *Status* |
|---|---|---|
| **Offset (c0)** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |
| **Slope (c1)** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |
| **Correlation Coeffi.** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |
| **Variance** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |
| **Std. Deviation** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |
| **Rel. Std. Dev.** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |
| **Variance Coeff.** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |

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# Chromeleon Operational Qualification, Part 1

## Verification of Selected Results

| *Report Variable* | *Peak Name* | *Status* |
|---|---|---|
| **Calibration Point X** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |
| **Calibration Point Y** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |
| **Amount [ng]** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |
| **Resolution (EP)** | Acetanilide | ok |
| | Acetophenone | ok |
| **Resolution (USP)** | Acetanilide | ok |
| | Acetophenone | ok |
| **Peak Asymmetry (EP/USP)** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |
| **Peak Asymmetry (AIA)** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |

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# Chromeleon Operational Qualification, Part 1

## Verification of Selected Results

| *Report Variable* | *Peak Name* | *Status* |
|---|---|---|
| **Theoretical Plates (EP)** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |
| **Theoretical Plates (USP)** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |
| **Theoretical Plates (JP)** | Acetanilide | ok |
| | Acetophenone | ok |
| | Propiophenone | ok |

***Test Result:*** ***Passed***

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# Chromeleon Operational Qualification, Part 2

## Most Frequently Used Parameters: Comparison with Expected Results

Detection Algorithm: Cobra
Calibration Type: Lin, WithOffset
Evaluation Type: Area
Standard Method: External
Calibration Mode: Total

| *Variable Category* | *Report Variable* | *Peak Name* | *Status* |
|---|---|---|---|
| **Injection** | **No.** | | ok |
| | **Name** | | ok |
| | **Type** | | ok |
| | **Position** | | ok |
| | **Status** | | ok |
| | **Volume** | | ok |
| | **Dilution Factor** | | ok |
| | **Weight** | | ok |
| | **IntStd** | | ok |
| | **InstrumentMethod** | | ok |
| | **ProcessingMethod** | | ok |
| **Chromatogram** | **Channel** | | ok |
| | **No. of Peaks** | | ok |
| | **Chromatogram Start Time** | | ok |
| | **Signal Min.** | | ok |
| | **Signal Max.** | | ok |
| | **Unit** | | ok |
| | **Noise** | | ok |
| **Peak Results** | **No.** | Acetanilide | ok |
| | **No.** | Acetophenone | ok |
| | **No.** | Propiophenone | ok |
| | **Peak Name** | Acetanilide | ok |
| | **Peak Name** | Acetophenone | ok |
| | **Peak Name** | Propiophenone | ok |
| | **Ret.Time** | Acetanilide | ok |
| | **Ret.Time** | Acetophenone | ok |
| | **Ret.Time** | Propiophenone | ok |

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# Chromeleon Operational Qualification, Part 2

## Most Frequently Used Parameters: Comparison with Expected Results

| *Variable Category* | *Report Variable* | *Peak Name* | *Status* |
|---|---|---|---|
| **Peak Results** | **Abs.Ret.Dev.** | Acetanilide | ok |
| | **Ret.Dev.(abs)** | Acetophenone | ok |
| | **Ret.Dev.(abs)** | Propiophenone | ok |
| | **Rel.Ret.Dev.** | Acetanilide | ok |
| | **Ret.Dev.(rel)** | Acetophenone | ok |
| | **Ret.Dev.(rel)** | Propiophenone | ok |
| | **Area** | Acetanilide | ok |
| | **Area** | Acetophenone | ok |
| | **Area** | Propiophenone | ok |
| | **Rel.Area** | Acetanilide | ok |
| | **Rel.Area (Total)** | Acetophenone | ok |
| | **Rel.Area (Total)** | Propiophenone | ok |
| | **Height** | Acetanilide | ok |
| | **Height** | Acetophenone | ok |
| | **Height** | Propiophenone | ok |
| | **Rel.Height (Total)** | Acetanilide | ok |
| | **Rel.Height (Total)** | Acetophenone | ok |
| | **Rel.Height (Total)** | Propiophenone | ok |
| | **Amount** | Acetanilide | ok |
| | **Amount** | Acetophenone | ok |
| | **Amount** | Propiophenone | ok |
| | **Concentration** | Acetanilide | ok |
| | **Concentration** | Acetophenone | ok |
| | **Concentration** | Propiophenone | ok |
| | **Rel.Amount** | Acetanilide | ok |
| | **Rel.Amount** | Acetophenone | ok |
| | **Rel.Amount** | Propiophenone | ok |
| | **Peak Width (0%)** | Acetanilide | ok |
| | **Peak Width (0%)** | Acetophenone | ok |
| | **Peak Width (0%)** | Propiophenone | ok |
| | **Peak Width (5%)** | Acetanilide | ok |
| | **Peak Width (5%)** | Acetophenone | ok |
| | **Peak Width (5%)** | Propiophenone | ok |
| | **Peak Width (10%)** | Acetanilide | ok |
| | **Peak Width (10%)** | Acetophenone | ok |
| | **Peak Width (10%)** | Propiophenone | ok |

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# Chromeleon Operational Qualification, Part 2

## Most Frequently Used Parameters: Comparison with Expected Results

| *Variable Category* | *Report Variable* | *Peak Name* | *Status* |
|---|---|---|---|
| Peak Results | Peak Width (50%) | Acetanilide | ok |
| | Peak Width (50%) | Acetophenone | ok |
| | Peak Width (50%) | Propiophenone | ok |
| | Left Width (0%) | Acetanilide | ok |
| | Left Width (0%) | Acetophenone | ok |
| | Left Width (0%) | Propiophenone | ok |
| | Right Width (0%) | Acetanilide | ok |
| | Right Width (0%) | Acetophenone | ok |
| | Right Width (0%) | Propiophenone | ok |
| | Peak Start | Acetanilide | ok |
| | Peak Start | Acetophenone | ok |
| | Peak Start | Propiophenone | ok |
| | Peak Stop | Acetanilide | ok |
| | Peak Stop | Acetophenone | ok |
| | Peak Stop | Propiophenone | ok |
| | Peak Start Value | Acetanilide | ok |
| | Peak Start Value | Acetophenone | ok |
| | Peak Start Value | Propiophenone | ok |
| | Peak Stop Value | Acetanilide | ok |
| | Peak Stop Value | Acetophenone | ok |
| | Peak Stop Value | Propiophenone | ok |
| | BL-Value Peak Start | Acetanilide | ok |
| | BL-Value Peak Start | Acetophenone | ok |
| | BL-Value Peak Start | Propiophenone | ok |
| | BL-Value Peak Stop | Acetanilide | ok |
| | BL-Value Peak Stop | Acetophenone | ok |
| | BL-Value Peak Stop | Propiophenone | ok |
| | Type | Acetanilide | ok |
| | Type | Acetophenone | ok |
| | Type | Propiophenone | ok |
| | Resolution (EP) | Acetanilide | ok |
| | Resolution(EP) | Acetophenone | ok |
| | Resolution(USP) | Acetanilide | ok |
| | Resolution(USP) | Acetophenone | ok |
| | Asymmetry(EP) | Acetanilide | ok |
| | Asymmetry(EP) | Acetophenone | ok |
| | Asymmetry(EP) | Propiophenone | ok |

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# Chromeleon Operational Qualification, Part 2

## Most Frequently Used Parameters: Comparison with Expected Results

| *Variable Category* | *Report Variable* | *Peak Name* | *Status* |
|---|---|---|---|
| **Peak Results** | **Asymmetry(AIA)** | Acetanilide | ok |
| | **Asymmetry(AIA)** | Acetophenone | ok |
| | **Asymmetry(AIA)** | Propiophenone | ok |
| | **Theor. Plates(EP)** | Acetanilide | ok |
| | **Theor. Plates(EP)** | Acetophenone | ok |
| | **Theor. Plates(EP)** | Propiophenone | ok |
| | **Theor. Plates(USP)** | Acetanilide | ok |
| | **Theor. Plates(USP)** | Acetophenone | ok |
| | **Theor. Plates(USP)** | Propiophenone | ok |
| | **Theor.Plates (JP)** | Acetanilide | ok |
| | **Theor. Plates(JP)** | Acetophenone | ok |
| | **Theor. Plates(JP)** | Propiophenone | ok |
| **Peak Calibration** | **Cal.Mode** | Acetanilide | ok |
| | **Cal.Mode** | Acetophenone | ok |
| | **Cal.Mode** | Propiophenone | ok |
| | **Cal.Type** | Acetanilide | ok |
| | **Cal.Type** | Acetophenone | ok |
| | **Cal.Type** | Propiophenone | ok |
| | **Weights** | Acetanilide | ok |
| | **Weights** | Acetophenone | ok |
| | **Weights** | Propiophenone | ok |
| | **Calibr. Coefficient C0** | Acetanilide | ok |
| | **Calibr. Coefficient C0** | Acetophenone | ok |
| | **Calibr. Coefficient C0** | Propiophenone | ok |
| | **Calibr. Coefficient C1** | Acetanilide | ok |
| | **Calibr. Coefficient C1** | Acetophenone | ok |
| | **Calibr. Coefficient C1** | Propiophenone | ok |
| | **RF-Value** | Acetanilide | ok |
| | **RF-Value** | Acetophenone | ok |
| | **RF-Value** | Propiophenone | ok |
| | **No. of Points** | Acetanilide | ok |
| | **No. of Points** | Acetophenone | ok |

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# Chromeleon Operational Qualification, Part 2

## Most Frequently Used Parameters: Comparison with Expected Results

| *Variable Category* | *Report Variable* | *Peak Name* | *Status* |
|---|---|---|---|
| **Peak Calibration** | **No. of Points** | Propiophenone | ok |
| | **No. of Points(disabled)** | Acetanilide | ok |
| | **No. of Points(disabled)** | Acetophenone | ok |
| | **No. of Points(disabled)** | Propiophenone | ok |
| | **Variance** | Acetanilide | ok |
| | **Variance** | Acetophenone | ok |
| | **Variance** | Propiophenone | ok |
| | **Var.Coeff** | Acetanilide | ok |
| | **Var.Coeff** | Acetophenone | ok |
| | **Var.Coeff** | Propiophenone | ok |
| | **Std.Dev.** | Acetanilide | ok |
| | **Std.Dev.** | Acetophenone | ok |
| | **Std.Dev.** | Propiophenone | ok |
| | **Rel.Std.Dev.** | Acetanilide | ok |
| | **Rel.Std.Dev.** | Acetophenone | ok |
| | **Rel.Std.Dev.** | Propiophenone | ok |
| | **Corr.Coeff.** | Acetanilide | ok |
| | **Corr.Coeff.** | Acetophenone | ok |
| | **Corr.Coeff.** | Propiophenone | ok |
| | **R-Square** | Acetanilide | ok |
| | **R-Square** | Acetophenone | ok |
| | **R-Square** | Propiophenone | ok |
| | **Adj. R-Square** | Acetanilide | ok |
| | **Adj. R-Square** | Acetophenone | ok |
| | **Adj. R-Square** | Propiophenone | ok |
| | **X** | Acetanilide | ok |
| | **X** | Acetophenone | ok |
| | **X** | Propiophenone | ok |
| | **Y** | Acetanilide | ok |
| | **Y** | Acetophenone | ok |
| | **Y** | Propiophenone | ok |
| | **W** | Acetanilide | ok |
| | **W** | Acetophenone | ok |
| | **W** | Propiophenone | ok |
| | **F(X)** | Acetanilide | ok |
| | **F(X)** | Acetophenone | ok |
| | **F(X)** | Propiophenone | ok |

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# Chromeleon Operational Qualification, Part 2

## Most Frequently Used Parameters: Comparison with Expected Results

| *Variable Category* | *Report Variable* | *Peak Name* | *Status* |
|---|---|---|---|
| **Peak Calibration** | **Residual for Cal.Point X** | Acetanilide | ok |
| | **Residual for Cal.Point X** | Acetophenone | ok |
| | **Residual for Cal.Point X** | Propiophenone | ok |
| | **Calibration Point Status** | Acetanilide | ok |
| | **Calibration Point Status** | Acetophenone | ok |
| | **Calibration Point Status** | Propiophenone | ok |
| | **Amount** | Acetanilide | ok |
| | **Amount** | Acetophenone | ok |
| | **Amount** | Propiophenone | ok |
| **Component** | **Cal.Type** | Acetanilide | ok |
| | **Peak Type** | Acetanilide | ok |
| | **Left Limit** | Acetophenone | ok |
| | **Right Limit** | Acetanilide | ok |
| | **Group** | Acetanilide | ok |
| | **Factor** | Acetophenone | ok |
| | **Amount** | Acetanilide | ok |
| | **Conc.Unit** | Acetophenone | ok |

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# Chromeleon Operational Qualification, Part 2

## Most Frequently Used Parameters: Comparison with Expected Results

| *Variable Category* | *Report Variable* | *Peak Name* | *Status* |
|---|---|---|---|
| **Peak Purity** | **PPI** | Acetanilide | ok |
| | **PPI** | Acetophenone | ok |
| | **PPI** | Propiophenone | ok |
| | **RSD PPI** | Acetanilide | ok |
| | **RSD PPI** | Acetophenone | ok |
| | **RSD PPI** | Propiophenone | ok |
| | **Match** | Acetanilide | ok |
| | **Match** | Acetophenone | ok |
| | **Match** | Propiophenone | ok |
| | **RSD Match** | Acetanilide | ok |
| | **RSD Match** | Acetophenone | ok |
| | **RSD Match** | Propiophenone | ok |
| | **Rel.Max at** | Acetanilide | ok |
| | **Rel.Max at** | Acetophenone | ok |
| | **Rel.Max at** | Propiophenone | ok |

***Test Result:*** ***Passed***

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# Chromeleon Operational Qualification, Part 3

## System Suitability Test: Comparison with Expected Results

| *Variable Category* | *Report Variable* | *Status* |
|---|---|---|
| System Suitability Test Case | Number | ok |
| | Name | ok |
| | Inj.Condition | ok |
| | Eval. Formula | ok |
| | Operator | ok |
| | Statistics | ok |
| | Rounding | ok |
| | MinimumNumberOfInjections | ok |
| | MaximumNumberOfInjections | ok |
| | Channel | ok |
| | Peak | ok |
| | Ref. Value Formula 1 | ok |
| | Ref. Value Formula 2 | ok |
| | N.A. | ok |
| System Suitability Test Case Result | Inj. Eval. Result | ok |
| | Eval. Result | ok |
| | Peak Result | ok |
| | Injection Condition Result | ok |
| | Ref. Value 1 | ok |
| | Ref. Value 2 | ok |
| | Result | ok |
| | Message | ok |
| | Average | ok |
| | Count | ok |
| | Maximum | ok |
| | Minimum | ok |
| | Range | ok |
| | Rel. Range | ok |
| | Rel. Std. Dev. | ok |
| | Std. Dev. | ok |
| | Sum | ok |

***Test Result:*** ***Passed***

# PQ

## Performance Qualification

## Service Summary

These IQOQ Results should be reviewed by the Customer. If the IQOQ is accepted, both the Customer and the Service Representative should sign the IQOQ Results, below.

## IQOQ Results

Based upon the actual results obtained, this IQOQ **PASSED** the acceptance criteria described in the Installation Qualification and Operational Qualification procedure.

## Service Representative

A Field Service Representative signature below confirms the completion of all aspects of the Installation Qualification and Operational Qualification and have concluded that the system has been successfully verified to be operating as required.

## Customer

A Customer signature below confirms the completion of all aspects of the Installation Qualification and Operational Qualification have been completed and that the system has been successfully verified to be operating as required.

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ARCHEMICA LAB CO.,LTD.

| **Thermo Representative** | |
|---|---|
| **Signature:** Teerapat B. | **Date:** 19/Feb/26 |
| **Customer** | |
| **Signature:** | **Date:** |


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## Service Details

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| | |
|---|---|
| System Repeatability OQ Autosampler AS-DV 1 Test 1 | PASSED |
| Carryover OQ Autosampler AS-DV 1 Test 1 | PASSED |
| Flow Rate Repeatability OQ Pump Aquion 1 Test 1 | PASSED |
| Noise Drift OQ Detector (Aquion CD) Conductivity Detector 1 Test 1 | PASSED |
| Detector Linearity OQ Detector (Aquion CD) Conductivity Detector 1 Test 1 | PASSED |
| EG Current OQ IC EG Aquion RFIC 1 Test 1 | PASSED |
| Service Review and Completion | PASSED |


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## Document Generation

| | |
|---|---|
| This document was generated based on the system configuration being qualified. | RPGReports |
| Application Version | V3.4.8.0 |
| Database Version | 02.07.2025.001 |
| Document Generated | 09 - Mar - 2026 |
| Service Representative Name | teerapat.b |


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# Introduction

Documented evidence must be provided to demonstrate the integrity of data collected and validate the results obtained on laboratory instrumentation.

Many laboratories achieve this by formal quality systems, which are generally implemented in accordance with one or more of the following recognized quality standards and other quality guidelines:

- Good Laboratory Practice (GLP)
- Current Good Manufacturing Practice (cGMP)
- International Organization for Standardization (ISO) guidelines
- United States Pharmacopeia (USP)

These standards are written in broad terms, to make them as widely applicable as possible. All stipulate general requirements specifying instruments must be fit for purpose, properly maintained, and calibrated to national or international standards. The procedure used for the Thermo Fisher Scientific qualification methodology is adapted to these standards.

This qualification is intended to be performed only by trained and certified individuals. This report was created for a Thermo Scientific system using the RPG Reports software.

## Reference Documents

- Site Preparation Document(s)
- Individual Component Manuals
- Factory Installation Procedures


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# Test Equipment and Standards

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## Test Equipment

| Equipment | Manufacturer | Model | Serial Number | Cal Ver Date | Good Until |
|---|---|---|---|---|---|
| IC Qualification | Thermo Scientific | Test Box II | 22109053 | n/a | n/a |
| Multimeter | FLUKE | 289 | 32320105 | n/a | n/a |
| Thermocouple | FLUKE | K Type | 32320105 | n/a | n/a |

## Test Standards and Solvents

| Description | Manufacturer | Conc. / Grade | Part Number | Lot Number | Expiration Date |
|---|---|---|---|---|---|
| Nitrate | Thermo Scientific | 5 | 060254 | 250414 | Apr2026 |
| Nitrate | Thermo Scientific | 10 | 060254 | 250414 | Apr2026 |
| Nitrate | Thermo Scientific | 25 | 060254 | 250414 | Apr2026 |
| Nitrate | Thermo Scientific | 50 | 060254 | 250414 | Apr2026 |
| Nitrate | Thermo Scientific | 100 | 060254 | 250414 | Apr2026 |
| Nitrate | Thermo Scientific | 1000 | 060254 | 250414 | Apr2026 |


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## Autosampler Information

| | |
|---|---|
| Autosampler Model | AS-DV |
| Serial Number | 2205880126 |
| Firmware Version | 1.6.0 |
| Instrument Assigned | Instrument 1 |
| Tray Type | N/A |
| Syringe Volume | N/A |
| Loop Volume | 25 µL |
| Connection | USB |
| Powered On Successfully? | Yes |


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# System Repeatability OQ Autosampler AS-DV 1 Test 1

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## System Information

| | | | |
|---|---|---|---|
| Model | AS-DV | Acquisition Date | N/A |
| Serial Number | 2205880126 | Sequence | N/A |
| System Name | N/A | | |
| Test Configuration | Default | | |

## Data Entry Mode

| | |
|---|---|
| Data Entry Mode | Import |

## Peak Results

| Sample Name | Injection Volume (uL) | Retention Time (min) | Area (µS*min) |
|---|---|---|---|
| Repeatability 1 | 25 | 0.185 | 2.512 |
| Repeatability 2 | 25 | 0.1833 | 2.531 |
| Repeatability 3 | 25 | 0.1833 | 2.528 |
| Repeatability 4 | 25 | 0.185 | 2.554 |
| Repeatability 5 | 25 | 0.1833 | 2.558 |
| Repeatability 6 | 25 | 0.1833 | 2.555 |

## Repeatability Results

| Test | Measured | OQ Limit | Result |
|---|---|---|---|
| Retention Time Result | 0.5 % RSD | ≤ 5.0 % RSD | PASSED |
| Area Result | 0.7 % RSD | ≤ 1.0 % RSD | PASSED |


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# Carryover OQ Autosampler AS-DV 1 Test 1

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## System Information

| | | | |
|---|---|---|---|
| Model | AS-DV | Acquisition Date | N/A |
| Serial Number | 2205880126 | Sequence | N/A |
| System Name | N/A | | |
| Test Configuration | Default | | |

## Data Entry Mode

| | |
|---|---|
| Data Entry Mode | Import |

## Peak Results

| | Sample Name | Injection Volume (uL) | Retention Time (min) | Area (µS*min) |
|---|---|---|---|---|
| Blank | Carry over | 25 | 0.185 | 0.021 |
| High | Hight | 25 | 0.1833 | 43.512 |
| Carryover | Carry over | 25 | 0.1833 | 0.02 |

## Carryover Area Results

| Test | Measured | OQ Limit | Result |
|---|---|---|---|
| Carryover Area Result | 0.00 % | ≤ 0.10 % | PASSED |


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# Pump Aquion 1

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## Pump Information

| | |
|---|---|
| Pump Model | Aquion |
| Serial Number | 221280114 |
| Firmware Version | 3.1.0 |
| Pump Position | Single Unit |
| Seal Type | Normal Phase |
| Pressure Units | psi |
| Connection | USB |
| Powered On Successfully? | Yes |


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# Flow Rate Repeatability OQ Pump Aquion 1 Test 1

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## System Information

| | | | |
|---|---|---|---|
| Model | Aquion | Acquisition Date | N/A |
| Serial Number | 221280114 | Sequence | N/A |
| System Name | N/A | Pump Position | Single Unit |
| Test Configuration | Default | | |

## Data Entry Mode

| | |
|---|---|
| Data Entry Mode | Import |

## Peak Results

| Sample Name | Injection Volume (uL) | Retention Time (min) |
|---|---|---|
| Repeatability 1 | 25 | 0.185 |
| Repeatability 2 | 25 | 0.1833 |
| Repeatability 3 | 25 | 0.1833 |
| Repeatability 4 | 25 | 0.185 |
| Repeatability 5 | 25 | 0.1833 |
| Repeatability 6 | 25 | 0.1833 |

## Repeatability Results

| Test | Measured | OQ Limit | Result |
|---|---|---|---|
| Retention Time Result | 0.5 % RSD | ≤ 5.0 % RSD | PASSED |


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## Detector (Aquion CD) Conductivity Detector 1

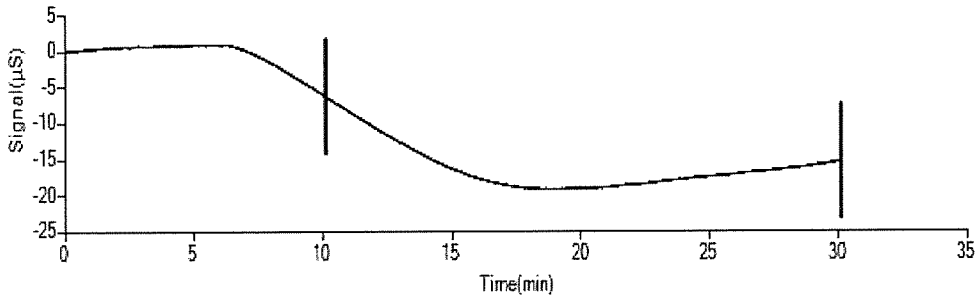
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### Detector Information

| | |
|---|---|
| Detector Model | Aquion CD |
| Serial Number | 221260053 |
| Powered On Successfully? | Yes |


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# Noise Drift OQ Detector (Aquion CD) Conductivity Detector 1 Test 1




## System Information

| | | | |
|---|---|---|---|
| Model | Aquion CD | Acquisition Date | N/A |
| Serial Number | 221260053 | Sequence | N/A |
| System Name | N/A | | |
| Test Configuration | Default | | |

## Data Entry Mode

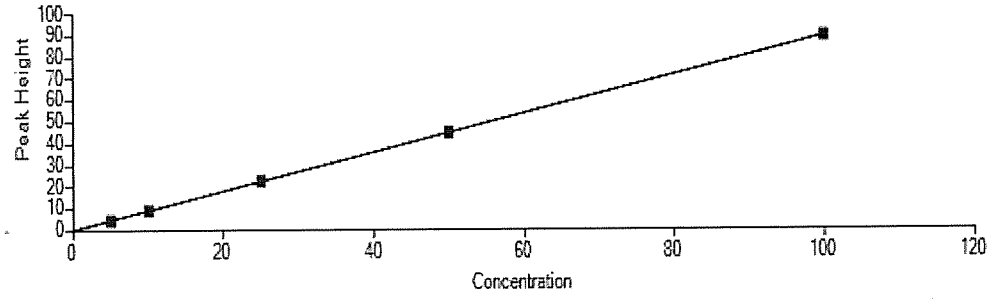
| | |
|---|---|
| Data Entry Mode | Import |

## Noise Drift Results

| Test | Measured | OQ Limit | Result | Conversion Factor |
|---|---|---|---|---|
| Noise Result | 0.1 nS | ≤ 2.0 nS | PASSED | 1000 |
| Drift Result | 17.7 nS/hr | ≤ 20.0 nS/hr | PASSED | 1000 |


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# Detector Linearity OQ Detector (Aquion CD)
# Conductivity Detector 1 Test 1




## System Information

| | | | |
|---|---|---|---|
| Model | Aquion CD | Acquisition Date | N/A |
| Serial Number | 221260053 | Sequence | N/A |
| System Name | N/A | | |
| Test Configuration | Default | | |

## Data Entry Mode

| | |
|---|---|
| Data Entry Mode | Import |

## Peak Results

| Sample Name | Concentration (ppm) | Peak Height (µS) | Calculated |
|---|---|---|---|
| Detector Linear | 5 | 4.868 | 4.983897 |
| Detector Linear | 10 | 9.29 | 9.945030 |
| Detector Linear | 25 | 22.754 | 25.050568 |
| Detector Linear | 50 | 45.04 | 50.053690 |
| Detector Linear | 100 | 89.529 | 99.966815 |

## Linearity Results

| Test | Measured | OQ Limit | Result |
|---|---|---|---|
| R^2 | 1.000 | ≥ 0.999 | PASSED |


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## EG Information

| | |
|---|---|
| Model | Aquion RFIC |
| Serial Number | 221280114 |
| Firmware Version | 3.1.0 |
| Cartridge Type | EGC III KOH |
| Instrument Assigned | Instrument 1 |
| Connection | USB |
| Powered On Successfully? | Yes |


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# EG Current OQ IC EG Aquion RFIC 1 Test 1

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## System Information

| | | | |
|---|---|---|---|
| Model | Aquion RFIC | Acquisition Date | |
| Serial Number | 221280114 | Sequence | |
| System Name | | | |
| Test Configuration | KOH - Analytical | | |

## Current Results

| Set Point | Expected Result | Reading | Deviation | OQ Limit | Result |
|---|---|---|---|---|---|
| 1.00 mM | 1.61 mA | 1.6100 mA | 0.00 mA | ± 0.01 mA | PASSED |
| 5.00 mM | 8.04 mA | 8.0400 mA | 0.00 mA | ± 0.05 mA | PASSED |
| 10.00 mM | 16.08 mA | 16.0800 mA | 0.00 mA | ± 0.10 mA | PASSED |
| 50.00 mM | 80.41 mA | 80.4200 mA | 0.01 mA | ± 0.50 mA | PASSED |
| 100.00 mM | 160.81 mA | 160.8300 mA | 0.02 mA | ± 1.00 mA | PASSED |


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## Service Review and Completion

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| Service Results: |
| --- |
| PASSED |
| This assessment was completed by a certified Service Representative after reviewing all performed service, including any testing performed per approved procedures, as documented in this report. The assessment is done prior to the generation of the final report, and does not preclude the customer's ultimate acceptance of this report. |

### Comments


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# Certificate

## Certificate of Standards and Instruments for Qualification

# Certificate of Analysis

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## Dionex Nitrate OQ/PQ IC Standards Kit
**(Set of 6)**

**Product Number 060254**
**Certificate of Analysis**

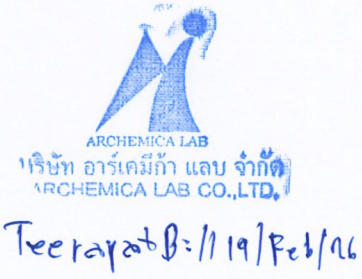
**Lot Number 250414**

**Expiration of Certification**
**April 2026**

The Dionex Nitrate Standard was developed to aid the analysis of anions by Ion Chromatography (IC). The single-ion standard was prepared by the dissolution of high-purity salt in ≥18.2 megohm deionized water, which was tested by IC for ionic contaminants. The bottle label states the nominal concentration value of the ionic component for informational purposes only. The actual ion concentration value was determined by Ion Chromatography. The IC system was standardized using the National Institute of Standards & Technology (NIST), Standard Reference Material, SRM 3185 (Nitrate Standard Solution). Actual concentration values determined for the single-ion is listed below.

**Dionex Nitrate Standard**

| Vial # | Concentration (mg/L) | |
|---|---|---|
| 1 | 5.10 | ± 0.03 |
| 2 | 10.15 | ± 0.04 |
| 3 | 25.49 | ± 0.05 |
| 4 | 50.03 | ± 0.06 |
| 5 | 99.7 | ± 0.3 |
| 6 | 993 | ± 18 |




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The concentration value is based a proven reliable method of analysis. The estimated uncertainties are two standard deviations of the concentration value. The concentration value is warranted to be stable for one year from the date of manufacture.

The preparation and analyses of the Dionex Nitrate Standard was performed with extreme care by Thermo Scientific Corporation Consumables Manufacturing Department in Sunnyvale California.

Document No. 078690-01 20-Dec-2011

Learn more at **thermofisher.com/documents**

thermoscientific

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Tel.+66(38) 694 145-8, Email : calibration@systronics.co.th

NSC - TISI - TIS 17025
CALIBRATION 0312

# CERTIFICATE OF CALIBRATION

**Certificate No :** EL251725
**Job No :** 25120018


**Customer Name.** : Archemica Lab Co., Ltd.
**Customer Address.** : 39 Soi Sukhumvit 63 ( Ekamai )
: Sukhumvit Rd.,North Klongton,
: Wattana , Bangkok 10110
**Instrument Description.** : TRUE RMS MULTIMETER
**Manufacturer.** : FLUKE
**Model No.** : 289
**Serial Number.** : 32320105

**Received Date :** 08 Dec 2025
**Calibrated Date :** 09 Dec 2025
**Issued Date :** 09 Dec 2025
**Tag No :** -
**Service :** -
**Condition As Received :** Used

**Calibration Procedure.**
Calibration were conducted using in-house calibration procedure according to direct measurement with reference standard.

**Procedure No.**
CP-EL-01, 02, 03, 04, 05, 06, 07, 10.

**Comment.**
-

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**Reference Standards Instrument.**

| Instrument Name | Model | Serial No. | Cert. No. | Due Date. |
|---|---|---|---|---|
| Multi-Function Calibrator | Fluke 5500A | 9395005 | E2U2500317 | 05 Nov 2026 |
| - | - | - | - | - |
| - | - | - | - | - |
| - | - | - | - | - |

**Traceability Information.**
- Traceable to the International System of Units (SI) through the National Institute of Metrology (Thailand), NIMT.

**Environmental Conditions.**
Temperature : (23 +/- 3) °C Relative Humidity : (50 +/- 15) %

**Calibration Information.**
- The result of calibration was found accurate as show on date and place of calibration only.
- The reported uncertainty of measurement is based on standard uncertainty multiplied by a coverage factor $k$ = 2, providing confidence level of approximately 95%.

**Calibrated by :** Mr.Suttinan Pravingrat

**Approved by :**
**Approved Signatory**
( ) Mr.Phitsanu Wangchai
(✓) Mr.Chanan Chanasit

SYSTRONICS INSLAB CALIBRATION LABORATORY

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CALIBRATION 0312

# CERTIFICATE OF CALIBRATION

**Certificate No.** EL251725


| Range | Standard Value | UUC*Reading | Error | (±) Uncertainty |
|---|---|---|---|---|
| **Function : DC Voltage Measurement (Without Adjustment)** | | | | |
| 50 mV | 0.0000 mV | 0.000 mV | 0.000 mV | 0.0027 mV |
| 50 mV | 5.0000 mV | 4.991 mV | -0.009 mV | 0.0029 mV |
| 50 mV | 45.0000 mV | 44.991 mV | -0.009 mV | 0.0047 mV |
| 50 mV | -45.0000 mV | -45.011 mV | -0.011 mV | 0.0047 mV |
| 500 mV | 50.0000 mV | 50.00 mV | 0.00 mV | 0.0076 mV |
| 500 mV | 450.000 mV | 449.96 mV | -0.04 mV | 0.023 mV |
| 500 mV | -450.000 mV | -450.01 mV | -0.01 mV | 0.023 mV |
| 5 V | 0.500000 V | 0.5000 V | 0.0000 V | 0.000063 V |
| 5 V | 4.50000 V | 4.4998 V | -0.0002 V | 0.00023 V |
| 5 V | -4.50000 V | -4.4996 V | 0.0004 V | 0.00023 V |
| 50 V | 5.00000 V | 5.000 V | 0.000 V | 0.00063 V |
| 50 V | -5.00000 V | -5.000 V | 0.000 V | 0.00063 V |
| 50 V | 25.00000 V | 25.000 V | 0.000 V | 0.0012 V |
| 50 V | 45.0000 V | 44.999 V | -0.001 V | 0.0024 V |
| 50 V | -45.0000 V | -44.998 V | 0.002 V | 0.0024 V |
| 500 V | 50.0000 V | 50.00 V | 0.00 V | 0.0063 V |
| 500 V | 450.000 V | 449.99 V | -0.01 V | 0.022 V |
| 500 V | -450.000 V | -449.98 V | 0.02 V | 0.022 V |
| 1000 V | 100.0000 V | 100.0 V | 0.0 V | 0.058 V |
| 1000 V | 900.000 V | 899.9 V | -0.1 V | 0.070 V |
| 1000 V | -900.000 V | -899.9 V | 0.1 V | 0.070 V |
| **Function : DC Voltage Measurement LoZ (Without Adjustment)** | | | | |
| 1000 V | 0.0000000 V | 0.0 V | 0.0 V | 0.058 V |
| 1000 V | 100.0000 V | 100.0 V | 0.0 V | 0.058 V |
| 1000 V | 900.000 V | 900.5 V | 0.5 V | 0.070 V |
| 1000 V | -900.000 V | -900.5 V | -0.5 V | 0.070 V |
| **Function : AC Voltage Measurement (Without Adjustment)** | | | | |
| 50 mV | 5.000 mV 50 Hz | 4.993 mV | -0.007 mV | 0.022 mV |
| 50 mV | 45.000 mV 50 Hz | 44.997 mV | -0.003 mV | 0.033 mV |
| 50 mV | 45.000 mV 1 kHz | 44.99 mV | -0.01 mV | 0.034 mV |
| 500 mV | 50.000 mV 50 Hz | 49.99 mV | -0.01 mV | 0.036 mV |
| 500 mV | 450.00 mV 50 Hz | 449.98 mV | -0.02 mV | 0.16 mV |
| 500 mV | 450.00 mV 1 kHz | 449.87 mV | -0.13 mV | 0.16 mV |
| 5 V | 0.50000 V 50 Hz | 0.4999 V | -0.0001 V | 0.00018 V |
| 5 V | 4.5000 V 50 Hz | 4.5022 V | 0.0022 V | 0.0019 V |
| 5 V | 4.5000 V 1 kHz | 4.5012 V | 0.0012 V | 0.0019 V |
| 50 V | 5.0000 V 50 Hz | 5.009 V | 0.009 V | 0.0021 V |
| 50 V | 25.0000 V 50 Hz | 25.018 V | 0.018 V | 0.0083 V |
| 50 V | 45.000 V 50 Hz | 45.031 V | 0.031 V | 0.023 V |
| 50 V | 45.000 V 1 kHz | 45.020 V | 0.020 V | 0.023 V |
| 500 V | 50.000 V 50 Hz | 50.00 V | 0.00 V | 0.026 V |
| 500 V | 450.00 V 50 Hz | 450.26 V | 0.26 V | 0.24 V |
| 500 V | 450.00 V 1 kHz | 450.17 V | 0.17 V | 0.24 V |
| 1000 V | 100.000 V 50 Hz | 100.0 V | 0.0 V | 0.073 V |
| 1000 V | 900.00 V 50 Hz | 900.5 V | 0.5 V | 0.42 V |

**Remark :** (*) UUC : Unit Under Calibration

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CALIBRATION 0312

# CERTIFICATE OF CALIBRATION



| Range | Standard Value | UUC*Reading | Error | (±) Uncertainty |
|---|---|---|---|---|
| **Function : AC Voltage Measurement LoZ (Without Adjustment)** | | | | |
| 1000 V | 100.000 V 50 Hz | 100.3 V | 0.3 V | 0.073 V |
| 1000 V | 900.00 V 50 Hz | 904.2 V | 4.2 V | 0.42 V |
| **Function : DC Current Measurement (Without Adjustment)** | | | | |
| 500 uA | 0.00 uA | 0.00 uA | 0.00 uA | 0.040 uA |
| 500 uA | 50.00 uA | 50.02 uA | 0.02 uA | 0.045 uA |
| 500 uA | 450.00 uA | 450.00 uA | 0.00 uA | 0.085 uA |
| 5000 uA | 500.00 uA | 500.0 uA | 0.0 uA | 0.11 uA |
| 5000 uA | 4500.0 uA | 4499.6 uA | -0.4 uA | 0.57 uA |
| 50 mA | 5.0000 mA | 5.000 mA | 0.000 mA | 0.00082 mA |
| 50 mA | 45.000 mA | 44.995 mA | -0.005 mA | 0.0061 mA |
| 400 mA | 40.000 mA | 39.99 mA | -0.01 mA | 0.0081 mA |
| 400 mA | 200.000 mA | 199.96 mA | -0.04 mA | 0.019 mA |
| 400 mA | 360.00 mA | 359.96 mA | -0.04 mA | 0.12 mA |
| 400 mA | -360.00 mA | -359.94 mA | 0.06 mA | 0.12 mA |
| 5 A | 0.50000 A | 0.4999 A | -0.0001 A | 0.00017 A |
| 5 A | 4.5000 A | 4.5010 A | 0.0010 A | 0.0024 A |
| 10 A | 1.00000 A | 1.000 A | 0.000 A | 0.00064 A |
| 10 A | 9.0000 A | 9.001 A | 0.001 A | 0.0045 A |
| **Function : AC Current Measurement (Without Adjustment)** | | | | |
| 500 uA | 50.00 uA 50 Hz | 49.96 uA | -0.04 uA | 0.25 uA |
| 500 uA | 450.0 uA 50 Hz | 449.63 uA | -0.37 uA | 0.59 uA |
| 500 uA | 450.0 uA 1 kHz | 449.86 uA | -0.14 uA | 0.59 uA |
| 5000 uA | 500.0 uA 50 Hz | 500.0 uA | 0.0 uA | 0.63 uA |
| 5000 uA | 4500. uA 50 Hz | 4499.9 uA | -0.1 uA | 5.5 uA |
| 5000 uA | 4500. uA 1 kHz | 4500.3 uA | 0.3 uA | 5.5 uA |
| 50 mA | 5.000 mA 50 Hz | 4.991 mA | -0.009 mA | 0.0059 mA |
| 50 mA | 45.00 mA 50 Hz | 44.955 mA | -0.045 mA | 0.055 mA |
| 50 mA | 45.00 mA 1 kHz | 44.963 mA | -0.037 mA | 0.055 mA |
| 400 mA | 40.00 mA 50 Hz | 40.00 mA | 0.00 mA | 0.052 mA |
| 400 mA | 200.00 mA 50 Hz | 199.93 mA | -0.07 mA | 0.17 mA |
| 400 mA | 360.00 mA 50 Hz | 359.92 mA | -0.08 mA | 0.52 mA |
| 400 mA | 360.00 mA 1 kHz | 360.08 mA | 0.08 mA | 0.52 mA |
| 5 A | 0.50000 A 50 Hz | 0.4991 A | -0.0009 A | 0.00063 A |
| 5 A | 4.5000 A 50 Hz | 4.4986 A | -0.0014 A | 0.0038 A |
| 5 A | 4.5000 A 1 kHz | 4.4998 A | -0.0002 A | 0.014 A |
| 10 A | 1.00000 A 50 Hz | 1.000 A | 0.000 A | 0.0012 A |
| 10 A | 9.0000 A 50 Hz | 9.001 A | 0.001 A | 0.0059 A |
| 10 A | 9.0000 A 1 kHz | 9.006 A | 0.006 A | 0.025 A |

**Remark :** (*) UUC : Unit Under Calibration

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Tel.+66(38) 694 145-8, Email : calibration@systronics.co.th

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CALIBRATION 0312

# CERTIFICATE OF CALIBRATION

**Certificate No.** EL251725
**Page.** 4 of 5

| Range | | Standard Value | UUC*Reading | Error | (±) Uncertainty |
|---|---|---|---|---|---|
| **Function : Resistance Measurement (Without Adjustment)** | | | | | |
| 500 | Ω | 0.000 Ω | 0.00 Ω | 0.00 Ω | 0.0085 Ω |
| 500 | Ω | 50.000 Ω | 50.05 Ω | 0.05 Ω | 0.017 Ω |
| 500 | Ω | 450.00 Ω | 449.96 Ω | -0.04 Ω | 0.079 Ω |
| 5 | kΩ | 0.50000 kΩ | 0.4999 kΩ | -0.0001 kΩ | 0.00010 kΩ |
| 5 | kΩ | 4.5000 kΩ | 4.4991 kΩ | -0.0009 kΩ | 0.00079 kΩ |
| 50 | kΩ | 5.0000 kΩ | 5.000 kΩ | 0.000 kΩ | 0.0010 kΩ |
| 50 | kΩ | 45.000 kΩ | 45.000 kΩ | 0.000 kΩ | 0.0086 kΩ |
| 500 | kΩ | 50.000 kΩ | 50.01 kΩ | 0.01 kΩ | 0.011 kΩ |
| 500 | kΩ | 450.00 kΩ | 449.77 kΩ | -0.23 kΩ | 0.096 kΩ |
| 5 | M Ω | 0.50000 M Ω | 0.4996 M Ω | -0.0004 M Ω | 0.00012 M Ω |
| 5 | M Ω | 4.5000 M Ω | 4.4972 M Ω | -0.0028 M Ω | 0.0026 M Ω |
| 30 | M Ω | 3.00000 M Ω | 2.998 M Ω | -0.002 M Ω | 0.00070 M Ω |
| 30 | M Ω | 27.0000 M Ω | 26.964 M Ω | -0.036 M Ω | 0.022 M Ω |
| 50 | M Ω | 5.0000 M Ω | 4.99 M Ω | -0.01 M Ω | 0.0064 M Ω |
| 50 | M Ω | 45.000 M Ω | 44.92 M Ω | -0.08 M Ω | 0.18 M Ω |
| 100 | M Ω | 10.0000 M Ω | 10.0 M Ω | 0.0 M Ω | 0.058 M Ω |
| 100 | M Ω | 90.000 M Ω | 89.7 M Ω | -0.3 M Ω | 0.36 M Ω |
| 500 | M Ω | 150.000 M Ω | 149.4 M Ω | -0.6 M Ω | 0.60 M Ω |
| 500 | M Ω | 330.000 M Ω | 327.4 M Ω | -2.6 M Ω | 4.4 M Ω |
| **Function : Resistance Measurement LoΩ (Without Adjustment)** | | | | | |
| 50 | Ω | 0.000 Ω | 0.000 Ω | 0.000 Ω | 0.0063 Ω |
| 50 | Ω | 5.000 Ω | 5.003 Ω | 0.003 Ω | 0.0067 Ω |
| 50 | Ω | 25.000 Ω | 25.004 Ω | 0.004 Ω | 0.014 Ω |
| 50 | Ω | 45.000 Ω | 45.009 Ω | 0.009 Ω | 0.015 Ω |
| **Function : Capacitance Measurement (Without Adjustment)** | | | | | |
| 1 | nF | 0.0000 nF | 0.000 nF | 0.000 nF | 0.0078 nF |
| 1 | nF | 0.5000 nF | 0.499 nF | -0.001 nF | 0.0098 nF |
| 1 | nF | 0.9000 nF | 0.899 nF | -0.001 nF | 0.012 nF |
| 10 | nF | 1.0000 nF | 1.00 nF | 0.00 nF | 0.013 nF |
| 10 | nF | 9.000 nF | 9.00 nF | 0.00 nF | 0.044 nF |
| 100 | nF | 10.000 nF | 10.0 nF | 0.0 nF | 0.075 nF |
| 100 | nF | 90.00 nF | 90.1 nF | 0.1 nF | 0.29 nF |
| 1 | uF | 0.10000 uF | 0.100 uF | 0.000 uF | 0.00064 uF |
| 1 | uF | 0.9000 uF | 0.900 uF | 0.000 uF | 0.0029 uF |
| 10 | uF | 1.0000 uF | 1.00 uF | 0.00 uF | 0.0064 uF |
| 10 | uF | 9.000 uF | 9.00 uF | 0.00 uF | 0.033 uF |
| 100 | uF | 10.000 uF | 10.0 uF | 0.0 uF | 0.068 uF |
| 100 | uF | 90.00 uF | 90.0 uF | 0.0 uF | 0.44 uF |
| 1000 | uF | 100.00 uF | 100 uF | 0 uF | 0.75 uF |
| 1000 | uF | 900.0 uF | 899 uF | -1 uF | 7.3 uF |
| 10 | mF | 1.0 mF | 1.00 mF | 0.00 mF | 0.0099 mF |

**Remark :** (*) UUC : Unit Under Calibration

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# CERTIFICATE OF CALIBRATION

**Certificate No.** EL251725
**Page.** 5 of 5

| Range | Standard Value | | UUC*Reading | Error | (±) Uncertainty |
|---|---|---|---|---|---|
| **Function : Frequency Measurement (Without Adjustment)** | | | | | |
| 100 Hz | 10.00 Hz | @ 1 V | 10.000 Hz | 0.000 Hz | 0.0012 Hz |
| 100 Hz | 90.00 Hz | @ 1 V | 90.000 Hz | 0.000 Hz | 0.0026 Hz |
| 1000 Hz | 100.00 Hz | @ 1 V | 100.00 Hz | 0.00 Hz | 0.0064 Hz |
| 1000 Hz | 900.0 Hz | @ 1 V | 900.00 Hz | 0.00 Hz | 0.020 Hz |
| 10 kHz | 1.0000 kHz | @ 1 V | 1.0000 kHz | 0.0000 kHz | 0.000062 kHz |
| 10 kHz | 9.000 kHz | @ 1 V | 9.0000 kHz | 0.0000 kHz | 0.00019 kHz |
| 100 kHz | 10.000 kHz | @ 1 V | 10.000 kHz | 0.000 kHz | 0.00061 kHz |
| 100 kHz | 90.00 kHz | @ 1 V | 90.000 kHz | 0.000 kHz | 0.0019 kHz |
| 1000 kHz | 100.00 kHz | @ 1 V | 100.00 kHz | 0.00 kHz | 0.0061 kHz |
| 1000 kHz | 500.0 kHz | @ 1 V | 500.00 kHz | 0.00 kHz | 0.012 kHz |

| Range | Standard Value | Required UUC*Reading | UUC*Reading | Error | (±) Uncertainty |
|---|---|---|---|---|---|
| **Function : Thermocouple Measurement K Type (Without Adjustment)** | | | | | |
| -200 to 1350 °C | -5.550 mV | -180.0 °C | -179.6 °C | 0.4 °C | 0.40 °C |
| -200 to 1350 °C | 0.000 mV | 0.0 °C | 0.2 °C | 0.2 °C | 0.25 °C |
| -200 to 1350 °C | 4.096 mV | 100.0 °C | 100.2 °C | 0.2 °C | 0.22 °C |
| -200 to 1350 °C | 24.905 mV | 600.0 °C | 600.2 °C | 0.2 °C | 0.23 °C |
| -200 to 1350 °C | 37.326 mV | 900.0 °C | 900.2 °C | 0.2 °C | 0.24 °C |
| -200 to 1350 °C | 48.838 mV | 1200.0 °C | 1200.2 °C | 0.2 °C | 0.26 °C |

**Remark :** (*) UUC : Unit Under Calibration

**END OF CALIBRATION**

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# CERTIFICATE OF CALIBRATION

**Certificate No.** TL250426
**Job No.** 25120018
**Page.** 1 of 2

**Customer Name** : Archemica Lab Co., Ltd.
**Customer Address** : 39 Soi Sukhumvit 63 ( Ekamai )Sukhumvit Rd.,
: North Klongton, Wattana ,
: Bangkok 10110.

**Received Date** : 08 Dec 2025
**Calibrated Date** : 11 Dec 2025
**Issued Date** : 11 Dec 2025

**Instrument Description** : Digital Thermometer with sensor
**Manufacturer** : FLUKE
**Model No.** : 289
**Serial Number** : 32320105

**Tag No.** : -
**Service** : -
**Condition As Received** : Used Item

**Calibration Procedure.**
Calibration were conducted using in-house calibration procedure according to comparison measurement with Platinum Resistance Thermometer ( PRT ) into temperature source.

**Procedure No.**
CP-TL-01

**Comment.**
-

**Reference Standards Instrument.**

| Instrument Name | Model | Serial No. | Cert No. | Due Date |
|---|---|---|---|---|
| Platinum Resistance Thermometer | 5615 | 958332 | TT-1018-25 | 28 Apr 2027 |
| Thermometer Readout | 1529 | B29730 | 23E4020 | 22 Dec 2025 |
| - | - | - | - | - |

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**Traceability Information.**
The temperature scale used was based on ITS-90.
This certification is traceable to the International System of Units (SI).

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**Environmental Conditions**
Temperature : (23 ± 3) °C Relative Humidity : (50 ± 15) %RH

**Calibration Information.**
The result of calibration was found accurate as show on date and place of calibration only.
The reported uncertainty of measurement is based on standard uncertainty multiplied by a coverage factor *(k)*, providing confidence level of approximately 95%.

**Calibrated by :** Nuttapon Srisuwan

SYSTRONICS INSLAB CALIBRATION LABORATORY

**Approved by :**

Approved Signatory
( ) Mr. Phitsanu Wangchai
( ) Mr. Chanan Chanasit

This certificate may not be reproduced, except in full unless permission for the publication of an approved abstract is obtained in writing from the calibration organization issuing this report.

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# CERTIFICATE OF CALIBRATION

**Certificate No.** TL250426



**Result of Calibration :**

( Without Adjustment )

**Parameter Setting :** OFFSET = 0.0

**Sensor of UUC* :** Thermocouple Wire Type : K Serial No.: - ID/Tag No.: 32320105

Dimension : Length : 930 mm Diameter : 1.5 mm

| Immersion Depth | Standard Reading | UUC* Reading | Correction Value | Uncertainty of Measurement (±) | Coverage Factor |
|---|---|---|---|---|---|
| mm | °C | °C | °C | °C | $k$ = |
| 150 | 0.0041 | 0.7 | -0.7 | 0.50 | 2.00 |
| 150 | 50.0053 | 49.6 | 0.4 | 0.50 | 2.00 |
| 150 | 100.0055 | 99.4 | 0.6 | 0.50 | 2.00 |

**UUC*** : Unit Under Calibration

**END OF CERTIFICATE**

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Thermo SCIENTIFIC

# CERTIFICATE OF CONFORMITY

## IC QUALIFICATION TEST BOX II

**This certificate validates that the product values referenced below meet or exceed all Thermo Scientific functional specifications and release requirements.**

**Instrument Serial Number:** 22109053
**Instrument Part Number:** 22000-60001

## TEST BOX LOADS AND FUNCTIONS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| [x] | AES | 100Ω | +/- 5% | [x] | CR-TC 3-pin ANA INT | 1.3KΩ | +/- 5% |
| [x] | EGC CAP KOH | 100Ω | +/- 5% | [x] | CR-TC 3-pin CAP INT | 13.05kΩ | +/- 1% |
| [x] | EGC CAP MSA | 100Ω | +/- 5% | [x] | CR-TC 4-pin ANA INT | 1.3KΩ | +/- 5% |
| [x] | EGC ANA KOH | 100Ω | +/- 5% | [x] | CR-TC 4-pin CAP INT | 13.05kΩ | +/- 1% |
| [x] | EGC ANA MSA | 100Ω | +/- 5% | [x] | EGC – Memory Test | | |
| [x] | ERS (CC) | 12Ω | +/- 5% | [x] | ERS – Memory Test | | |
| [x] | ERC (CV) | 250Ω | +/- 5% | [x] | CR-TC – Memory Test | | |

**Tester:** Luis Angel Sosa Ruiz

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ARCHEMICA LAB CO.,LTD.

**Date:** 1 - March - 2022

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P/N 22000-97001 C

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May 15, 2018

To whom it may concern,

Be advised that the IC Qualification Test Box II (P/N 22000-60001) no longer comes with a sticker labelled "Periodic Calibration Required". An IC Qualification Test Box II can be used without any re-calibration after shipment.

Sincerely,

Thomas Wu
ICSP Product Manager
Thermo Fisher Scientific

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Chromatography and Mass Spectrometry Division
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ThermoFisher SCIENTIFIC

# Certificate of Completion

This certifies that

## Teerapat Boonla

Has successfully completed

## OJT RPG Mentoring: Ion Chromatography System Qualification Service Training

**Valid for 3 years from:**

Aug/26/2024

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**Issued electronically and approved by:**

**Thermo Fisher University LMS Certification Management and Compliance Group**
**tmc.training@thermofisher.com**

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Important note: The certificate is only valid during employment with the Thermo Fisher Scientific including its subsidiaries and certified contractors.