# ภาคผนวกที่ 4

## สรุปเอกสารสอบเทียบอุปกรณ์เครื่องมือ

เอกสารการสอบเทียบเครื่องมือตรวจวัดระดับเสียงในบรรยากาศ

ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT
975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,
Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280
Tel: +66 2709 4860 Fax: +66 2324 0917

NSC-TISI-TIS 17025
CALIBRATION 0119

Certificate No.: CP20260134EA
Operation No.: CP2026030079

# Certificate of Calibration

| | |
|---|---|
| Equipment: | Sound Level Meter |
| Manufacturer: | ACO |
| Model/Type: | 6236 (Meter), 7052NR (Microphone), - (Preamplifier) |
| Serial No.: | 222185 (Meter), 84161 (Microphone), - (Preamplifier) |
| ID No.: | NS-03-015 |
| Customer: | C.E.M. Technology (Thailand) Co.,Ltd. |
| Address: | 31/8 Moo 13 T.Rai Khung, A.Sam Phran, Nakorn Phatom 73210 |
| Received Date: | 12 March 2026 |
| Calibrated Date: | 20 - 21 April 2026 |
| Issued Date: | 24 April 2026 |
| Calibrated by: | Ms. Juntaporn Kunhakom |

Approved by: _____
( Mr. Sittichai Swaksuriyawong )
Group Manager

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The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor ($k$) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.





Certificate No.: CP20260134EA

## Calibration Report

Equipment: Sound Level Meter
Manufacturer: ACO
Model/Type: 6236 (Meter), 7052NR (Microphone), - (Preamplifier)
Serial No.: 222185 (Meter), 84161 (Microphone), - (Preamplifier)
ID No.: NS-03-015
Ambient Temperature: ( 23 ± 2 ) °C
Relative Humidity: ( 50 ± 15 ) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC61672-3:2013.

Condition of this result of calibration
1. Reference standards instrument :-

| | Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|---|
| 1) | Standard microphone | 4180 | 2661000 | AA-1011-25 | 24 June 2026 |
| 2) | Arbitrary Function Generator | AFG2021 | C010063 | CK20250037EA | 25 June 2026 |
| 3) | Programmable Attenuator | PA5 | 2913 | EF-0026-25 | 9 June 2026 |
| 4) | 6.5 Digit precision multimeter | 8846A | 9609027 | CB20250141EA | 20 August 2026 |
| 5) | Pressure humidity and Temperature Transmitter | PTU301 | F0640002 | CL1-P260022<br>CD20250221EA | 18 March 2027<br>8 August 2026 |
| 6) | Performance Audio Analyzer | U8903B | MY56510003 | CB20260043EA<br>CK20250065EA | 10 March 2027<br>23 September 2026 |

2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This certification is traceable to the international system of unit maintained at :-
Reference standards instrument for Acoustic function
- National Institute of Metrology (Thailand).; ILAC Policy, Item 2 (1) No.ILAC-P10:07/2020.
Reference standards instrument for Electrical function
- National Institute of Metrology (Thailand)
- Electrical and Electronics Institute; NSC Accredited Calibration No.0119
- IRPC Metrology Center, IRPC Public Co., Ltd.; NSC Accredited Calibration No.0204.

Result of Calibration:-
Function : 1. Indication at the calibration check frequency

| Reference Acoustic Signal (dB) | Measured value (dB) | Deviation (dB) | Acceptance limits (dB) |
|---|---|---|---|
| - | - | - | - |



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Certificate No.: CP20260134EA

## Calibration Report

Function : 2. Self-generated Noise
2.1 Microphone Installed

| Measured value (dB) |
|---|
| 20.2 |

2.2 Microphone replaced by the electrical input signal device

| Frequency Weighting | Measured value (dB) |
|---|---|
| A-weighting | 17.1 |
| C-weighting | 24.4 |
| Z-weighting | 32.8 |

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)
Meter free-field acoustic response at a level of 84 dB.

| Frequency (Hz) | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting (dB) | A-Weighting (dB) | Z-Weighting (dB) | Acceptance limits (dB) |
| 125 | 0.1 | -0.1 | 0.0 | ±1.5 |
| 1000 | 0.3 | 0.3 | 0.3 | ±1.0 |
| 8000 | -0.3 | -0.2 | -0.1 | ±5.0 |

Function : 4. Electrical signal tests of frequency weightings
Weighting network response with relative to 1 kHz.

| Frequency (Hz) | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting (dB) | A-Weighting (dB) | Z-Weighting (dB) | Acceptance limits (dB) |
| 63 | -0.1 | -0.1 | 0.0 | ±2.0 |
| 125 | 0.0 | -0.1 | 0.0 | ±1.5 |
| 250 | 0.0 | -0.1 | 0.0 | ±1.5 |
| 500 | 0.0 | 0.0 | 0.0 | ±1.5 |
| 1000 | 0.0 | 0.0 | 0.0 | ±1.0 |
| 2000 | -0.1 | 0.0 | 0.1 | ±2.0 |
| 4000 | -0.2 | -0.2 | 0.0 | ±3.0 |
| 8000 | -0.4 | -0.3 | -0.1 | ±5.0 |

Certificate No.: CP20260134EA

## Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

| Frequency Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| C-weighting | 94.0 | 0.0 | ±0.2 |
| A-weighting | 94.0 | 0.0 | ±0.2 |
| Z-weighting | 94.0 | 0.0 | ±0.2 |

5.2 Time weighting at 1 kHz

| Time Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| Fast | 94.0 | 0.0 | ±0.1 |
| Slow | 94.0 | 0.0 | ±0.1 |
| LAeq | 94.0 | 0.0 | ±0.1 |

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 30 | 94.0 | 94.0 | 0.0 | ±0.3 |

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±1.1 |
| 99.0 | 99.0 | 0.0 | ±1.1 |
| 104.0 | 104.0 | 0.0 | ±1.1 |
| 109.0 | 109.0 | 0.0 | ±1.1 |
| 114.0 | 114.0 | 0.0 | ±1.1 |
| 119.0 | 119.0 | 0.0 | ±1.1 |
| 120.0 | 120.1 | 0.1 | ±1.1 |
| 121.0 | 121.1 | 0.1 | ±1.1 |





Certificate No.: CP20260134EA

## Calibration Report

7.2 Level Linearity on the reference level range, Lower

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±1.1 |
| 89.0 | 89.0 | 0.0 | ±1.1 |
| 84.0 | 84.0 | 0.0 | ±1.1 |
| 79.0 | 79.0 | 0.0 | ±1.1 |
| 74.0 | 74.0 | 0.0 | ±1.1 |
| 69.0 | 69.0 | 0.0 | ±1.1 |
| 64.0 | 64.0 | 0.0 | ±1.1 |
| 59.0 | 59.0 | 0.0 | ±1.1 |
| 54.0 | 53.8 | -0.2 | ±1.1 |
| 49.0 | 48.8 | -0.2 | ±1.1 |
| 44.0 | 43.8 | -0.2 | ±1.1 |
| 39.0 | 38.8 | -0.2 | ±1.1 |
| 34.0 | 33.8 | -0.2 | ±1.1 |
| 33.0 | 32.9 | -0.1 | ±1.1 |
| 32.0 | 32.0 | 0.0 | ±1.1 |
| 31.0 | 31.2 | 0.2 | ±1.1 |
| 30.0 | 30.3 | 0.3 | ±1.1 |

Function : 8. Level Linearity including level range control

8.1. Level Linearity Including the Level Range (Reference Signal)

| Range | Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 20-100 | 94.0 | 94.0 | 0.0 | ±1.1 |
| 20-110 | 94.0 | 94.0 | 0.0 | ±1.1 |
| 30-120 | 94.0 | 94.0 | 0.0 | ±1.1 |
| 40-130 | 94.0 | 94.0 | 0.0 | ±1.1 |

8.2. Level Linearity Including the Level range (5dB Above Under-range)

| Range | Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 20-80 | 25.0 | 25.1 | 0.1 | ±1.1 |
| 20-90 | 25.0 | 25.2 | 0.2 | ±1.1 |
| 20-100 | 25.0 | 25.4 | 0.4 | ±1.1 |
| 20-110 | 25.0 | 25.3 | 0.3 | ±1.1 |
| 30-120 | 35.0 | 35.0 | 0.0 | ±1.1 |
| 40-130 | 45.0 | 45.0 | 0.0 | ±1.1 |





Certificate No.: CP20260134EA

## Calibration Report

Function : 9. Tone burst response

| Time Weighting | Tone burst duration, Tb (ms) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Fast | 200 | 116.0 | 0.0 | ±1.0 |
| | 2 | 98.9 | -0.1 | +1.0 ; -2.5 |
| | 0.25 | 89.9 | -0.1 | +1.5 ; -5.0 |
| Slow | 200 | 109.4 | -0.2 | ±1.0 |
| | 2 | 89.8 | -0.2 | +1.0 ; -5.0 |
| LAE | 200 | 109.9 | -0.1 | ±1.0 |
| | 2 | 90.0 | 0.0 | +1.0 ; -2.5 |
| | 0.25 | 80.9 | -0.1 | +1.5 ; -5.0 |

Function : 10. Peak C sound level

| Number of cycles in test signal | Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Complete cycle | 125.4 | 125.7 | 0.3 | ±3.0 |
| Positive half cycle | 124.4 | 124.2 | -0.2 | ±2.0 |
| Negative half cycle | 124.4 | 124.2 | -0.2 | ±2.0 |

Function : 11. Overload indication

| Measured value (dB) | | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| Positive one-half cycle | Negative one-half cycle | | |
| - | - | - | - |

Function : 12. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 5 | 129.0 | 129.0 | 0.0 | ±0.3 |





Certificate No.: CP20260134EA

## Calibration Report

Uncertainty of measurement

| Function | Uncertainty (dB) | Maximum-permitted uncertainty of measurement (dB) |
|---|---|---|
| 1) Indication at the calibration check frequency | 0.30 | Not applicable |
| 2) Self-generated Noise | 0.10 | Not applicable |
| 3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level | 0.30 | 0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz) |
| 4) Electrical signal tests of frequency weightings | 0.20 | 0.20 |
| 5) Frequency and time weighting at 1 kHz | 0.20 | 0.20 |
| 6) Long-Term Stability | 0.10 | 0.10 |
| 7) Level Linearity on the reference level range | 0.30 | 0.30 |
| 8) Level Linearity including level range control | 0.30 | 0.30 |
| 9) Tone burst response | 0.20 | 0.30 |
| 10) Peak C sound level | 0.20 | 0.35 |
| 11) Overload indication | 0.24 | 0.25 |
| 12) High-Level Stability | 0.10 | 0.10 |

Remarks:
1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
2. Overload indication can not measured because sound level meter can not set to Reference value of the standard calibration.
3. The acceptance limit is for the deviated value.
4. Acceptance limits was IEC61672-3:2013 Class 2.
5. The coverage factor $k$ = 2.00

- - End of Report - -

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FOUNDATION FOR INDUSTRIAL DEVELOPMENT
975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,
Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280
Tel: +66 2709 4860 Fax: +66 2324 0917

NSC-TISI-TIS 17025
CALIBRATION 0119

Certificate No.: CP20260086EA
Operation No.: CP2026020048

# Certificate of Calibration

| | |
|---|---|
| Equipment: | Sound Level Meter |
| Manufacturer: | ACO |
| Model/Type: | 6236 (Meter), 7052NR (Microphone), - (Preamplifier) |
| Serial No.: | 222187 (Meter), 84151 (Microphone), - (Preamplifier) |
| ID No.: | NS-03-017 |
| Customer: | C.E.M. Technology (Thailand) Co.,Ltd. |
| Address: | 31/8 Moo 13 T.Rai Khung, A.Sam Phran, Nakorn Phatom 73210 |
| Received Date: | 9 February 2026 |
| Calibrated Date: | 10 - 11 March 2026 |
| Issued Date: | 18 March 2026 |
| Calibrated by: | Ms. Juntaporn Kunhakom |

Approved by: _____
( Mr. Sittichai Swaksuriyawong )
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor ($k$) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.





Certificate No.: CP20260086EA

## Calibration Report

Equipment: Sound Level Meter
Manufacturer: ACO
Model/Type: 6236 (Meter), 7052NR (Microphone), - (Preamplifier)
Serial No.: 222187 (Meter), 84151 (Microphone), - (Preamplifier)
ID No.: NS-03-017
Ambient Temperature: ( 23 ± 2 ) °C
Relative Humidity: ( 50 ± 15 ) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

| | Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|---|
| 1) | Standard microphone | 4180 | 2661000 | AA-1011-25 | 24 June 2026 |
| 2) | Arbitrary Function Generator | AFG2021 | C010063 | CK20250037EA | 25 June 2026 |
| 3) | Programmable Attenuator | PA5 | 2913 | EF-0026-25 | 9 June 2026 |
| 4) | 6.5 Digit precision multimeter | 8846A | 9609027 | CB20250141EA | 20 August 2026 |
| 5) | Pressure humidity and Temperature Transmitter | PTU301 | F0640002 | CL1-P250028<br>CD20250221EA | 23 March 2026<br>8 August 2026 |
| 6) | Pressure humidity and Temperature Transmitter | PTU301 | F0640003 | CL1-P250034<br>CD20250096EA | 10 April 2026<br>29 March 2026 |
| 7) | Performance Audio Analyzer | U8903B | MY56510003 | CB20260043EA<br>CK20250065EA | 10 March 2027<br>23 September 2026 |

2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This certification is traceable to the international system of unit maintained at :-
   Reference standards instrument for Acoustic function
   - National Institute of Metrology (Thailand).; ILAC Policy, Item 2 (1) No.ILAC-P10:07/2020.
   Reference standards instrument for Electrical function
   - National Institute of Metrology (Thailand)
   - Electrical and Electronics Institute; NSC Accredited Calibration No.0119
   - IRPC Metrology Center, IRPC Public Co., Ltd.; NSC Accredited Calibration No.0204.

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

| Reference Acoustic Signal (dB) | Measured value (dB) | Deviation (dB) | Acceptance limits (dB) |
|---|---|---|---|
| - | - | - | - |





Certificate No.: CP20260086EA

## Calibration Report

Function : 2. Self-generated Noise
2.1 Microphone Installed

| Measured value (dB) |
|---|
| 20.7 |

2.2 Microphone replaced by the electrical input signal device

| Frequency Weighting | Measured value (dB) |
|---|---|
| A-weighting | 18.6 |
| C-weighting | 26.8 |
| Z-weighting | 33.9 |

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)
Meter free-field acoustic response at a level of 84 dB.

| Frequency (Hz) | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting (dB) | A-Weighting (dB) | Z-Weighting (dB) | Acceptance limits (dB) |
| 125 | -0.4 | -0.6 | -0.5 | ±1.5 |
| 1000 | 0.0 | 0.0 | 0.0 | ±1.0 |
| 8000 | 0.2 | 0.3 | 0.5 | ±5.0 |

Function : 4. Electrical signal tests of frequency weightings
Weighting network response with relative to 1 kHz.

| Frequency (Hz) | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting (dB) | A-Weighting (dB) | Z-Weighting (dB) | Acceptance limits (dB) |
| 63 | 0.0 | -0.2 | 0.0 | ±2.0 |
| 125 | 0.0 | -0.2 | 0.0 | ±1.5 |
| 250 | 0.0 | -0.1 | 0.0 | ±1.5 |
| 500 | 0.0 | 0.0 | 0.0 | ±1.5 |
| 1000 | 0.0 | 0.0 | 0.0 | ±1.0 |
| 2000 | -0.1 | 0.0 | 0.0 | ±2.0 |
| 4000 | -0.4 | -0.3 | -0.1 | ±3.0 |
| 8000 | -0.4 | -0.4 | -0.1 | ±5.0 |





Certificate No.: CP20260086EA

## Calibration Report

Function : 5. Frequency and time weighting at 1 kHz
5.1 Frequency weighting at 1 kHz

| Frequency Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| C-weighting | 94.0 | 0.0 | ±0.2 |
| A-weighting | 94.0 | 0.0 | ±0.2 |
| Z-weighting | 93.9 | -0.1 | ±0.2 |

5.2 Time weighting at 1 kHz

| Time Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| Fast | 94.0 | 0.0 | ±0.1 |
| Slow | 94.0 | 0.0 | ±0.1 |
| LAeq | 94.0 | 0.0 | ±0.1 |

Function : 6. Long-Term Stability
Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 30 | 94.0 | 94.0 | 0.0 | ±0.3 |

Function : 7. Level Linearity on the reference level range
7.1 Level Linearity on the reference level range, Upper

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±1.1 |
| 99.0 | 99.0 | 0.0 | ±1.1 |
| 104.0 | 104.0 | 0.0 | ±1.1 |
| 109.0 | 109.0 | 0.0 | ±1.1 |
| 114.0 | 114.0 | 0.0 | ±1.1 |
| 119.0 | 119.0 | 0.0 | ±1.1 |
| 120.0 | 120.1 | 0.1 | ±1.1 |
| 121.0 | 121.1 | 0.1 | ±1.1 |

Certificate No.: CP20260086EA

## Calibration Report

7.2 Level Linearity on the reference level range, Lower

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±1.1 |
| 89.0 | 89.0 | 0.0 | ±1.1 |
| 84.0 | 84.0 | 0.0 | ±1.1 |
| 79.0 | 79.0 | 0.0 | ±1.1 |
| 74.0 | 74.0 | 0.0 | ±1.1 |
| 69.0 | 69.0 | 0.0 | ±1.1 |
| 64.0 | 64.0 | 0.0 | ±1.1 |
| 59.0 | 59.0 | 0.0 | ±1.1 |
| 54.0 | 54.0 | 0.0 | ±1.1 |
| 49.0 | 49.0 | 0.0 | ±1.1 |
| 44.0 | 44.0 | 0.0 | ±1.1 |
| 39.0 | 38.8 | -0.2 | ±1.1 |
| 34.0 | 33.8 | -0.2 | ±1.1 |
| 33.0 | 32.9 | -0.1 | ±1.1 |
| 32.0 | 31.9 | -0.1 | ±1.1 |
| 31.0 | 31.0 | 0.0 | ±1.1 |
| 30.0 | 30.2 | 0.2 | ±1.1 |

Function : 8. Level Linearity including level range control

8.1. Level Linearity Including the Level Range (Reference Signal)

| Range | Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 20-100 | 94.0 | 93.9 | -0.1 | ±1.1 |
| 20-110 | 94.0 | 94.0 | 0.0 | ±1.1 |
| 30-120 | 94.0 | 94.0 | 0.0 | ±1.1 |
| 40-130 | 94.0 | 94.0 | 0.0 | ±1.1 |

8.2. Level Linearity Including the Level range (5dB Above Under-range)

| Range | Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 20-80 | 25.0 | 25.2 | 0.2 | ±1.1 |
| 20-90 | 25.0 | 25.3 | 0.3 | ±1.1 |
| 20-100 | 25.0 | 25.6 | 0.6 | ±1.1 |
| 20-110 | 25.0 | 25.7 | 0.7 | ±1.1 |
| 30-120 | 35.0 | 35.0 | 0.0 | ±1.1 |
| 40-130 | 45.0 | 45.2 | 0.2 | ±1.1 |



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20260086EA

## Calibration Report

Function : 9. Tone burst response

| Time Weighting | Tone burst duration, Tb (ms) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Fast | 200 | 116.0 | 0.0 | ±1.0 |
| | 2 | 98.9 | -0.1 | +1.0 ; -2.5 |
| | 0.25 | 89.8 | -0.2 | +1.5 ; -5.0 |
| Slow | 200 | 109.5 | -0.1 | ±1.0 |
| | 2 | 90.0 | 0.0 | +1.0 ; -5.0 |
| LAE | 200 | 109.9 | -0.1 | ±1.0 |
| | 2 | 89.9 | -0.1 | +1.0 ; -2.5 |
| | 0.25 | 80.8 | -0.2 | +1.5 ; -5.0 |

Function : 10. Peak C sound level

| Number of cycles in test signal | Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Complete cycle | 125.4 | 125.7 | 0.3 | ±3.0 |
| Positive half cycle | 124.4 | 124.2 | -0.2 | ±2.0 |
| Negative half cycle | 124.4 | 124.2 | -0.2 | ±2.0 |

Function : 11. Overload indication

| Measured value (dB) | | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| Positive one-half cycle | Negative one-half cycle | | |
| - | - | - | - |

Function : 12. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 5 | 129.0 | 129.0 | 0.0 | ±0.3 |



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20260086EA

## Calibration Report

Uncertainty of measurement

| Function | Uncertainty (dB) | Maximum-permitted uncertainty of measurement (dB) |
|---|---|---|
| 1) Indication at the calibration check frequency | 0.30 | Not applicable |
| 2) Self-generated Noise | 0.10 | Not applicable |
| 3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level | 0.30 | 0.60 (10Hz to 4kHz)<br>0.70 (>4kHz to 10kHz) |
| 4) Electrical signal tests of frequency weightings | 0.20 | 0.20 |
| 5) Frequency and time weighting at 1 kHz | 0.20 | 0.20 |
| 6) Long-Term Stability | 0.10 | 0.10 |
| 7) Level Linearity on the reference level range | 0.30 | 0.30 |
| 8) Level Linearity including level range control | 0.30 | 0.30 |
| 9) Tone burst response | 0.20 | 0.30 |
| 10) Peak C sound level | 0.20 | 0.35 |
| 11) Overload indication | 0.24 | 0.25 |
| 12) High-Level Stability | 0.10 | 0.10 |

Remarks:
1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
2. Overload indication can not measured because sound level meter can not set to Reference value of the standard calibration.
3. The acceptance limit is for the deviated value.
4. Acceptance limits was IEC61672-3:2013 Class 2.
5. The coverage factor $k$ = 2.00

- - End of Report - -



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT
975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,
Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280
Tel: +66 2709 4860 Fax: +66 2324 0917

NSC-TISI-TIS 17025 CALIBRATION 0119

Certificate No.: CP20250264EA
Operation No.: CP2025090258

# Certificate of Calibration

| | |
|---|---|
| **Equipment:** | Sound Level Meter |
| **Manufacturer:** | BSWA TECH |
| **Model/Type:** | BSWA 309 (Meter), MP309 (Microphone), MA231T (Preamplifier) |
| **Serial No.:** | 590102 (Meter), 395600 (Microphone), 590612 (Preamplifier) |
| **ID No.:** | NS-04-003 |
| **Customer:** | C.E.M. Technology (Thailand) Co.,Ltd. |
| **Address:** | 31/8 Moo 13, T.Rai Khing, A.Sam Phran, Nakhon Pathom 73210 |
| **Received Date:** | 10 September 2025 |
| **Calibrated Date:** | 23 - 25 September 2025 |
| **Issued Date:** | 26 September 2025 |
| **Calibrated by:** | Ms. Juntaporn Kunhakom |

Approved by: _____
( Mr. Sittichai Swaksuriyawong )
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.
The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor ($k$) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.



F-CAL-004 Ed.1

Certificate No.: CP20250264EA

## Calibration Report

Equipment: Sound Level Meter
Manufacturer: BSWA TECH
Model/Type: BSWA 309 (Meter), MP309 (Microphone), MA231T (Preamplifier)
Serial No.: 590102 (Meter), 395600 (Microphone), 590612 (Preamplifier)
ID No.: NS-04-003
Ambient Temperature: ( 23 ± 2 ) °C
Relative Humidity: ( 50 ± 15 ) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

| | Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|---|
| 1) | Standard microphone | 4180 | 2661000 | AA-1011-25 | 24 June 2026 |
| 2) | Arbitrary Function Generator | AFG2021 | C010063 | CK20250037EA | 25 June 2026 |
| 3) | Programmable Attenuator | PA5 | 2755 | EF-0035-24 | 28 October 2025 |
| 4) | 6.5 Digit precision multimeter | 8846A | 9610014 | CB20240215EA | 26 November 2025 |
| 5) | Pressure humidity and Temperature Transmitter | PTU301 | F0640003 | CL1-P250034<br>CD20250096EA | 10 April 2026<br>29 March 2026 |
| 6) | Performance Audio Analyzer | U8903B | MY56510003 | CB20250030EA<br>CK20250065EA | 13 February 2026<br>23 September 2026 |

2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This certification is traceable to the international system of unit maintained at :-
   Reference standards instrument for Acoustic function
   - National Institute of Metrology (Thailand).; ILAC Policy, Item 2 (1) No.ILAC-P10:07/2020.
   Reference standards instrument for Electrical function
   - National Institute of Metrology (Thailand)
   - Electrical and Electronics Institute; NSC Accredited Calibration No.0119
   - IRPC Metrology Center, IRPC Public Co., Ltd.; NSC Accredited Calibration No.0204.

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

| Reference Acoustic Signal (dB) | Measured value (dB) | Deviation (dB) | Acceptance limits (dB) |
|---|---|---|---|
| - | - | - | - |





Certificate No.: CP20250264EA

## Calibration Report

Function : 2. Self-generated Noise
2.1 Microphone Installed

| Measured value (dB) |
|---|
| 18.9 |

2.2 Microphone replaced by the electrical input signal device

| Frequency Weighting | Measured value (dB) |
|---|---|
| A-weighting | 13.3 |
| C-weighting | 18.9 |
| Z-weighting | 26.7 |

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)
Meter free-field acoustic response at a level of 84 dB.

| Frequency | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting | A-Weighting | Z-Weighting | Acceptance limits |
| (Hz) | (dB) | (dB) | (dB) | (dB) |
| 125 | 0.0 | -0.1 | 0.0 | ±1.5 |
| 1000 | 0.1 | 0.1 | 0.1 | ±1.0 |
| 8000 | 0.5 | 0.5 | 1.0 | ±5.0 |

Function : 4. Electrical signal tests of frequency weightings
Weighting network response with relative to 1 kHz.

| Frequency | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting | A-Weighting | Z-Weighting | Acceptance limits |
| (Hz) | (dB) | (dB) | (dB) | (dB) |
| 63 | 0.0 | 0.0 | 0.0 | ±2.0 |
| 125 | 0.0 | -0.1 | 0.0 | ±1.5 |
| 250 | 0.0 | -0.1 | 0.0 | ±1.5 |
| 500 | 0.0 | -0.1 | 0.0 | ±1.5 |
| 1000 | 0.0 | 0.0 | 0.0 | ±1.0 |
| 2000 | 0.0 | 0.0 | -0.1 | ±2.0 |
| 4000 | -0.1 | -0.1 | 0.0 | ±3.0 |
| 8000 | -0.6 | -0.5 | 0.0 | ±5.0 |

Function : 5. Frequency and time weighting at 1 kHz
5.1 Frequency weighting at 1 kHz

| Frequency Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| C-weighting | 94.0 | 0.0 | ±0.2 |
| A-weighting | 94.0 | 0.0 | ±0.2 |
| Z-weighting | 94.0 | 0.0 | ±0.2 |





Certificate No.: CP20250264EA

## Calibration Report

5.2 Time weighting at 1 kHz

| Time Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| Fast | 94.0 | 0.0 | ±0.1 |
| Slow | 94.0 | 0.0 | ±0.1 |
| LAeq | 94.0 | 0.0 | ±0.1 |

Function : 6. Long-Term Stability
Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 30 | 94.0 | 94.0 | 0.0 | ±0.3 |

Function : 7. Level Linearity on the reference level range
7.1 Level Linearity on the reference level range, Upper

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±1.1 |
| 99.0 | 99.0 | 0.0 | ±1.1 |
| 104.0 | 104.0 | 0.0 | ±1.1 |
| 109.0 | 109.0 | 0.0 | ±1.1 |
| 114.0 | 114.0 | 0.0 | ±1.1 |
| 119.0 | 119.0 | 0.0 | ±1.1 |
| 124.0 | 124.0 | 0.0 | ±1.1 |
| 129.0 | 129.0 | 0.0 | ±1.1 |
| 134.0 | 134.0 | 0.0 | ±1.1 |
| 135.0 | 135.0 | 0.0 | ±1.1 |
| 136.0 | 136.0 | 0.0 | ±1.1 |

7.2 Level Linearity on the reference level range, Lower

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±1.1 |
| 89.0 | 89.0 | 0.0 | ±1.1 |
| 84.0 | 84.0 | 0.0 | ±1.1 |
| 79.0 | 79.0 | 0.0 | ±1.1 |
| 74.0 | 74.0 | 0.0 | ±1.1 |
| 69.0 | 69.0 | 0.0 | ±1.1 |
| 64.0 | 64.0 | 0.0 | ±1.1 |
| 59.0 | 59.0 | 0.0 | ±1.1 |
| 54.0 | 54.0 | 0.0 | ±1.1 |
| 49.0 | 49.0 | 0.0 | ±1.1 |
| 44.0 | 44.0 | 0.0 | ±1.1 |
| 39.0 | 39.0 | 0.0 | ±1.1 |
| 34.0 | 34.0 | 0.0 | ±1.1 |





Certificate No.: CP20250264EA

## Calibration Report

7.2 Level Linearity on the reference level range, Lower (Cont.)

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 29.0 | 29.1 | 0.1 | ±1.1 |
| 28.0 | 28.1 | 0.1 | ±1.1 |
| 27.0 | 27.1 | 0.1 | ±1.1 |
| 26.0 | 26.2 | 0.2 | ±1.1 |
| 25.0 | 25.3 | 0.3 | ±1.1 |
| 24.0 | 24.4 | 0.4 | ±1.1 |
| 23.0 | 23.5 | 0.5 | ±1.1 |
| 22.0 | 22.6 | 0.6 | ±1.1 |
| 21.0 | 21.8 | 0.8 | ±1.1 |
| 20.0 | 21.0 | 1.0 | ±1.1 |

Function : 8. Tone burst response

| Time Weighting | Tone burst duration, Tb (ms) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Fast | 200 | 133.0 | 0.0 | ±1.0 |
| | 2 | 116.0 | 0.0 | +1.0 ; -2.5 |
| | 0.25 | 106.9 | -0.1 | +1.5 ; -5.0 |
| Slow | 200 | 126.6 | 0.0 | ±1.0 |
| | 2 | 107.0 | 0.0 | +1.0 ; -5.0 |
| SEL | 200 | 127.0 | 0.0 | ±1.0 |
| | 2 | 107.0 | 0.0 | +1.0 ; -2.5 |
| | 0.25 | 97.9 | -0.1 | +1.5 ; -5.0 |

Function : 9. Peak C sound level

| Number of cycles in test signal | Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Complete cycle | 132.4 | 132.1 | -0.3 | ±3.0 |
| Positive half cycle | 131.4 | 131.2 | -0.2 | ±2.0 |
| Negative half cycle | 131.4 | 131.2 | -0.2 | ±2.0 |

Function : 10. Overload indication

| Measured value (dB) | | Deviated value | Acceptance limits |
|---|---|---|---|
| Positive one-half cycle | Negative one-half cycle | (dB) | (dB) |
| 138.8 | 138.8 | 0.0 | ±1.5 |

ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20250264EA

## Calibration Report

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 5 | 136.0 | 136.0 | 0.0 | ±0.3 |

Uncertainty of measurement

| Function | Uncertainty (dB) | Maximum-permitted uncertainty of measurement (dB) |
|---|---|---|
| 1) Indication at the calibration check frequency | 0.30 | Not applicable |
| 2) Self-generated Noise | 0.10 | Not applicable |
| 3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level | 0.30 | 0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz) |
| 4) Electrical signal tests of frequency weightings | 0.20 | 0.20 |
| 5) Frequency and time weighting at 1 kHz | 0.20 | 0.20 |
| 6) Long-Term Stability | 0.10 | 0.10 |
| 7) Level Linearity on the reference level range | 0.30 | 0.30 |
| 8) Tone burst response | 0.20 | 0.30 |
| 9) Peak C sound level | 0.20 | 0.35 |
| 10) Overload indication | 0.24 | 0.25 |
| 11) High-Level Stability | 0.10 | 0.10 |

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
2. The acceptance limit is for the deviated value.
3. Acceptance limits was IEC61672-3:2013 Class 2.
4. The coverage factor $k$ = 2.00

- - End of Report - -



F-CAL-005 Ed.1

SMART TECH CALIBRATION & SERVICES CO., LTD.
14/506 MOO 3, RANGSIT-NAKHON NAYOK ROAD, LAM PHAK KUT,
THANYABURI, PATHUM THANI 12110, THAILAND
Tel. +662-114-3148 Email : stcal.md@gmail.com Website : stc-cal.com

ANAB ACCREDITED CALIBRATION LABORATORY AC-3093

## Certificate of Calibration

**Certificate No.** STCR-2509134-12
**Work Order No.** STCR-2509134


| | | |
|---|---|---|
| **Customer Name** | : | CEM Technology Thailand Co., Ltd.<br>31/8 Moo.13 Raikhing Sub-district, Samphran District,<br>Nakhonpathom, 73210 |
| **Equipment Name** | : | Sound Level Meter |
| **Manufacturer** | : | Pulsar |
| **Model** | : | 44 |
| **Serial Number** | : | PN2297 |
| **Control Number** | : | NS-08-001 |
| **Received Date** | : | Sep 22, 2025 |
| **Calibration Date** | : | Sep 22, 2025 |
| **Recommended Due Date** | : | Sep 22, 2026 |
| **Calibration Method** | : | Calibration Procedure No. CPE-04-01 |
| **Environmental Conditions** | | |
| Ambient Temperature | : | (25 ± 2) °C |
| Ambient Relative Humidity | : | (50 ± 15) %RH |
| Calibration Place | : | Permanent Calibration Laboratory |
| **Condition as received** | : | Normal |
| **Calibration Result** | : | See data attached |

1. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Smart Tech Calibration & Services Co., Ltd.
5. This results of this report only to the items calibrated.

**Date of Issue** : Oct 1, 2025
**Calibrated by** : Y. Perapon

**Approved by :**
( Mr.Chayut Wongkeng )
**Laboratory Manager**

@smarttechcal

## Calibration Report

Smart Tech Calibration & Services Co., Ltd.

**Certificate No.:** STCR-2509134-12


**Standards Equipment Used**

| Equipment Name | Serial No. | Certificate No. | Due Date | Traceability to |
|---|---|---|---|---|
| Sound Calibrator | N975185 | 5523631031354566 | Nov 6, 2025 | MP-TH |

**Traceability**

This calibration is traceable to the International System of Unit via :

- MP-TH : Micro Precision Calibration Laboratory (Thailand) Co., Ltd.

## Calibration Report

Smart Tech Calibration & Services Co., Ltd.

**Certificate No.:** STCR-2509134-12


UUC Range : (20 to 140) dB Resolution : 0.1 dB

Results of Calibration: [ ] Without adjustment [ ✓ ] With adjustment

Appearance and Function of Use Inspection : GOOD

Sound Level Calibration @ Frequency 1 kHz Select : A

| Response times | STD. Value | UUC. Reading | | Correction | (±) Uncertainty |
|---|---|---|---|---|---|
| | | Before Adjustment | After Adjustment | | |
| FAST | 94.09 dB | 94.9 dB | 93.8 dB | 0.29 dB | 0.40 dB |
| | 114.07 dB | 114.8 dB | 113.8 dB | 0.27 dB | 0.40 dB |
| SLOW | 94.09 dB | 92.5 dB | 93.8 dB | 0.29 dB | 0.40 dB |
| | 114.07 dB | 112.5 dB | 113.8 dB | 0.27 dB | 0.40 dB |

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -

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FOUNDATION FOR INDUSTRIAL DEVELOPMENT
975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,
Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280
Tel: +66 2709 4860 Fax: +66 2324 0917

NSC-TISI-TIS 17025
CALIBRATION 0119

Certificate No.: CP20260087EA
Operation No.: CP2026020050

# Certificate of Calibration

| | |
|---|---|
| **Equipment:** | Sound Level Meter |
| **Manufacturer:** | SCARLET TECH |
| **Model/Type:** | ST11D (Meter), AWA14425 (Microphone), - (Preamplifier) |
| **Serial No.:** | 820891 (Meter), 60237 (Microphone), - (Preamplifier) |
| **ID No.:** | NS-12-002 |
| **Customer:** | C.E.M. Technology (Thailand) Co.,Ltd. |
| **Address:** | 31/8 Moo 13 T.Rai Khung, A.Sam Phran, Nakorn Phatom 73210 |
| **Received Date:** | 9 February 2026 |
| **Calibrated Date:** | 10 - 11 March 2026 |
| **Issued Date:** | 13 March 2026 |
| **Calibrated by:** | Ms. Juntaporn Kunhakom |

Approved by: _____
( Mr. Sittichai Swaksuriyawong )
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor ($k$) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.





Certificate No.: CP20260087EA

## Calibration Report

Equipment: Sound Level Meter
Manufacturer: SCARLET TECH
Model/Type: ST11D (Meter), AWA14425 (Microphone), - (Preamplifier)
Serial No.: 820891 (Meter), 60237 (Microphone), - (Preamplifier)
ID No.: NS-12-002
Ambient Temperature: ( 23 ± 2 ) °C
Relative Humidity: ( 50 ± 15 ) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

| | Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|---|
| 1) | Standard microphone | 4180 | 2661000 | AA-1011-25 | 24 June 2026 |
| 2) | Arbitrary Function Generator | AFG2021 | C010063 | CK20250037EA | 25 June 2026 |
| 3) | Programmable Attenuator | PA5 | 2913 | EF-0026-25 | 9 June 2026 |
| 4) | 6.5 Digit precision multimeter | 8846A | 9609027 | CB20250141EA | 20 August 2026 |
| 5) | Pressure humidity and Temperature Transmitter | PTU301 | F0640002 | CL1-P250028<br>CD20250221EA | 23 March 2026<br>8 August 2026 |
| 6) | Pressure humidity and Temperature Transmitter | PTU301 | F0640003 | CL1-P250034<br>CD20250096EA | 10 April 2026<br>29 March 2026 |
| 7) | Performance Audio Analyzer | U8903B | MY56510003 | CB20260043EA<br>CK20250065EA | 10 March 2027<br>23 September 2026 |

2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This certification is traceable to the international system of unit maintained at :-
   Reference standards instrument for Acoustic function
   - National Institute of Metrology (Thailand).; ILAC Policy, Item 2 (1) No.ILAC-P10:07/2020.
   Reference standards instrument for Electrical function
   - National Institute of Metrology (Thailand)
   - Electrical and Electronics Institute; NSC Accredited Calibration No.0119
   - IRPC Metrology Center, IRPC Public Co., Ltd.; NSC Accredited Calibration No.0204.

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

| Reference Acoustic Signal (dB) | Measured value (dB) | Deviation (dB) | Acceptance limits (dB) |
|---|---|---|---|
| - | - | - | - |





Certificate No.: CP20260087EA

## Calibration Report

Function : 2. Self-generated Noise
2.1 Microphone Installed

| Measured value (dB) |
|---|
| 15.5 |

2.2 Microphone replaced by the electrical input signal device

| Frequency Weighting | Measured value (dB) |
|---|---|
| A-weighting | 5.8 |
| C-weighting | 6.9 |
| Z-weighting | 13.0 |

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)
Meter free-field acoustic response at a level of 84 dB.

| Frequency (Hz) | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting (dB) | A-Weighting (dB) | Z-Weighting (dB) | Acceptance limits (dB) |
| 125 | 0.4 | 0.2 | 0.2 | ±1.0 |
| 1000 | 0.1 | 0.1 | 0.1 | ±0.7 |
| 8000 | -0.9 | -1.6 | -1.5 | +1.5; -2.5 |

Function : 4. Electrical signal tests of frequency weightings
Weighting network response with relative to 1 kHz.

| Frequency (Hz) | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting (dB) | A-Weighting (dB) | Z-Weighting (dB) | Acceptance limits (dB) |
| 63 | 0.1 | -0.1 | 0.0 | ±1.0 |
| 125 | 0.0 | 0.0 | -0.1 | ±1.0 |
| 250 | 0.0 | -0.1 | 0.0 | ±1.0 |
| 500 | 0.0 | 0.0 | 0.0 | ±1.0 |
| 1000 | 0.0 | 0.0 | 0.0 | ±0.7 |
| 2000 | 0.0 | 0.0 | 0.0 | ±1.0 |
| 4000 | 0.1 | 0.0 | 0.0 | ±1.0 |
| 8000 | -0.1 | -0.1 | 0.0 | +1.5; -2.5 |
| 16000 | -5.2 | -5.2 | 0.1 | +2.5; -16.0 |





Certificate No.: CP20260087EA

## Calibration Report

Function : 5. Frequency and time weighting at 1 kHz
5.1 Frequency weighting at 1 kHz

| Frequency Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| C-weighting | 94.0 | 0.0 | ±0.2 |
| A-weighting | 94.0 | 0.0 | ±0.2 |
| Z-weighting | 93.9 | -0.1 | ±0.2 |

5.2 Time weighting at 1 kHz

| Time Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| Fast | 94.0 | 0.0 | ±0.1 |
| Slow | 94.0 | 0.0 | ±0.1 |
| LAeq | 94.0 | 0.0 | ±0.1 |

Function : 6. Long-Term Stability
Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 30 | 94.0 | 94.0 | 0.0 | ±0.1 |

Function : 7. Level Linearity on the reference level range
7.1 Level Linearity on the reference level range, Upper

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±0.8 |
| 99.0 | 99.0 | 0.0 | ±0.8 |
| 104.0 | 104.0 | 0.0 | ±0.8 |
| 109.0 | 109.0 | 0.0 | ±0.8 |
| 114.0 | 114.0 | 0.0 | ±0.8 |
| 119.0 | 119.0 | 0.0 | ±0.8 |
| 124.0 | 124.0 | 0.0 | ±0.8 |
| 129.0 | 129.0 | 0.0 | ±0.8 |
| 134.0 | 134.0 | 0.0 | ±0.8 |
| 139.0 | 139.0 | 0.0 | ±0.8 |

7.2 Level Linearity on the reference level range, Lower

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±0.8 |
| 89.0 | 89.0 | 0.0 | ±0.8 |
| 84.0 | 84.0 | 0.0 | ±0.8 |
| 79.0 | 79.0 | 0.0 | ±0.8 |
| 74.0 | 74.0 | 0.0 | ±0.8 |

Certificate No.: CP20260087EA

## Calibration Report

7.2 Level Linearity on the reference level range, Lower

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 69.0 | 69.0 | 0.0 | ±0.8 |
| 64.0 | 64.0 | 0.0 | ±0.8 |
| 59.0 | 59.0 | 0.0 | ±0.8 |
| 54.0 | 54.0 | 0.0 | ±0.8 |
| 49.0 | 49.0 | 0.0 | ±0.8 |
| 44.0 | 44.0 | 0.0 | ±0.8 |
| 39.0 | 39.0 | 0.0 | ±0.8 |
| 34.0 | 33.9 | -0.1 | ±0.8 |
| 29.0 | 28.9 | -0.1 | ±0.8 |
| 28.0 | 27.8 | -0.2 | ±0.8 |
| 27.0 | 26.8 | -0.2 | ±0.8 |
| 26.0 | 25.8 | -0.2 | ±0.8 |
| 25.0 | 24.7 | -0.3 | ±0.8 |
| 24.0 | 23.7 | -0.3 | ±0.8 |
| 23.0 | 22.7 | -0.3 | ±0.8 |
| 22.0 | 21.6 | -0.4 | ±0.8 |
| 21.0 | 20.5 | -0.5 | ±0.8 |
| 20.0 | 19.4 | -0.6 | ±0.8 |
| 19.0 | 18.3 | -0.7 | ±0.8 |

Function : 8. Tone burst response

| Time Weighting | Tone burst duration, Tb (ms) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Fast | 200 | 136.0 | 0.0 | ±0.5 |
| | 2 | 119.0 | 0.0 | +1.0 ; -1.5 |
| | 0.25 | 109.7 | -0.3 | +1.0 ; -3.0 |
| Slow | 200 | 129.6 | 0.0 | ±0.5 |
| | 2 | 110.0 | 0.0 | +1.0 ; -3.0 |
| SEL | 200 | 130.1 | 0.1 | ±0.5 |
| | 2 | 110.1 | 0.1 | +1.0 ; -1.5 |
| | 0.25 | 101.0 | 0.0 | +1.0 ; -3.0 |

Function : 9. Peak C sound level

| Number of cycles in test signal | Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Complete cycle | 135.4 | 134.9 | -0.5 | ±2.0 |
| Positive half cycle | 134.4 | 134.1 | -0.3 | ±1.0 |
| Negative half cycle | 134.4 | 134.1 | -0.3 | ±1.0 |





Certificate No.: CP20260087EA

## Calibration Report

Function : 10. Overload indication

| Measured value (dB) | | Deviated value | Acceptance limits |
|---|---|---|---|
| Positive one-half cycle | Negative one-half cycle | (dB) | (dB) |
| 142.4 | 142.4 | 0.0 | ±1.5 |

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 5 | 139.0 | 139.0 | 0.0 | ±0.1 |

Uncertainty of measurement

| Function | Uncertainty (dB) | Maximum-permitted uncertainty of measurement (dB) |
|---|---|---|
| 1) Indication at the calibration check frequency | 0.30 | Not applicable |
| 2) Self-generated Noise | 0.10 | Not applicable |
| 3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level | 0.30 | 0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz) |
| 4) Electrical signal tests of frequency weightings | 0.20 | 0.20 |
| 5) Frequency and time weighting at 1 kHz | 0.20 | 0.20 |
| 6) Long-Term Stability | 0.10 | 0.10 |
| 7) Level Linearity on the reference level range | 0.30 | 0.30 |
| 8) Tone burst response | 0.20 | 0.30 |
| 9) Peak C sound level | 0.20 | 0.35 |
| 10) Overload indication | 0.24 | 0.25 |
| 11) High-Level Stability | 0.10 | 0.10 |

Remarks:
1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
2. The acceptance limit is for the deviated value.
3. Acceptance limits was IEC61672-3:2013 Class 1.
4. The coverage factor $k$ = 2.00

- - End of Report - -



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975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,
Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280
Tel: +66 2709 4860 Fax: +66 2324 0917

NSC-TISI-TIS 17025
CALIBRATION 0119

Certificate No.: CP20260089EA
Operation No.: CP2026020052

# Certificate of Calibration

| | |
|---|---|
| Equipment: | Sound Level Meter |
| Manufacturer: | SCARLET TECH |
| Model/Type: | ST11D (Meter), AWA14425 (Microphone), - (Preamplifier) |
| Serial No.: | 821486 (Meter), 61344 (Microphone), - (Preamplifier) |
| ID No.: | NS-12-004 |
| Customer: | C.E.M. Technology (Thailand) Co.,Ltd. |
| Address: | 31/8 Moo 13 T.Rai Khung, A.Sam Phran, Nakorn Phatom 73210 |
| Received Date: | 9 February 2026 |
| Calibrated Date: | 11 - 12 March 2026 |
| Issued Date: | 13 March 2026 |
| Calibrated by: | Ms. Juntaporn Kunhakom |

Approved by: _____
( Mr. Sittichai Swaksuriyawong )
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor ($k$) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.





Certificate No.: CP20260089EA

## Calibration Report

| | |
|---|---|
| Equipment: | Sound Level Meter |
| Manufacturer: | SCARLET TECH |
| Model/Type: | ST11D (Meter), AWA14425 (Microphone), - (Preamplifier) |
| Serial No.: | 821486 (Meter), 61344 (Microphone), - (Preamplifier) |
| ID No.: | NS-12-004 |
| Ambient Temperature: | ( 23 ± 2 ) °C |
| Relative Humidity: | ( 50 ± 15 ) % |
| Pressure: | (101.3 ± 1.5) kPa |

Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

| | Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|---|
| 1) | Standard microphone | 4180 | 2661000 | AA-1011-25 | 24 June 2026 |
| 2) | Arbitrary Function Generator | AFG2021 | C010063 | CK20250037EA | 25 June 2026 |
| 3) | Programmable Attenuator | PA5 | 2913 | EF-0026-25 | 9 June 2026 |
| 4) | 6.5 Digit precision multimeter | 8846A | 9609027 | CB20250141EA | 20 August 2026 |
| 5) | Pressure humidity and Temperature Transmitter | PTU301 | F0640002 | CL1-P250028<br>CD20250221EA | 23 March 2026<br>8 August 2026 |
| 6) | Pressure humidity and Temperature Transmitter | PTU301 | F0640003 | CL1-P250034<br>CD20250096EA | 10 April 2026<br>29 March 2026 |
| 7) | Performance Audio Analyzer | U8903B | MY56510003 | CB20260043EA<br>CK20250065EA | 10 March 2027<br>23 September 2026 |

2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This certification is traceable to the international system of unit maintained at :-
   Reference standards instrument for Acoustic function
   - National Institute of Metrology (Thailand).; ILAC Policy, Item 2 (1) No.ILAC-P10:07/2020.
   Reference standards instrument for Electrical function
   - National Institute of Metrology (Thailand)
   - Electrical and Electronics Institute; NSC Accredited Calibration No.0119
   - IRPC Metrology Center, IRPC Public Co., Ltd.; NSC Accredited Calibration No.0204.

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

| Reference Acoustic Signal (dB) | Measured value (dB) | Deviation (dB) | Acceptance limits (dB) |
|---|---|---|---|
| - | - | - | - |

Certificate No.: CP20260089EA

## Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

| Measured value (dB) |
|---|
| 15.9 |

2.2 Microphone replaced by the electrical input signal device

| Frequency Weighting | Measured value (dB) |
|---|---|
| A-weighting | 8.4 |
| C-weighting | 10.1 |
| Z-weighting | 15.4 |

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Meter free-field acoustic response at a level of 84 dB.

| Frequency (Hz) | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting (dB) | A-Weighting (dB) | Z-Weighting (dB) | Acceptance limits (dB) |
| 125 | 0.1 | 0.1 | 0.0 | ±1.0 |
| 1000 | 0.2 | 0.2 | 0.2 | ±0.7 |
| 8000 | -0.8 | -0.7 | -0.7 | +1.5; -2.5 |

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

| Frequency (Hz) | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting (dB) | A-Weighting (dB) | Z-Weighting (dB) | Acceptance limits (dB) |
| 63 | 0.0 | 0.0 | 0.0 | ±1.0 |
| 125 | 0.0 | -0.1 | 0.0 | ±1.0 |
| 250 | 0.0 | -0.2 | -0.1 | ±1.0 |
| 500 | 0.0 | 0.0 | -0.1 | ±1.0 |
| 1000 | 0.0 | 0.0 | 0.0 | ±0.7 |
| 2000 | 0.0 | 0.1 | 0.0 | ±1.0 |
| 4000 | 0.0 | 0.1 | 0.0 | ±1.0 |
| 8000 | -0.1 | 0.0 | -0.1 | +1.5; -2.5 |
| 16000 | -5.2 | -5.2 | 0.1 | +2.5; -16.0 |



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Certificate No.: CP20260089EA

## Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

| Frequency Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| C-weighting | 94.0 | 0.0 | ±0.2 |
| A-weighting | 94.0 | 0.0 | ±0.2 |
| Z-weighting | 93.9 | -0.1 | ±0.2 |

5.2 Time weighting at 1 kHz

| Time Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| Fast | 94.0 | 0.0 | ±0.1 |
| Slow | 94.0 | 0.0 | ±0.1 |
| LAeq | 94.0 | 0.0 | ±0.1 |

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 30 | 94.0 | 94.0 | 0.0 | ±0.1 |

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±0.8 |
| 99.0 | 99.0 | 0.0 | ±0.8 |
| 104.0 | 104.0 | 0.0 | ±0.8 |
| 109.0 | 109.0 | 0.0 | ±0.8 |
| 114.0 | 114.0 | 0.0 | ±0.8 |
| 119.0 | 119.0 | 0.0 | ±0.8 |
| 124.0 | 124.0 | 0.0 | ±0.8 |
| 129.0 | 129.0 | 0.0 | ±0.8 |
| 134.0 | 134.0 | 0.0 | ±0.8 |
| 139.0 | 139.0 | 0.0 | ±0.8 |

7.2 Level Linearity on the reference level range, Lower

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±0.8 |
| 89.0 | 89.0 | 0.0 | ±0.8 |
| 84.0 | 84.0 | 0.0 | ±0.8 |
| 79.0 | 79.0 | 0.0 | ±0.8 |
| 74.0 | 74.0 | 0.0 | ±0.8 |



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20260089EA

## Calibration Report

7.2 Level Linearity on the reference level range, Lower

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 69.0 | 69.0 | 0.0 | ±0.8 |
| 64.0 | 64.0 | 0.0 | ±0.8 |
| 59.0 | 59.0 | 0.0 | ±0.8 |
| 54.0 | 54.0 | 0.0 | ±0.8 |
| 49.0 | 49.0 | 0.0 | ±0.8 |
| 44.0 | 44.0 | 0.0 | ±0.8 |
| 39.0 | 39.0 | 0.0 | ±0.8 |
| 34.0 | 33.9 | -0.1 | ±0.8 |
| 29.0 | 28.9 | -0.1 | ±0.8 |
| 28.0 | 27.8 | -0.2 | ±0.8 |
| 27.0 | 26.8 | -0.2 | ±0.8 |
| 26.0 | 25.8 | -0.2 | ±0.8 |
| 25.0 | 24.8 | -0.2 | ±0.8 |
| 24.0 | 23.8 | -0.2 | ±0.8 |
| 23.0 | 22.8 | -0.2 | ±0.8 |
| 22.0 | 21.8 | -0.2 | ±0.8 |
| 21.0 | 20.7 | -0.3 | ±0.8 |
| 20.0 | 19.6 | -0.4 | ±0.8 |
| 19.0 | 18.5 | -0.5 | ±0.8 |

Function : 8. Tone burst response

| Time Weighting | Tone burst duration, Tb (ms) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Fast | 200 | 135.9 | -0.1 | ±0.5 |
| | 2 | 118.9 | -0.1 | +1.0 ; -1.5 |
| | 0.25 | 109.7 | -0.3 | +1.0 ; -3.0 |
| Slow | 200 | 129.6 | 0.0 | ±0.5 |
| | 2 | 110.0 | 0.0 | +1.0 ; -3.0 |
| SEL | 200 | 130.0 | 0.0 | ±0.5 |
| | 2 | 110.0 | 0.0 | +1.0 ; -1.5 |
| | 0.25 | 101.0 | 0.0 | +1.0 ; -3.0 |

Function : 9. Peak C sound level

| Number of cycles in test signal | Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Complete cycle | 135.4 | 135.0 | -0.4 | ±2.0 |
| Positive half cycle | 134.4 | 134.0 | -0.4 | ±1.0 |
| Negative half cycle | 134.4 | 134.0 | -0.4 | ±1.0 |



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20260089EA

## Calibration Report

Function : 10. Overload indication

| Measured value (dB) | | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| Positive one-half cycle | Negative one-half cycle | | |
| 142.8 | 143.0 | 0.2 | ±1.5 |

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 5 | 139.0 | 139.0 | 0.0 | ±0.1 |

Uncertainty of measurement

| Function | Uncertainty (dB) | Maximum-permitted uncertainty of measurement (dB) |
|---|---|---|
| 1) Indication at the calibration check frequency | 0.30 | Not applicable |
| 2) Self-generated Noise | 0.10 | Not applicable |
| 3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level | 0.30 | 0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz) |
| 4) Electrical signal tests of frequency weightings | 0.20 | 0.20 |
| 5) Frequency and time weighting at 1 kHz | 0.20 | 0.20 |
| 6) Long-Term Stability | 0.10 | 0.10 |
| 7) Level Linearity on the reference level range | 0.30 | 0.30 |
| 8) Tone burst response | 0.20 | 0.30 |
| 9) Peak C sound level | 0.20 | 0.35 |
| 10) Overload indication | 0.24 | 0.25 |
| 11) High-Level Stability | 0.10 | 0.10 |

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
2. The acceptance limit is for the deviated value.
3. Acceptance limits was IEC61672-3:2013 Class 1.
4. The coverage factor $k = 2.00$

- - End of Report - -

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975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,
Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280
Tel: +66 2709 4860 Fax: +66 2324 0917

NSC-TISI-TIS 17025
CALIBRATION 0119

Certificate No.: CP20260090EA
Operation No.: CP2026020053

# Certificate of Calibration

| | |
|---|---|
| Equipment: | Sound Level Meter |
| Manufacturer: | SCARLET TECH |
| Model/Type: | ST11D (Meter), AWA14425 (Microphone), - (Preamplifier) |
| Serial No.: | 821487 (Meter), 52240 (Microphone), - (Preamplifier) |
| ID No.: | NS-12-005 |
| Customer: | C.E.M. Technology (Thailand) Co.,Ltd. |
| Address: | 31/8 Moo 13 T.Rai Khung, A.Sam Phran, Nakorn Phatom 73210 |
| Received Date: | 9 February 2026 |
| Calibrated Date: | 11 - 12 March 2026 |
| Issued Date: | 13 March 2026 |
| Calibrated by: | Ms. Juntaporn Kunhakom |

Approved by:
( Mr. Sittichai Swaksuriyawong )
Group Manager

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Certificate No.: CP20260090EA

## Calibration Report

Equipment: Sound Level Meter
Manufacturer: SCARLET TECH
Model/Type: ST11D (Meter), AWA14425 (Microphone), - (Preamplifier)
Serial No.: 821487 (Meter), 52240 (Microphone), - (Preamplifier)
ID No.: NS-12-005
Ambient Temperature: ( 23 ± 2 ) °C
Relative Humidity: ( 50 ± 15 ) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|
| 1) Standard microphone | 4180 | 2661000 | AA-1011-25 | 24 June 2026 |
| 2) Arbitrary Function Generator | AFG2021 | C010063 | CK20250037EA | 25 June 2026 |
| 3) Programmable Attenuator | PA5 | 2913 | EF-0026-25 | 9 June 2026 |
| 4) 6.5 Digit precision multimeter | 8846A | 9609027 | CB20250141EA | 20 August 2026 |
| 5) Pressure humidity and Temperature Transmitter | PTU301 | F0640002 | CL1-P250028<br>CD20250221EA | 23 March 2026<br>8 August 2026 |
| 6) Pressure humidity and Temperature Transmitter | PTU301 | F0640003 | CL1-P250034<br>CD20250096EA | 10 April 2026<br>29 March 2026 |
| 7) Performance Audio Analyzer | U8903B | MY56510003 | CB20260043EA<br>CK20250065EA | 10 March 2027<br>23 September 2026 |

2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This certification is traceable to the international system of unit maintained at :-
   Reference standards instrument for Acoustic function
   - National Institute of Metrology (Thailand).; ILAC Policy, Item 2 (1) No.ILAC-P10:07/2020.
   Reference standards instrument for Electrical function
   - National Institute of Metrology (Thailand)
   - Electrical and Electronics Institute; NSC Accredited Calibration No.0119
   - IRPC Metrology Center, IRPC Public Co., Ltd.; NSC Accredited Calibration No.0204.

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

| Reference Acoustic Signal (dB) | Measured value (dB) | Deviation (dB) | Acceptance limits (dB) |
|---|---|---|---|
| - | - | - | - |





Certificate No.: CP20260090EA

## Calibration Report

Function : 2. Self-generated Noise
2.1 Microphone Installed

| Measured value (dB) |
|---|
| 16.2 |

2.2 Microphone replaced by the electrical input signal device

| Frequency Weighting | Measured value (dB) |
|---|---|
| A-weighting | 9.2 |
| C-weighting | 9.3 |
| Z-weighting | 16.9 |

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)
Meter free-field acoustic response at a level of 84 dB.

| Frequency (Hz) | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting (dB) | A-Weighting (dB) | Z-Weighting (dB) | Acceptance limits (dB) |
| 125 | 0.2 | 0.2 | 0.2 | ±1.0 |
| 1000 | 0.0 | 0.0 | 0.0 | ±0.7 |
| 8000 | -1.0 | -0.9 | -1.0 | +1.5; -2.5 |

Function : 4. Electrical signal tests of frequency weightings
Weighting network response with relative to 1 kHz.

| Frequency (Hz) | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting (dB) | A-Weighting (dB) | Z-Weighting (dB) | Acceptance limits (dB) |
| 63 | 0.1 | 0.1 | 0.1 | ±1.0 |
| 125 | 0.0 | 0.0 | 0.0 | ±1.0 |
| 250 | 0.0 | 0.0 | 0.0 | ±1.0 |
| 500 | 0.0 | 0.0 | 0.0 | ±1.0 |
| 1000 | 0.0 | 0.0 | 0.0 | ±0.7 |
| 2000 | 0.0 | 0.1 | 0.3 | ±1.0 |
| 4000 | 0.1 | 0.0 | 0.0 | ±1.0 |
| 8000 | -0.1 | 0.0 | 0.1 | +1.5; -2.5 |
| 16000 | -5.2 | -5.2 | -0.1 | +2.5; -16.0 |





Certificate No.: CP20260090EA

## Calibration Report

Function : 5. Frequency and time weighting at 1 kHz
5.1 Frequency weighting at 1 kHz

| Frequency Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| C-weighting | 94.0 | 0.0 | ±0.2 |
| A-weighting | 94.0 | 0.0 | ±0.2 |
| Z-weighting | 93.9 | -0.1 | ±0.2 |

5.2 Time weighting at 1 kHz

| Time Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| Fast | 94.0 | 0.0 | ±0.1 |
| Slow | 94.0 | 0.0 | ±0.1 |
| LAeq | 94.0 | 0.0 | ±0.1 |

Function : 6. Long-Term Stability
Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 30 | 94.0 | 94.0 | 0.0 | ±0.1 |

Function : 7. Level Linearity on the reference level range
7.1 Level Linearity on the reference level range, Upper

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±0.8 |
| 99.0 | 99.0 | 0.0 | ±0.8 |
| 104.0 | 104.0 | 0.0 | ±0.8 |
| 109.0 | 109.0 | 0.0 | ±0.8 |
| 114.0 | 114.0 | 0.0 | ±0.8 |
| 119.0 | 119.0 | 0.0 | ±0.8 |
| 124.0 | 124.0 | 0.0 | ±0.8 |
| 129.0 | 129.0 | 0.0 | ±0.8 |
| 134.0 | 134.0 | 0.0 | ±0.8 |
| 139.0 | 139.0 | 0.0 | ±0.8 |
| 140.0 | 140.0 | 0.0 | ±0.8 |

7.2 Level Linearity on the reference level range, Lower

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±0.8 |
| 89.0 | 89.0 | 0.0 | ±0.8 |
| 84.0 | 84.0 | 0.0 | ±0.8 |
| 79.0 | 79.0 | 0.0 | ±0.8 |
| 74.0 | 74.0 | 0.0 | ±0.8 |

Certificate No.: CP20260090EA

## Calibration Report

7.2 Level Linearity on the reference level range, Lower

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 69.0 | 69.0 | 0.0 | ±0.8 |
| 64.0 | 64.0 | 0.0 | ±0.8 |
| 59.0 | 59.0 | 0.0 | ±0.8 |
| 54.0 | 54.0 | 0.0 | ±0.8 |
| 49.0 | 49.0 | 0.0 | ±0.8 |
| 44.0 | 44.0 | 0.0 | ±0.8 |
| 39.0 | 39.0 | 0.0 | ±0.8 |
| 34.0 | 33.9 | -0.1 | ±0.8 |
| 29.0 | 28.9 | -0.1 | ±0.8 |
| 28.0 | 27.8 | -0.2 | ±0.8 |
| 27.0 | 26.8 | -0.2 | ±0.8 |
| 26.0 | 25.8 | -0.2 | ±0.8 |
| 25.0 | 24.8 | -0.2 | ±0.8 |
| 24.0 | 23.8 | -0.2 | ±0.8 |
| 23.0 | 22.8 | -0.2 | ±0.8 |
| 22.0 | 21.8 | -0.2 | ±0.8 |
| 21.0 | 20.7 | -0.3 | ±0.8 |
| 20.0 | 19.6 | -0.4 | ±0.8 |
| 19.0 | 18.5 | -0.5 | ±0.8 |

Function : 8. Tone burst response

| Time Weighting | Tone burst duration, Tb (ms) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Fast | 200 | 136.0 | 0.0 | ±0.5 |
| | 2 | 118.8 | -0.2 | +1.0 ; -1.5 |
| | 0.25 | 109.8 | -0.2 | +1.0 ; -3.0 |
| Slow | 200 | 129.6 | 0.0 | ±0.5 |
| | 2 | 110.0 | 0.0 | +1.0 ; -3.0 |
| SEL | 200 | 130.0 | 0.0 | ±0.5 |
| | 2 | 110.0 | 0.0 | +1.0 ; -1.5 |
| | 0.25 | 100.9 | -0.1 | +1.0 ; -3.0 |

Function : 9. Peak C sound level

| Number of cycles in test signal | Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Complete cycle | 135.4 | 135.0 | -0.4 | ±2.0 |
| Positive half cycle | 134.4 | 134.1 | -0.3 | ±1.0 |
| Negative half cycle | 134.4 | 134.1 | -0.3 | ±1.0 |





Certificate No.: CP20260090EA

## Calibration Report

Function : 10. Overload indication

| Measured value (dB) | | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| Positive one-half cycle | Negative one-half cycle | | |
| 143.5 | 143.5 | 0.0 | ±1.5 |

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 5 | 139.0 | 139.0 | 0.0 | ±0.1 |

Uncertainty of measurement

| Function | Uncertainty (dB) | Maximum-permitted uncertainty of measurement (dB) |
|---|---|---|
| 1) Indication at the calibration check frequency | 0.30 | Not applicable |
| 2) Self-generated Noise | 0.10 | Not applicable |
| 3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level | 0.30 | 0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz) |
| 4) Electrical signal tests of frequency weightings | 0.20 | 0.20 |
| 5) Frequency and time weighting at 1 kHz | 0.20 | 0.20 |
| 6) Long-Term Stability | 0.10 | 0.10 |
| 7) Level Linearity on the reference level range | 0.30 | 0.30 |
| 8) Tone burst response | 0.20 | 0.30 |
| 9) Peak C sound level | 0.20 | 0.35 |
| 10) Overload indication | 0.24 | 0.25 |
| 11) High-Level Stability | 0.10 | 0.10 |

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
2. The acceptance limit is for the deviated value.
3. Acceptance limits was IEC61672-3:2013 Class 1.
4. The coverage factor $k$ = 2.00

- - End of Report - -



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FOUNDATION FOR INDUSTRIAL DEVELOPMENT
975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,
Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280
Tel: +66 2709 4860 Fax: +66 2324 0917

NSC-TISI-TIS 17025 CALIBRATION 0119

Certificate No.: CP20250255EA
Operation No.: CP2025080248

# Certificate of Calibration

| | |
|---|---|
| **Equipment:** | Sound Level Meter |
| **Manufacturer:** | SCARLET TECH |
| **Model/Type:** | ST11D (Meter), AWA14425 (Microphone), - (Preamplifier) |
| **Serial No.:** | 821488 (Meter), 55133 (Microphone), - (Preamplifier) |
| **ID No.:** | NS-12-006 |
| **Customer:** | C.E.M. Technology (Thailand) Co.,Ltd. |
| **Address:** | 31/8 Moo 13, T.Rai Khing, A.Sam Phran, Nakhon Pathom 73210 |
| **Received Date:** | 26 August 2025 |
| **Calibrated Date:** | 2 - 3 September 2025 |
| **Issued Date:** | 4 September 2025 |
| **Calibrated by:** | Ms. Juntaporn Kunhakom |

Approved by: _____
( Mr. Sittichai Swaksuriyawong )
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor ($k$) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.





Certificate No.: CP20250255EA

## Calibration Report

**Equipment:** Sound Level Meter
**Manufacturer:** SCARLET TECH
**Model/Type:** ST11D (Meter), AWA14425 (Microphone), - (Preamplifier)
**Serial No.:** 821488 (Meter), 55133 (Microphone), - (Preamplifier)
**ID No.:** NS-12-006
**Ambient Temperature:** ( 23 ± 2 ) ℃
**Relative Humidity:** ( 50 ± 15 ) %
**Pressure:** (101.3 ± 1.5) kPa
**Method of Calibration :-**
IEC 61672-3:2013.

**Condition of this result of calibration**

1. Reference standards instrument :-

| | Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|---|
| 1) | Standard microphone | 4180 | 2661000 | AA-1011-25 | 24 June 2026 |
| 2) | Arbitrary Function Generator | AFG2021 | C010063 | CK20250037EA | 25 June 2026 |
| 3) | Programmable Attenuator | PA5 | 2755 | EF-0035-24 | 28 October 2025 |
| 4) | 6.5 Digit precision multimeter | 8846A | 9610014 | CB20240215EA | 26 November 2025 |
| 5) | Pressure humidity and Temperature Transmitter | PTU301 | F0640003 | CL1-P250034<br>CD20250096EA | 10 April 2026<br>29 March 2026 |
| 6) | Performance Audio Analyzer | U8903B | MY56510003 | CB20250030EA<br>CK20240069EA | 13 February 2026<br>19 September 2025 |

2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This certification is traceable to the international system of unit maintained at :-
Reference standards instrument for Acoustic function
- National Institute of Metrology (Thailand)
Reference standards instrument for Electrical function
- National Institute of Metrology (Thailand)
- Electrical and Electronics Institute; NSC Accredited Calibration No.0119
- IRPC Metrology Center, IRPC Public Co., Ltd.; NSC Accredited Calibration No.0204.

**Result of Calibration:-**

Function : 1. Indication at the calibration check frequency

| Reference Acoustic Signal (dB) | Measured value (dB) | Deviation (dB) | Acceptance limits (dB) |
|---|---|---|---|
| - | - | - | - |

Certificate No.: CP20250255EA

## Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

| Measured value (dB) |
|---|
| 15.9 |

2.2 Microphone replaced by the electrical input signal device

| Frequency Weighting | Measured value (dB) |
|---|---|
| A-weighting | 8.0 |
| C-weighting | 10.0 |
| Z-weighting | 16.0 |

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Meter free-field acoustic response at a level of 84 dB.

| Frequency (Hz) | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting (dB) | A-Weighting (dB) | Z-Weighting (dB) | Acceptance limits (dB) |
| 125 | 0.6 | 0.6 | 0.5 | ±1.0 |
| 1000 | -0.1 | -0.1 | -0.1 | ±0.7 |
| 8000 | -0.3 | -0.2 | -0.3 | +1.5; -2.5 |

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

| Frequency (Hz) | Deviation from various Frequency Weighting Response Curve | | | |
|---|---|---|---|---|
| | C-Weighting (dB) | A-Weighting (dB) | Z-Weighting (dB) | Acceptance limits (dB) |
| 63 | 0.1 | 0.0 | 0.0 | ±1.0 |
| 125 | 0.1 | -0.1 | 0.0 | ±1.0 |
| 250 | 0.1 | 0.0 | -0.1 | ±1.0 |
| 500 | 0.0 | 0.0 | 0.0 | ±1.0 |
| 1000 | 0.0 | 0.0 | 0.0 | ±0.7 |
| 2000 | 0.1 | 0.1 | 0.0 | ±1.0 |
| 4000 | 0.1 | 0.1 | 0.0 | ±1.0 |
| 8000 | 0.0 | -0.1 | 0.1 | +1.5; -2.5 |
| 16000 | -5.2 | -5.2 | 0.0 | +2.5; -16.0 |



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## Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

| Frequency Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| C-weighting | 94.0 | 0.0 | ±0.2 |
| A-weighting | 94.0 | 0.0 | ±0.2 |
| Z-weighting | 93.9 | -0.1 | ±0.2 |

5.2 Time weighting at 1 kHz

| Time Weighting | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| Fast | 94.0 | 0.0 | ±0.1 |
| Slow | 94.0 | 0.0 | ±0.1 |
| LAeq | 94.0 | 0.0 | ±0.1 |

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 30 | 94.0 | 94.0 | 0.0 | ±0.1 |

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±0.8 |
| 99.0 | 99.0 | 0.0 | ±0.8 |
| 104.0 | 104.0 | 0.0 | ±0.8 |
| 109.0 | 109.0 | 0.0 | ±0.8 |
| 114.0 | 114.0 | 0.0 | ±0.8 |
| 119.0 | 119.0 | 0.0 | ±0.8 |
| 124.0 | 124.0 | 0.0 | ±0.8 |
| 129.0 | 129.0 | 0.0 | ±0.8 |
| 134.0 | 134.0 | 0.0 | ±0.8 |
| 139.0 | 139.0 | 0.0 | ±0.8 |
| 140.0 | 140.0 | 0.0 | ±0.8 |

7.2 Level Linearity on the reference level range, Lower

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 94.0 | 94.0 | 0.0 | ±0.8 |
| 89.0 | 89.0 | 0.0 | ±0.8 |
| 84.0 | 84.0 | 0.0 | ±0.8 |
| 79.0 | 79.0 | 0.0 | ±0.8 |
| 74.0 | 74.0 | 0.0 | ±0.8 |



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## Calibration Report

7.2 Level Linearity on the reference level range, Lower (Cont.)

| Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| 69.0 | 69.0 | 0.0 | ±0.8 |
| 64.0 | 64.0 | 0.0 | ±0.8 |
| 59.0 | 59.0 | 0.0 | ±0.8 |
| 54.0 | 54.0 | 0.0 | ±0.8 |
| 49.0 | 49.0 | 0.0 | ±0.8 |
| 44.0 | 44.0 | 0.0 | ±0.8 |
| 39.0 | 39.0 | 0.0 | ±0.8 |
| 34.0 | 33.9 | -0.1 | ±0.8 |
| 29.0 | 28.9 | -0.1 | ±0.8 |
| 28.0 | 27.9 | -0.1 | ±0.8 |
| 27.0 | 26.9 | -0.1 | ±0.8 |
| 26.0 | 25.8 | -0.2 | ±0.8 |

Function : 8. Tone burst response

| Time Weighting | Tone burst duration, Tb (ms) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Fast | 200 | 135.9 | -0.1 | ±0.5 |
| | 2 | 118.7 | -0.3 | +1.0 ; -1.5 |
| | 0.25 | 109.7 | -0.3 | +1.0 ; -3.0 |
| Slow | 200 | 129.5 | -0.1 | ±0.5 |
| | 2 | 109.9 | -0.1 | +1.0 ; -3.0 |
| SEL | 200 | 130.0 | 0.0 | ±0.5 |
| | 2 | 110.0 | 0.0 | +1.0 ; -1.5 |
| | 0.25 | 100.8 | -0.2 | +1.0 ; -3.0 |

Function : 9. Peak C sound level

| Number of cycles in test signal | Anticipated Value (dB) | Measured value (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| Complete cycle | 135.4 | 135.1 | -0.3 | ±2.0 |
| Positive half cycle | 134.4 | 134.1 | -0.3 | ±1.0 |
| Negative half cycle | 134.4 | 134.1 | -0.3 | ±1.0 |



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## Calibration Report

Function : 10. Overload indication

| Measured value (dB) | | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|
| Positive one-half cycle | Negative one-half cycle | | |
| 142.9 | 143.3 | 0.4 | ±1.5 |

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

| Time Period to Apply Signal (min) | Reference SPL (dB) | Record SPL at Conclusion of Time Period (dB) | Deviated value (dB) | Acceptance limits (dB) |
|---|---|---|---|---|
| 5 | 139.0 | 139.0 | 0.0 | ±0.1 |

Uncertainty of measurement

| Function | Uncertainty (dB) | Maximum-permitted uncertainty of measurement (dB) |
|---|---|---|
| 1) Indication at the calibration check frequency | 0.30 | Not applicable |
| 2) Self-generated Noise | 0.10 | Not applicable |
| 3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level | 0.30 | 0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz) |
| 4) Electrical signal tests of frequency weightings | 0.20 | 0.20 |
| 5) Frequency and time weighting at 1 kHz | 0.20 | 0.20 |
| 6) Long-Term Stability | 0.10 | 0.10 |
| 7) Level Linearity on the reference level range | 0.30 | 0.30 |
| 8) Tone burst response | 0.20 | 0.30 |
| 9) Peak C sound level | 0.20 | 0.35 |
| 10) Overload indication | 0.24 | 0.25 |
| 11) High-Level Stability | 0.10 | 0.10 |

Remarks:
1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
2. The acceptance limit is for the deviated value.
3. Acceptance limits was IEC61672-3:2013 Class 1.
4. The coverage factor $k = 2.00$

- - End of Report - -

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Trade & Engineering

## TSP High Volume Sampler
## TE-5000 TSP Sampler Verification

### Site Information

| | | |
|---|---|---|
| **Location:** – | **Site ID:** – | **Date:** 10 Oct 25 |
| **Sampler:** TE-5000 TSP | **Serial No:** 3269 | **Tech:** Tong.P |

### Site Conditions

| | |
|---|---|
| **Barometric Pressure (in Hg):** 27.70 | **Corrected Pressure (mm Hg):** 703.6 |
| **Temperature (deg F):** 76.4 | **Temperature (deg K):** 297.8 |
| **Average Press. (in Hg):** 27.32 | **Corrected Average (mm Hg):** 693.9 |
| **Average Temp (Deg F):** 75.0 | **Average Temp: (Deg K):** 297.0 |

### Calibration Orifice

| | |
|---|---|
| **Make:** Tisch | **Qstd Slope:** 1.57894 |
| **Model:** TE-5028A | **Qstd Intercept:** -0.01520 |
| **Serial#:** 1179 | **Calibration Due Date** 22 October 2025 |

### Calibration Information

| Plate or Test # | H2O (in) | Qstd (m3/min) | I (chart) | IC (corrected) |
|---|---|---|---|---|
| 1 | 8.05 | 1.739 | 60.2 | 57.94 |
| 2 | 6.60 | 1.576 | 55.6 | 53.51 |
| 3 | 5.20 | 1.400 | 47.9 | 46.10 |
| 4 | 4.60 | 1.317 | 43.1 | 41.48 |
| 5 | 4.05 | 1.112 | 35.3 | 33.97 |

**Linear Regression**
**Slope:** 39.3862
**Intercept:** -9.6675
**Corr. Coeff:** 0.9958
**# of Observations:** 5

### Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)
Tstd = 298 deg K
Pstd = 760 mm Hg
For subsequent calculation of sampler flow:
1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

**Enter Average I (chart):** 48.4
**Average Flow Calculation m3/min**
1.422065879
**Average Flow Calculation in cfm**
50.21418999
Sample Time (Hrs): 24.0
**Total flow in 24 hours m3/min**
2047.774866
**Total flow in 24 hours cfm**
72308.43358

**NOTE: Ensure calibration orifice has been certified within 12 months of use**

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Trade & Engineering

## TSP High Volume Sampler
## TE-5000 TSP Sampler Verification

### Site Information

| | | |
|---|---|---|
| **Location:** – | **Site ID:** – | **Date:** 10 Oct 25 |
| **Sampler:** TE-5000 TSP | **Serial No:** 3270 | **Tech:** Tong.P |

### Site Conditions

| | |
|---|---|
| **Barometric Pressure (in Hg):** 28.50 | **Corrected Pressure (mm Hg):** 723.9 |
| **Temperature (deg F):** 75.3 | **Temperature (deg K):** 297.2 |
| **Average Press. (in Hg):** 27.33 | **Corrected Average (mm Hg):** 694.2 |
| **Average Temp (Deg F):** 75.2 | **Average Temp: (Deg K):** 297.2 |

### Calibration Orifice

| | |
|---|---|
| **Make:** Tisch | **Qstd Slope:** 1.57894 |
| **Model:** TE-5028A | **Qstd Intercept:** -0.01520 |
| **Serial#:** 1179 | **Calibration Due Date** 22 October 2025 |

### Calibration Information

| Plate or Test # | H2O (in) | Qstd (m3/min) | I (chart) | IC (corrected) |
|---|---|---|---|---|
| 1 | 8.20 | 1.782 | 60.4 | 59.03 |
| 2 | 6.55 | 1.594 | 55.6 | 54.34 |
| 3 | 5.60 | 1.474 | 47.9 | 46.81 |
| 4 | 4.55 | 1.330 | 43.3 | 42.32 |
| 5 | 4.10 | 1.112 | 34.5 | 33.72 |

**Linear Regression**
**Slope:** 38.8216
**Intercept:** -9.3751
**Corr. Coeff:** 0.9935
**# of Observations:** 5

### Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)
Tstd = 298 deg K
Pstd = 760 mm Hg
For subsequent calculation of sampler flow:
1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

**Enter Average I (chart):** 48.3
**Average Flow Calculation m3/min**
1.433237179
**Average Flow Calculation in cfm**
50.60865679
Sample Time (Hrs): 24.0
**Total flow in 24 hours m3/min**
2063.861538
**Total flow in 24 hours cfm**
72876.46578

**NOTE: Ensure calibration orifice has been certified within 12 months of use**

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Trade & Engineering

## PM10 High Volume Sampler Verification

### Site Information

| | | |
|---|---|---|
| **Location:** – | **Site ID:** – | **Date:** 17 September 2025 |
| **Sampler:** TE-6070 PM10 | **Serial No:** 3183 | **Tech:** Tong P. |

### Site Conditions

| | |
|---|---|
| **Barometric Pressure (in Hg):** 27.05 | **Corrected Pressure (mm Hg):** 687.1 |
| **Temperature (deg F):** 75.6 | **Temperature (deg K):** 297.2 |
| **Average Press. (in Hg):** 26.71 | **Corrected Average (mm Hg):** 678.4 |
| **Average Temp. (deg F):** 75.8 | **Average Temp. (deg K):** 297.3 |

### Calibration Orifice

| | |
|---|---|
| **Make:** Tisch Environmental, Inc. | **Qstd Slope:** 1.57894 |
| **Model:** TE-5028A | **Qstd Intercept:** -0.01520 |
| **Serial#:** 1179 | **Calibration Due Date:** 22 Oct 25 |

### Calibration Data

| Plate or Test # | In H2O | Qa (m3/min) | I (chart) | IC (corrected) |
|---|---|---|---|---|
| 1 | 9.30 | 1.280 | 60.1 | 39.53 |
| 2 | 7.70 | 1.166 | 57.5 | 37.82 |
| 3 | 6.60 | 1.080 | 52.7 | 34.66 |
| 4 | 5.75 | 1.037 | 50.4 | 33.15 |
| 5 | 5.10 | 1.006 | 45.6 | 29.99 |

**Linear Regression**
**Slope** 32.5138
**Intercept** -1.1790
**Corr. Coeff** 0.9523
**SFR** 1.115
**SSP** 53.35
**# of Observations:** 5

### Calculations

Qa = 1/m(Sqrt((H2O)(Ta/Pa))-b)
IC = I(Sqrt(Ta/Pa))

Qa = actual flow rate
IC = corrected chart response
m = calibrator slope
b = calibrator intercept
Ta = actual temperature (deg K)
Pa = actual pressure (mm Hg)
For subsequent calculation of sampler flow:

SFR = 1.13(Ps/Pa)(Ta/Ts)
SSP = (m*SFR+b)(Sqrt(Pa/Ta))

SFR = sampler set point flow rate
SSP = sampler chart set point
m = sampler slope
b = sampler intercept
Ta = actual temperature (deg K)
Pa = actual pressure (mm Hg)
Ts = Average temperature (deg K)
Ps = Average pressure (mm Hg)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

**Average I(chart):** 53.3
**Average Flow over Sample (m3/min)**
1.120690582
**Enter Total Time (Hrs)** 24.0
**Total flow over sample (m3/min)**
1613.794438
**Total flow over sample (CFM)**
56983.0816

**NOTE: Ensure calibration orifice has been certified within 12 months of u**

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Trade & Engineering

## PM10 High Volume Sampler Verification

### Site Information

| | | | |
|---|---|---|---|
| **Location:** | – | **Site ID:** | – |
| **Sampler:** | TE-6070 PM10 | **Serial No:** | 3310 |
| **Date:** | 24 September 2025 | | |
| **Tech:** | Tong P. | | |

### Site Conditions

| | | | |
|---|---|---|---|
| **Barometric Pressure (in Hg):** | 27.10 | **Corrected Pressure (mm Hg):** | 688.3 |
| **Temperature (deg F):** | 75.5 | **Temperature (deg K):** | 297.2 |
| **Average Press. (in Hg):** | 26.68 | **Corrected Average (mm Hg):** | 677.7 |
| **Average Temp. (deg F):** | 76.2 | **Average Temp. (deg K):** | 297.6 |

### Calibration Orifice

| | | | |
|---|---|---|---|
| **Make:** | Tisch Environmental, Inc. | **Qstd Slope:** | 1.57894 |
| **Model:** | TE-5028A | **Qstd Intercept:** | -0.01520 |
| **Serial#:** | 1179 | **Calibration Due Date:** | 22 Oct 25 |

### Calibration Data

| Plate or Test # | In H2O | Qa (m3/min) | I (chart) | IC (corrected) |
|---|---|---|---|---|
| 1 | 9.35 | 1.282 | 61.0 | 40.08 |
| 2 | 7.60 | 1.157 | 56.6 | 37.19 |
| 3 | 6.40 | 1.062 | 53.1 | 34.89 |
| 4 | 5.65 | 1.037 | 51.0 | 33.51 |
| 5 | 5.05 | 1.006 | 47.9 | 31.47 |

**Linear Regression**

| | |
|---|---|
| **Slope** | 29.0790 |
| **Intercept** | 3.1838 |
| **Corr. Coeff** | 0.9783 |
| **SFR** | 1.111 |
| **SSP** | 54.02 |
| **# of Observations:** | 5 |

### Calculations

Qa = 1/m(Sqrt((H2O)(Ta/Pa))-b)
IC = I(Sqrt(Ta/Pa))

Qa = actual flow rate
IC = corrected chart response
m = calibrator slope
b = calibrator intercept
Ta = actual temperature (deg K)
Pa = actual pressure (mm Hg)
For subsequent calculation of sampler flow:

SFR = 1.13(Ps/Pa)(Ta/Ts)
SSP = (m*SFR+b)(Sqrt(Pa/Ta))

SFR = sampler set point flow rate
SSP = sampler chart set point
m = sampler slope
b = sampler intercept
Ta = actual temperature (deg K)
Pa = actual pressure (mm Hg)
Ts = Average temperature (deg K)
Ps = Average pressure (mm Hg)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

| | |
|---|---|
| **Average I(chart):** | 53.9 |
| **Average Flow over Sample (m3/min)** | 1.119209407 |
| **Enter Total Time (Hrs)** | 24.0 |
| **Total flow over sample (m3/min)** | 1611.661546 |
| **Total flow over sample (CFM)** | 56907.76919 |

**NOTE: Ensure calibration orifice has been certified within 12 months of**

Tisch Environmental 145 South Miami Ave, Cleves OH 45002 • 877.263.7610 • sales@tisch-env.com • www.tisch-env.com

Trade & Engineering

## Certificate of Analyzer Performance Testing

**Calibrated Date** : 8-Jan-26

Certificate No. : 0126-001
Page : 1/1

**Analyzer Instruments**

| | | | | | |
|---|---|---|---|---|---|
| Analyzer Type | : | THC Analyzer | Manufacturer | : | Thermo Environmental |
| Model | : | 51 | Serial No. | : | 51HT-73244-373 |

**Environmental**

| | | | |
|---|---|---|---|
| Temperature | : | 25.0 | °C |
| Humidity | : | 46.2 | %RH |

**Calibration System**

**Calibrator Units**

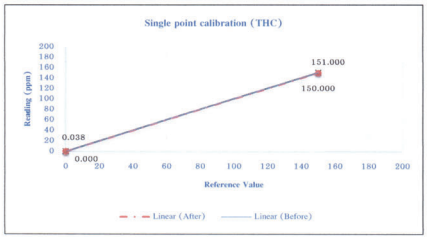
| | | | | | |
|---|---|---|---|---|---|
| Gas Calibration | : | Thermo Environmental | Zero Air Generator | : | API |
| Model | : | 146C | Model | : | 701 |
| Serial No. | : | 514811458 | Serial No. | : | 179 |

**Standard Gas**

| | | | | | |
|---|---|---|---|---|---|
| Propane Conc. | : | 150 | ppm | Cylinder No. | : CGA350 |
| | | | | Expire Date | : 10-Apr-26 |

**Calibration Check**

| Gas | Zero | | | Span | | |
|---|---|---|---|---|---|---|
| | Reading Value (ppm) | Expected Value (ppm) | Drift (%) | Reading Value (ppm) | Expected Value (ppm) | Drift (%) |
| Before | | | | | | |
| THC | 0.038 | 0.000 | 0.038 | 151 | 150 | 0.667 |
| After | | | | | | |
| THC | 0.000 | 0.000 | 0.000 | 150 | 150 | 0.000 |




Calibrated by :
(Mr. Tong Puima)

Trade & Engineering

## Certificate of Analyzer Performance Testing

**Calibrated Date** : 8-Jan-26

Certificate No. : 0126-002
Page : 1/1

**Analyzer Instruments**

| | | | | | |
|---|---|---|---|---|---|
| Analyzer Type | : | THC Analyzer | Manufacturer | : | Baseline |
| Model | : | Series 8800 | Serial No. | : | 584 |

**Environmental**

| | | | |
|---|---|---|---|
| Temperature | : | 25.0 | °C |
| Humidity | : | 46.1 | %RH |

**Calibration System**

**Calibrator Units**

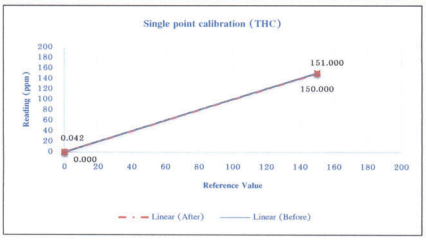
| | | | | | |
|---|---|---|---|---|---|
| Gas Calibration | : | Thermo Environmental | Zero Air Generator | : | API |
| Model | : | 146C | Model | : | 701 |
| Serial No. | : | 514811458 | Serial No. | : | 179 |

**Standard Gas**

| | | | | | |
|---|---|---|---|---|---|
| Propane Conc. | : | 150 | ppm | Cylinder No. | : CGA350 |
| | | | | Expire Date | : 10-Apr-26 |

**Calibration Check**

| Gas | Zero | | | Span | | |
|---|---|---|---|---|---|---|
| | Reading Value (ppm) | Expected Value (ppm) | Drift (%) | Reading Value (ppm) | Expected Value (ppm) | Drift (%) |
| Before | | | | | | |
| THC | 0.042 | 0.000 | 0.042 | 151 | 150 | 0.667 |
| After | | | | | | |
| THC | 0.000 | 0.000 | 0.000 | 150 | 150 | 0.000 |




Calibrated by :
(Mr. Tong Puima)

Trade & Engineering

## Certificate of Analyzer Performance Testing

**Calibrated Date** : 20-Aug-25

Certificate No. : 0825-008
Page : 1/1

**Analyzer Instruments**

| | | | | | |
|---|---|---|---|---|---|
| Analyzer Type | : | CO Analyzer | Manufacturer | : | Thermo Environmental |
| Model | : | 48C | Serial No. | : | 508011064 |

**Environmental**

| | | | |
|---|---|---|---|
| Temperature | : | 25.7 | °C |
| Humidity | : | 38.7 | %RH |

**Calibration System**

**Calibrator Units**

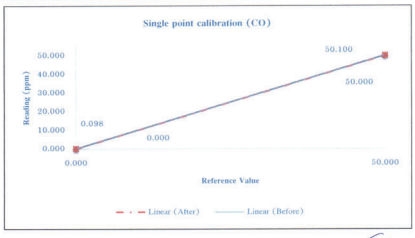
| | | | | | |
|---|---|---|---|---|---|
| Gas Calibration | : | Thermo Environmental | Zero Air Generator | : | API |
| Model | : | 146C | Model | : | 701 |
| Serial No. | : | 514811458 | Serial No. | : | 179 |

**Standard Gas**

| | | | | | |
|---|---|---|---|---|---|
| NO Conc. | : | 2 | ppm | Cylinder No. | : 307199 |
| SO2 Conc. | : | 2 | ppm | Expire Date | : 10-Oct-25 |
| CO Conc. | : | 50 | ppm | | |

**Calibration Check**

| Gas | Zero | | | Span | | |
|---|---|---|---|---|---|---|
| | Reading Value (ppm) | Expected Value (ppm) | Drift (%) | Reading Value (ppm) | Expected Value (ppm) | Drift (%) |
| Before | | | | | | |
| CO | 0.098 | 0.000 | 0.10 | 50.1 | 50.000 | 0.20 |
| After | | | | | | |
| CO | 0.000 | 0.000 | 0.00 | 50.0 | 50.000 | 0.00 |




Calibrated by :
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Trade & Engineering

## Certificate of Analyzer Performance Testing

**Calibrated Date** : 20-Aug-25 — Certificate No. : 0825-007 — Page : 1/1

**Analyzer Instruments**

Analyzer Type : CO Analyzer — Manufacturer : Thermo Environmental
Model : 48C — Serial No. : 508011064

**Environmental**

Temperature : 22.4 °C
Humidity : 40.5 %RH

**Calibration System**

**Calibrator Units**

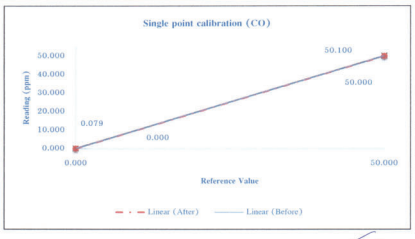
Gas Calibration : Thermo Environmental — Zero Air Generator : API
Model : 146C — Model : 701
Serial No. : 514811458 — Serial No. : 179

**Standard Gas**

NO Conc. : 2 ppm — Cylinder No. : 307199
SO2 Conc. : 2 ppm — Expire Date : 10-Oct-25
CO Conc. : 50 ppm

**Calibration Check**

| Gas | Zero | | | Span | | |
|---|---|---|---|---|---|---|
| | Reading Value (ppm) | Expected Value (ppm) | Drift (%) | Reading Value (ppm) | Expected Value (ppm) | Drift (%) |
| Before | | | | | | |
| CO | 0.079 | 0.000 | 0.08 | 50.1 | 50.000 | 0.20 |
| After | | | | | | |
| CO | 0.000 | 0.000 | 0.00 | 50.0 | 50.000 | 0.00 |




Calibrated by :
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## Certificate of Analyzer Performance Testing

**Calibrated Date** : 23-Sep-25 — Certificate No. : 0925-001 — Page : 1/1

**Analyzer Instruments**

Analyzer Type : SO2 Analyzer — Manufacturer : Thermo Environmental
Model : 43C — Serial No. : CTL63588-340

**Environmental**

Temperature : 26.4 °C
Humidity : 45.2 %RH

**Calibration System**

**Calibrator Units**

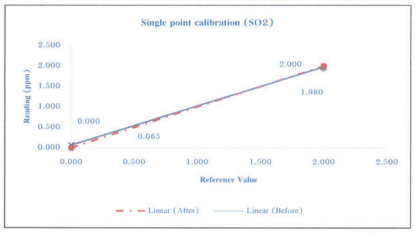
Gas Calibration : Thermo Environmental — Zero Air Generator : API
Model : 146C — Model : 701
Serial No. : 514811458 — Serial No. : 179

**Standard Gas**

NO Conc. : 2 ppm — Cylinder No. : 307199
SO2 Conc. : 2 ppm — Expire Date : 10-Oct-25
CO Conc. : 50 ppm

**Calibration Check**

| Gas | Zero | | | Span | | |
|---|---|---|---|---|---|---|
| | Reading Value (ppm) | Expected Value (ppm) | Drift (%) | Reading Value (ppm) | Expected Value (ppm) | Drift (%) |
| Before | | | | | | |
| SO2 | 0.065 | 0.000 | 0.07 | 1.98 | 2.000 | -1.00 |
| After | | | | | | |
| SO2 | 0.000 | 0.000 | 0.00 | 2.00 | 2.000 | 0.00 |




Calibrated by :
(Mr. Tong Puima)

Trade & Engineering

## Certificate of Analyzer Performance Testing

**Calibrated Date** : 29-Jul-25 — Certificate No. : 0725-001 — Page : 1/1

**Analyzer Instruments**

Analyzer Type : SO2 Analyzer — Manufacturer : Thermo Environmental
Model : 43C — Serial No. : 43C-62201-334

**Environmental**

Temperature : 25.2 °C
Humidity : 43.3 %RH

**Calibration System**

**Calibrator Units**

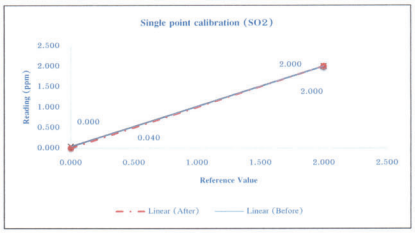
Gas Calibration : Thermo Environmental — Zero Air Generator : API
Model : 146C — Model : 701
Serial No. : 514811458 — Serial No. : 179

**Standard Gas**

NO Conc. : 2 ppm — Cylinder No. : 307199
SO2 Conc. : 2 ppm — Expire Date : 10-Oct-25
CO Conc. : 50 ppm

**Calibration Check**

| Gas | Zero | | | Span | | |
|---|---|---|---|---|---|---|
| | Reading Value (ppm) | Expected Value (ppm) | Drift (%) | Reading Value (ppm) | Expected Value (ppm) | Drift (%) |
| Before | | | | | | |
| SO2 | 0.040 | 0.000 | 0.04 | 2.00 | 2.000 | 0.00 |
| After | | | | | | |
| SO2 | 0.000 | 0.000 | 0.00 | 2.00 | 2.000 | 0.00 |




Calibrated by :
(Mr. Tong Puima)

Trade & Engineering

## Certificate of Analyzer Performance Testing

**Calibrated Date** : 20-Aug-25 — Certificate No. : 0825-006 — Page : 1/1

**Analyzer Instruments**

Analyzer Type : NO/NO2/NOx Analyzer — Manufacturer : Thermo Environmental
Model : 42C — Serial No. : 66193-351

**Environmental**

Temperature : 26.3 °C
Humidity : 45.6 %RH

**Calibration System**

**Calibrator Units**

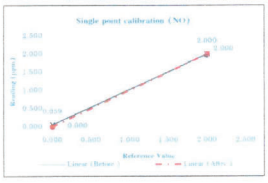
Gas Calibration : Thermo Environmental — Zero Air Generator : API
Model : 146C — Model : 701
Serial No. : 514811458 — Serial No. : 179

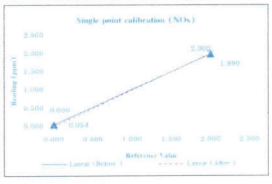
**Standard Gas**

NO Conc. : 2 ppm — Cylinder No. : 307199
SO2 : 2 ppm — Expire Date : 10-Oct-25
CO Conc. : 50 ppm

**Calibration Check**

| Gas | Zero | | | Span | | |
|---|---|---|---|---|---|---|
| | Reading Value (ppm) | Expected Value (ppm) | Drift (%) | Reading Value (ppm) | Expected Value (ppm) | Drift (%) |
| Before | | | | | | |
| NO | 0.059 | 0.000 | 0.06 | 2.00 | 2.00 | 0.00 |
| NOx | 0.054 | 0.000 | 0.05 | 1.99 | 2.00 | -0.50 |
| After | | | | | | |
| NO | 0.000 | 0.000 | 0.00 | 2.00 | 2.00 | 0.00 |
| NOx | 0.000 | 0.000 | 0.00 | 2.00 | 2.00 | 0.00 |




Calibrated by :
(Mr. Tong Puima)

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## Certificate of Analyzer Performance Testing

Calibrated Date : 25-Mar-25
Certificate No. : 0325-003
Page : 1/1

**Analyzer Instruments**
Analyzer Type : NO/NO2/NOx Analyzer
Model : 42C
Manufacturer : Thermo Environmental
Serial No. : 72454-371

**Environmental**
Temperature : 25.1 °C
Humidity : 46.2 %RH

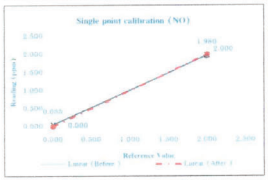
**Calibration System**

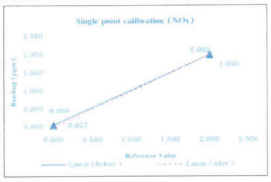
**Calibrator Units**
Gas Calibration : Thermo Environmental
Model : 146C
Serial No. : 514811458
Zero Air Generator : API
Model : 701
Serial No. : 179

**Standard Gas**
NO Conc. : 2 ppm
SO2 : 2 ppm
CO Conc. : 50 ppm
Cylinder No. : 307199
Expire Date : 10-Oct-25

Calibration Check

| Gas | Zero | | | Span | | |
|---|---|---|---|---|---|---|
| | Reading Value (ppm) | Expected Value (ppm) | Drift (%) | Reading Value (ppm) | Expected Value (ppm) | Drift (%) |
| Before | | | | | | |
| NO | 0.055 | 0.000 | 0.00 | 1.98 | 2.00 | 1.00 |
| NOx | 0.057 | 0.000 | 0.00 | 2.00 | 2.00 | 0.00 |
| After | | | | | | |
| NO | 0.000 | 0.000 | 0.00 | 2.00 | 2.00 | 0.00 |
| NOx | 0.000 | 0.000 | 0.00 | 2.00 | 2.00 | 0.00 |




Calibrated by :
(Ms. Jong Puima)

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Trade & Engineering

Certificate of Analyzer Performance Testing

Calibrated Date : 29-Jul-25
Certificate No. : 0725-002
Page : 1/1

**Analyzer Instruments**
Analyzer Type : NO/NO2/NOx Analyzer
Model : 42i
Manufacturer : Thermo Environmental
Serial No. : 508011077

**Environmental**
Temperature : 26.1 °C
Humidity : 46.2 %RH

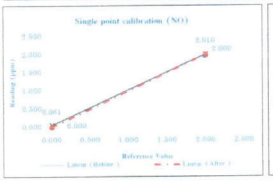
**Calibration System**

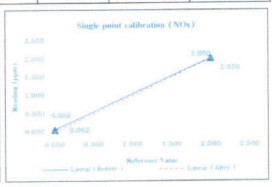
**Calibrator Units**
Gas Calibration : Thermo Environmental
Model : 146C
Serial No. : 514811458
Zero Air Generator : API
Model : 701
Serial No. : 179

**Standard Gas**
NO Conc. : 2 ppm
SO2 : 2 ppm
CO Conc. : 50 ppm
Cylinder No. : 307199
Expire Date : 10-Oct-25

Calibration Check

| Gas | Zero | | | Span | | |
|---|---|---|---|---|---|---|
| | Reading Value (ppm) | Expected Value (ppm) | Drift (%) | Reading Value (ppm) | Expected Value (ppm) | Drift (%) |
| Before | | | | | | |
| NO | 0.061 | 0.000 | 0.00 | 2.01 | 2.00 | 0.50 |
| NOx | 0.062 | 0.000 | 0.00 | 2.02 | 2.00 | 1.00 |
| After | | | | | | |
| NO | 0.000 | 0.000 | 0.00 | 2.00 | 2.00 | 0.00 |
| NOx | 0.000 | 0.000 | 0.00 | 2.00 | 2.00 | 0.00 |




Calibrated by :
(Ms. Jong Puima)

**เอกสารการสอบเทียบเครื่องมือตรวจวัดความสั่นสะเทือน**

สถาบันไฟฟ้าและอิเล็กทรอนิกส์
ELECTRICAL AND ELECTRONICS INSTITUTE

ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT
975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37
Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280
Tel: +66 2709 4860 Fax: +66 2324 0917

Certificate No.: CP20250269EA
Operation No.: CP2025060184

## Certificate of Calibration

| | |
|---|---|
| **Equipment:** | Vibration Meter |
| **Manufacturer:** | Instantel |
| **Model/Type:** | Micromate |
| **Serial No.:** | UM20453 (Meter), UM6231 (Micromate Geophone) |
| **ID No.:** | VB-01-007 |
| **Customer:** | C.E.M. Technology (Thailand) Co.,Ltd. |
| **Address:** | 31/8 Moo 13, T.Rai Khing, A.Sam Phran, Nakhon Pathom 73210 |
| **Received Date:** | 24 June 2025 |
| **Calibrated Date:** | 25 - 30 September 2025 |
| **Issued Date:** | 1 October 2025 |
| **Calibrated by:** | Ms. Juntaporn Kunhakom |

Approved by: _____
( Mr. Sittichai Swaksuriyawong )
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor ($k$) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.

Certificate No.: CP20250269EA

## Calibration Report

Equipment: Vibration Meter
Manufacturer: Instantel
Model: Micromate
Serial No.: UM20453 (Meter), UM6231 (Micromate Geophone)
ID No.: VB-01-007
Ambient Temperature: ( 23 ± 5 )°C
Relative Humidity: ( 50 ± 15 )%
Method of Calibration :-
In-house method : CC-SV004 by comparison with standard accelerometer.

Condition of this result of calibration

1. Reference standards instrument :-

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|
| 1) Standard Accelerometer | 8305-001 | 30120 | AV-0028-25 | 3-Jul-2026 |
| 2) Measuring Amplifier | 2525 | 3016651 | AV-0025AA-25 | 15-Aug-2026 |
| 3) LAN XI Analyzer | 3160-4-042 | 3060-106135 | CQ20240016EA | 1-Dec-2025 |

2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This certification is traceable to the international system of unit maintained at :-
   - National Institute of Metrology (Thailand)
   - Electrical and Electronics Institute; NSC Accredited Calibration No.0119



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20250269EA

## Calibration Report

Result of Calibration:-

Function : Frequency response and Linearity test at 16 Hz

| Frequency (Hz) | Nominal (mm/s) | Standard (mm/s) | UUC (mm/s) | Deviation (mm/s) | Uncertainty ± (%) | Direction |
|---|---|---|---|---|---|---|
| 4.0 | 10.000 | 10.001 | 11.145 | 1.144 | 1.5 | Longitudinal (L) |
| 5.0 | 10.000 | 10.007 | 11.038 | 1.031 | 1.5 | |
| 6.3 | 10.000 | 10.000 | 11.179 | 1.179 | 1.5 | |
| 8.0 | 10.000 | 9.997 | 10.801 | 0.804 | 1.5 | |
| 10.0 | 10.000 | 10.001 | 10.779 | 0.778 | 1.5 | |
| 12.5 | 10.000 | 10.003 | 10.785 | 0.782 | 1.5 | |
| 16.0 | 10.000 | 10.001 | 10.493 | 0.492 | 1.5 | |
| | 20.000 | 19.997 | 21.134 | 1.137 | 1.5 | |
| | 30.000 | 29.970 | 31.747 | 1.777 | 1.5 | |
| | 50.000 | 49.992 | 52.787 | 2.795 | 1.5 | |
| 20.0 | 10.000 | 10.003 | 10.696 | 0.693 | 1.5 | |
| 25.0 | 10.000 | 10.006 | 10.719 | 0.713 | 1.5 | |
| 31.5 | 10.000 | 10.003 | 10.625 | 0.622 | 1.5 | |
| 40.0 | 10.000 | 10.006 | 10.609 | 0.603 | 1.5 | |
| 52.0 | 10.000 | 9.994 | 10.814 | 0.820 | 1.5 | |
| 63.0 | 10.000 | 9.987 | 10.893 | 0.906 | 1.5 | |
| 80.0 | 10.000 | 9.987 | 11.169 | 1.182 | 1.5 | |



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20250269EA

## Calibration Report

Function : Frequency response and Linearity test at 16 Hz (Cont.)

| Frequency (Hz) | Nominal (mm/s) | Standard (mm/s) | UUC (mm/s) | Deviation (mm/s) | Uncertainty ± (%) | Direction |
|---|---|---|---|---|---|---|
| 4.0 | 10.000 | 10.015 | 11.237 | 1.222 | 1.5 | Transverse (T) |
| 5.0 | 10.000 | 10.004 | 11.329 | 1.325 | 1.5 | |
| 6.3 | 10.000 | 10.007 | 11.426 | 1.419 | 1.5 | |
| 8.0 | 10.000 | 10.003 | 11.066 | 1.063 | 1.5 | |
| 10.0 | 10.000 | 10.013 | 11.084 | 1.071 | 1.5 | |
| 12.5 | 10.000 | 10.010 | 10.995 | 0.985 | 1.5 | |
| 16.0 | 10.000 | 10.001 | 10.475 | 0.474 | 1.5 | |
| | 20.000 | 19.997 | 20.910 | 0.913 | 1.5 | |
| | 30.000 | 30.010 | 31.299 | 1.289 | 1.5 | |
| | 50.000 | 49.992 | 51.941 | 1.949 | 1.5 | |
| 20.0 | 10.000 | 10.006 | 10.577 | 0.571 | 1.5 | |
| 25.0 | 10.000 | 10.004 | 10.538 | 0.534 | 1.5 | |
| 31.5 | 10.000 | 10.006 | 10.388 | 0.382 | 1.5 | |
| 40.0 | 10.000 | 9.998 | 10.365 | 0.367 | 1.5 | |
| 52.0 | 10.000 | 9.998 | 10.617 | 0.619 | 1.5 | |
| 63.0 | 10.000 | 10.011 | 10.577 | 0.566 | 1.5 | |
| 80.0 | 10.000 | 10.013 | 10.867 | 0.854 | 1.5 | |



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20250269EA

## Calibration Report

Function : Frequency response and Linearity test at 16 Hz (Cont.)

| Frequency (Hz) | Nominal (mm/s) | Standard (mm/s) | UUC (mm/s) | Deviation (mm/s) | Uncertainty ± (%) | Direction |
|---|---|---|---|---|---|---|
| 4.0 | 10.000 | 10.006 | 10.097 | 0.091 | 1.5 | Vertical (V) |
| 5.0 | 10.000 | 9.997 | 10.112 | 0.115 | 1.5 | |
| 6.3 | 10.000 | 10.006 | 10.349 | 0.343 | 1.5 | |
| 8.0 | 10.000 | 10.006 | 10.097 | 0.091 | 1.5 | |
| 10.0 | 10.000 | 9.998 | 10.199 | 0.201 | 1.5 | |
| 12.5 | 10.000 | 10.000 | 10.238 | 0.238 | 1.5 | |
| 16.0 | 10.000 | 9.994 | 10.136 | 0.142 | 1.5 | |
| | 20.000 | 19.997 | 20.256 | 0.259 | 1.5 | |
| | 30.000 | 29.995 | 30.392 | 0.397 | 1.5 | |
| | 50.000 | 49.992 | 50.770 | 0.778 | 1.5 | |
| 20.0 | 10.000 | 10.003 | 10.349 | 0.346 | 1.5 | |
| 25.0 | 10.000 | 10.001 | 10.320 | 0.319 | 1.5 | |
| 31.5 | 10.000 | 10.013 | 10.451 | 0.438 | 1.5 | |
| 40.0 | 10.000 | 10.006 | 10.380 | 0.374 | 1.5 | |
| 52.0 | 10.000 | 10.021 | 10.706 | 0.685 | 1.5 | |
| 63.0 | 10.000 | 10.013 | 10.893 | 0.880 | 1.5 | |
| 80.0 | 10.000 | 10.006 | 11.239 | 1.233 | 1.5 | |

Remark 1. UUC: Unit Under Calibration
2. The coverage factor $k = 2.00$

- - End of Report - -

ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT
975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37
Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280
Tel: +66 2709 4860 Fax: +66 2324 0917

Certificate No.: CP20250271EA
Operation No.: CP2025090264

# Certificate of Calibration

| | |
|---|---|
| **Equipment:** | Vibration Meter |
| **Manufacturer:** | Instantel |
| **Model/Type:** | Micromate |
| **Serial No.:** | UM21467 (Meter), UM15904 (Micromate Geophone) |
| **ID No.:** | VB-01-009 |
| **Customer:** | C.E.M. Technology (Thailand) Co.,Ltd. |
| **Address:** | 31/8 Moo 13, T.Rai Khing, A.Sam Phran, Nakhon Pathom 73210 |
| **Received Date:** | 22 September 2025 |
| **Calibrated Date:** | 30 September 2025 - 3 October 2025 |
| **Issued Date:** | 3 October 2025 |
| **Calibrated by:** | Ms. Juntaporn Kunhakom |

Approved by: _____
( Mr. Sittichai Swaksuriyawong )
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor (*k*) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.





Certificate No.: CP20250271EA

## Calibration Report

| | |
|---|---|
| **Equipment:** | Vibration Meter |
| **Manufacturer:** | Instantel |
| **Model:** | Micromate |
| **Serial No.:** | UM21467 (Meter), UM15904 (Micromate Geophone) |
| **ID No.:** | VB-01-009 |
| **Ambient Temperature:** | ( 23 ± 5 )°C |
| **Relative Humidity:** | ( 50 ± 15 )% |

**Method of Calibration :-**
In-house method : CC-SV004 by comparison with standard accelerometer.

**Condition of this result of calibration**

1. Reference standards instrument :-

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|---|---|---|---|---|
| 1) Standard Accelerometer | 8305-001 | 30120 | AV-0028-25 | 3-Jul-2026 |
| 2) Measuring Amplifier | 2525 | 3016651 | AV-0025AA-25 | 15-Aug-2026 |
| 3) LAN XI Analyzer | 3160-4-042 | 3060-106135 | CQ20240016EA | 1-Dec-2025 |

2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This certification is traceable to the international system of unit maintained at :-
   - National Institute of Metrology (Thailand)
   - Electrical and Electronics Institute; NSC Accredited Calibration No.0119





Certificate No.: CP20250271EA

## Calibration Report

**Result of Calibration:-**

**Function :** Frequency response and Linearity test at 16 Hz

| Frequency (Hz) | Nominal (mm/s) | Standard (mm/s) | UUC (mm/s) | Deviation (mm/s) | Uncertainty ± (%) | Direction |
|---|---|---|---|---|---|---|
| 4.0 | 10.000 | 10.013 | 11.029 | 1.016 | 1.5 | Longitudinal (L) |
| 5.0 | 10.000 | 10.003 | 11.013 | 1.010 | 1.5 | |
| 6.3 | 10.000 | 10.004 | 11.006 | 1.002 | 1.5 | |
| 8.0 | 10.000 | 10.017 | 10.918 | 0.901 | 1.5 | |
| 10.0 | 10.000 | 9.998 | 10.887 | 0.889 | 1.5 | |
| 12.5 | 10.000 | 10.003 | 10.806 | 0.803 | 1.5 | |
| 16.0 | 10.000 | 10.001 | 10.472 | 0.471 | 1.5 | |
| | 20.000 | 19.997 | 21.021 | 1.024 | 1.5 | |
| | 30.000 | 29.970 | 31.719 | 1.749 | 1.5 | |
| | 50.000 | 49.992 | 52.597 | 2.605 | 1.5 | |
| 20.0 | 10.000 | 10.013 | 10.690 | 0.677 | 1.5 | |
| 25.0 | 10.000 | 10.001 | 10.635 | 0.634 | 1.5 | |
| 31.5 | 10.000 | 10.003 | 10.846 | 0.843 | 1.5 | |
| 40.0 | 10.000 | 10.013 | 10.706 | 0.693 | 1.5 | |
| 52.0 | 10.000 | 10.003 | 10.883 | 0.880 | 1.5 | |
| 63.0 | 10.000 | 10.006 | 11.195 | 1.189 | 1.5 | |
| 80.0 | 10.000 | 10.000 | 11.326 | 1.326 | 1.5 | |





Certificate No.: CP20250271EA

## Calibration Report

**Function :** Frequency response and Linearity test at 16 Hz (Cont.)

| Frequency (Hz) | Nominal (mm/s) | Standard (mm/s) | UUC (mm/s) | Deviation (mm/s) | Uncertainty ± (%) | Direction |
|---|---|---|---|---|---|---|
| 4.0 | 10.000 | 10.020 | 11.205 | 1.185 | 1.5 | Transverse (T) |
| 5.0 | 10.000 | 10.013 | 11.118 | 1.105 | 1.5 | |
| 6.3 | 10.000 | 10.010 | 11.134 | 1.124 | 1.5 | |
| 8.0 | 10.000 | 9.998 | 10.814 | 0.816 | 1.5 | |
| 10.0 | 10.000 | 10.000 | 10.719 | 0.719 | 1.5 | |
| 12.5 | 10.000 | 10.017 | 10.585 | 0.568 | 1.5 | |
| 16.0 | 10.000 | 10.001 | 10.428 | 0.427 | 1.5 | |
| | 20.000 | 19.997 | 21.112 | 1.115 | 1.5 | |
| | 30.000 | 30.010 | 31.853 | 1.843 | 1.5 | |
| | 50.000 | 49.992 | 52.740 | 2.748 | 1.5 | |
| 20.0 | 10.000 | 10.014 | 10.491 | 0.477 | 1.5 | |
| 25.0 | 10.000 | 9.997 | 10.562 | 0.565 | 1.5 | |
| 31.5 | 10.000 | 10.001 | 10.727 | 0.726 | 1.5 | |
| 40.0 | 10.000 | 10.006 | 10.738 | 0.732 | 1.5 | |
| 52.0 | 10.000 | 9.998 | 10.856 | 0.858 | 1.5 | |
| 63.0 | 10.000 | 10.001 | 11.021 | 1.020 | 1.5 | |
| 80.0 | 10.000 | 10.013 | 11.305 | 1.292 | 1.5 | |

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FOUNDATION FOR INDUSTRIAL DEVELOPMENT

สถาบันไฟฟ้าและอิเล็กทรอนิกส์
ELECTRICAL AND ELECTRONICS INSTITUTE

Certificate No.: CP20250271EA

## Calibration Report

**Function :** Frequency response and Linearity test at 16 Hz (Cont.)

| Frequency (Hz) | Nominal (mm/s) | Standard (mm/s) | UUC (mm/s) | Deviation (mm/s) | Uncertainty ± (%) | Direction |
|---|---|---|---|---|---|---|
| 4.0 | 10.000 | 10.001 | 10.420 | 0.419 | 1.5 | Vertical (V) |
| 5.0 | 10.000 | 10.006 | 10.467 | 0.461 | 1.5 | |
| 6.3 | 10.000 | 9.998 | 10.577 | 0.579 | 1.5 | |
| 8.0 | 10.000 | 10.004 | 10.223 | 0.219 | 1.5 | |
| 10.0 | 10.000 | 9.998 | 10.317 | 0.319 | 1.5 | |
| 12.5 | 10.000 | 10.013 | 10.278 | 0.265 | 1.5 | |
| 16.0 | 10.000 | 9.998 | 10.104 | 0.106 | 1.5 | |
| | 20.000 | 19.997 | 20.406 | 0.409 | 1.5 | |
| | 30.000 | 29.995 | 30.574 | 0.579 | 1.5 | |
| | 50.000 | 49.992 | 50.775 | 0.783 | 1.5 | |
| 20.0 | 10.000 | 10.003 | 10.506 | 0.503 | 1.5 | |
| 25.0 | 10.000 | 10.001 | 10.381 | 0.380 | 1.5 | |
| 31.5 | 10.000 | 10.013 | 10.436 | 0.423 | 1.5 | |
| 40.0 | 10.000 | 10.008 | 10.491 | 0.483 | 1.5 | |
| 52.0 | 10.000 | 9.994 | 10.714 | 0.720 | 1.5 | |
| 63.0 | 10.000 | 10.013 | 10.767 | 0.754 | 1.5 | |
| 80.0 | 10.000 | 10.006 | 10.924 | 0.918 | 1.5 | |

Remark
1. UUC: Unit Under Calibration
2. The coverage factor $k = 2.00$

- - End of Report - -



เอกสารการสอบเทียบเครื่องมือตรวจวัดคุณภาพน้ำ

DKSH

ilac-MRA
NSC-TISI-TIS 17025
Calibration 0007

## 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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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



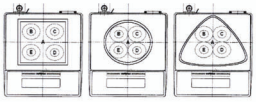
DKSH



**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**

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
Delivering Growth – in Asia and Beyond.
CAL-FM-C01-15: 30 Jun 2025

DKSH

# ใบตรวจสอบสภาพเครื่องชั่ง
## Electronic Balance Checklist

Equipment: Electronic Balance
Model: QUINTIX 224-1S
Serial No.: 0035009070

Certificate No.: C01261658
Job No.: WO-00124610

| Check date 11 Jun 2026 (Normal) | (Defective) | รายการตรวจเช็ค (Description) | Check before delivery 11 Jun 2026 (Normal) | (Defective) | หมายเหตุ (Remark) |
|---|---|---|---|---|---|
| | | *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) | ☑ | ☐ | |

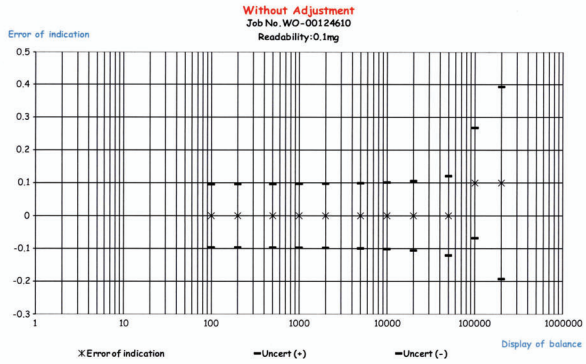
ข้อแนะนำ/ Note :

Mr. Wasan Nuchnabee
Service Engineer

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

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2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร 10260
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THAI CALIBRATION SERVICES CO., LTD.
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/m³) |
|---|---|---|---|---|---|
| 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 sucessive 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--

TCS-F-138 Issue 01/Rev.02/8 Aug 2025

DKSH

# 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).

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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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





**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

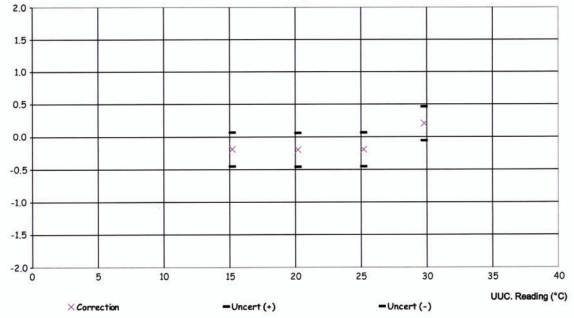
| Reference Temp. (°C) | Calibrate Point. (%RH) | STD. Reading (%RH) | UUC. Reading (%RH) | Correction (%RH) | Uncertainty (± %RH) |
|---|---|---|---|---|---|
| 25.00 | 20.0 | 20.08 | 25.3 | -5.22 | 1.1 |
| 25.00 | 30.0 | 29.99 | 35.4 | -5.41 | 1.1 |
| 25.00 | 40.0 | 40.02 | 45.7 | -5.68 | 1.3 |
| 25.00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

**The End of Certificate**

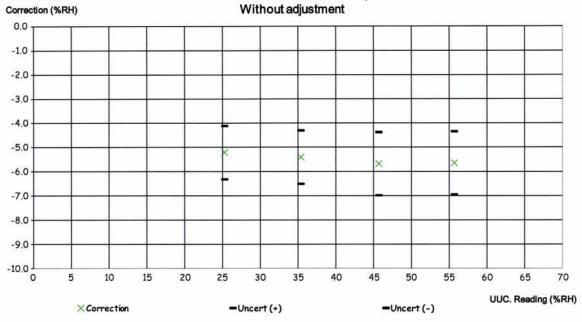
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2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
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CAL-FM-C19-12: 30 Jun 2025



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 26 May 2026 Normal | Check Date 26 May 2026 Defective | รายการตรวจเช็ค | Check before delivery 26 May 2026 Normal | Check before delivery 26 May 2026 Defective | หมายเหตุ (Remark) |
|---|---|---|---|---|---|
| | | **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

บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260
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# Certificate of Calibration

| | | | |
|---|---|---|---|
| **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).

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





**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 |

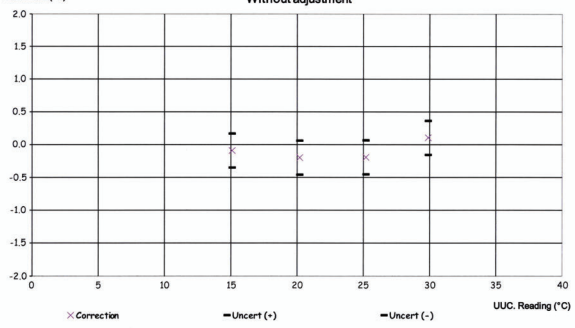
**The End of Certificate**

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

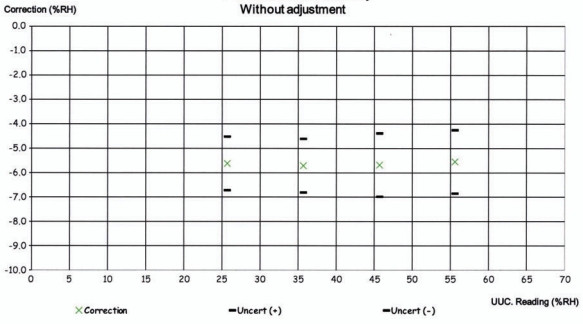
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CAL-FM-C19-12: 30 Jun 2025

**C19262638**
**Function Temperature:**
**Without adjustment**




**C19262638**
**Function Relative Humidity:**
**Without adjustment**




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# ใบตรวจสอบสภาพเครื่องมือวัดอุณหภูมิ
## (Thermo-Hygrometer Checklist)

Equipment : Electronic Thermo-Hygrometer
Certificate No. : C19262638
Serial No. : 45186324
Model : testo 608-H1

| Check Date 26 May 2026 Normal | Check Date 26 May 2026 Defective | รายการตรวจเช็ค | Check before delivery 26 May 2026 Normal | Check before delivery 26 May 2026 Defective | หมายเหตุ (Remark) |
|---|---|---|---|---|---|
| | | **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

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

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CAL
Calibratech Co.,Ltd.
7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120
Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech..cal@yahoo.com, calibratech..cal@hotmail.com

NSC-TISI-TIS17025
CALIBRATION 0030

# Certificate of Calibration

**Certificate No. :** 69-430003-1 **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 :** 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 **Page : 2 of 2**

**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 -

CAL-F0031-03

CAL
Calibratech Co.,Ltd.
7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120
Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech..cal@yahoo.com, calibratech..cal@hotmail.com

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 **Page : 2 of 2**

**Result of Calibration :**

**UUC Condition As-Received :** Good

**Function :** Electrical measurement
pH meter
Performing standard curve by Multiproduct Calibrator at pH (4,7,10)

| Adjustment Curve at nominal pH | Applied Voltage (mV) | Nominal Value (pH) | UUC Reading (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%

- o0o -

CAL-F0031-03

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Calibratech Co.,Ltd.
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Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech.cal@hotmail.com

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 **Page : 2 of 2**

**Result of Calibration :** Without Adjustment

**UUC Condition As-Received :** Good

**Function :** Temperature measurement

| Immersion Depth ( mm. ) | Standard Reading ( °C ) | UUC Reading ( °C ) | Correction ( °C ) | Uncertainty ( ±°C ) |
|---|---|---|---|---|
| 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-F0031-03

DKSH

NSC-TISI-TIS 17025
Calibration 0067

# Certificate of Calibration

**Equipment:** Hot Air Oven
Manufacturer: Memmert
Model: UF 55
Serial No.: B219.0142
ID No.: WW-05-002
Shelves(pc.): 2
Condition of the item: Normal

Certificate No.: C31260296
Issued Date: 11 February 2026
Job No.: WO-00105449
Ventilation Valve: Closed
Page: 1 of 4

**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

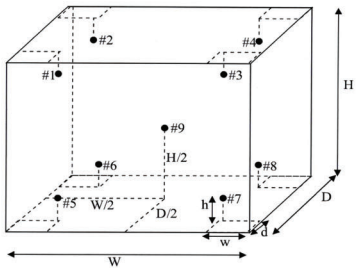
This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which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



DKSH






**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.

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## 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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CAL-FM-C31-11: 30 Jun 2025



## 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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## 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

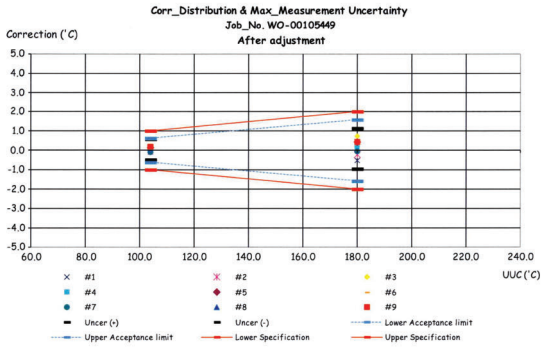
| Locations | Measured (°C) | Correction* (°C) | Guard band (W) (± °C) | Tolerance (± °C) | Conformity |
|---|---|---|---|---|---|
| #1 | 179.47 | -0.53 | 0.42 | 2.0 | Pass |
| #2 | 179.77 | -0.23 | 0.42 | 2.0 | Pass |
| #3 | 180.72 | 0.72 | 0.42 | 2.0 | Pass |
| #4 | 180.19 | 0.19 | 0.42 | 2.0 | Pass |
| #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 |

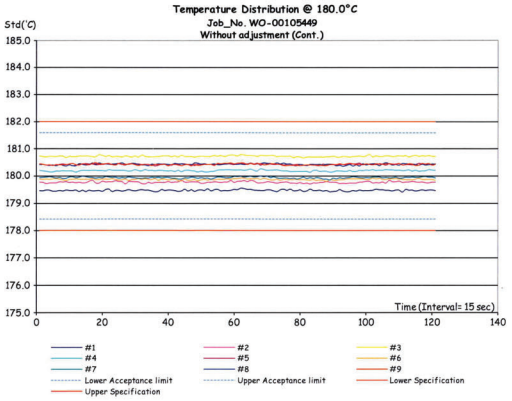
Correction* = Measured Temperature - Desired Temperature

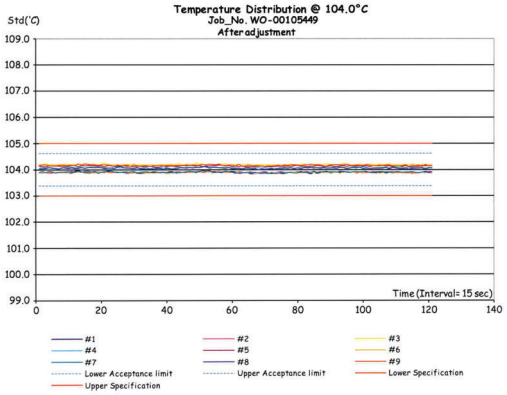
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

**The End of Statements of Conformity**

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DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพมหานคร 10260
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## 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

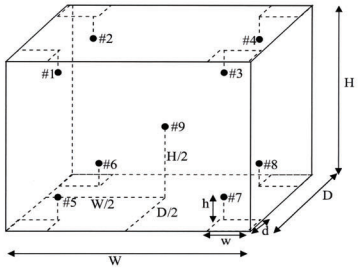
This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

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).

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**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.

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**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**

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CAL-FM-C31-11: 30 Jun 2025



## 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

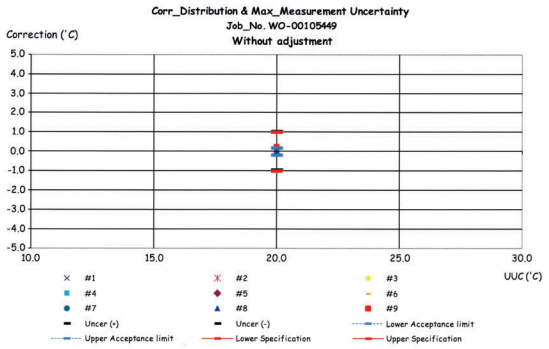
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

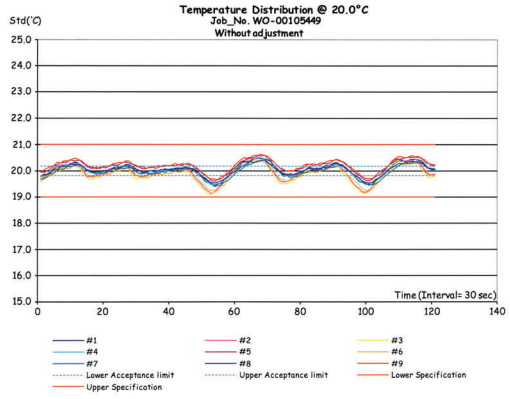
**The End of Statements of Conformity**

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

Delivering Growth – in Asia and Beyond.

CAL-FM-C31-11: 30 Jun 2025



DKSH

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

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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

# Certificate of Calibration

**Certificate No.:** WK2606-412-976 Page 1 of 2

**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

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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 Page 2 of 2

**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****

F5100 REV.00 27 Oct 16

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.**

ARCHEMICA LAB
บริษัท อาร์เคมีก้า แลบ จำกัด
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

Operator's Signature // Date 19/Feb/26





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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 |

ThermoFisher SCIENTIFIC

## 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

ThermoFisher SCIENTIFIC

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.

ARCHEMICA LAB
เอ็กซ์ อาร์เคมีก้า แลบ จำกัด
XRCHEMICA LAB CO.,LTD.

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



### 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 |

## 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 |



## Service Introduction

### 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



## Test Equipment and Standards

### 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 |



## Autosampler AS-DV 1

### 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 |

## 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 |



## Carryover OQ Autosampler AS-DV 1 Test 1

ThermoFisher SCIENTIFIC

### 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 |



## Pump Aquion 1

ThermoFisher SCIENTIFIC

### 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 |



## Flow Rate Repeatability OQ Pump Aquion 1 Test 1

ThermoFisher SCIENTIFIC

### 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 |

## Detector (Aquion CD) Conductivity Detector 1

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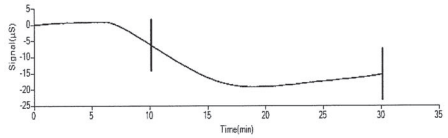
### Detector Information

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



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

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### 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 |

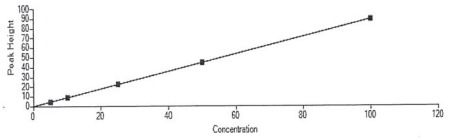
### Noise Drift Results

| 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 |



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

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### 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 |



## IC EG Aquion RFIC 1

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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 |

## 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 |



## 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



# 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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ARCHEMICA LAB CO.,LTD.
Teerayat B: 11/9/Feb/26

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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SYSTRONICS INSLAB COMPANY LIMITED

19/11-12, Sukhumvit Rd., Nernphra, Muang Rayong, Rayong 21150, Thailand

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

# CERTIFICATE OF CALIBRATION

Certificate No : EL251725
Job No : 25120018
Page : 1 of 5

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.**
-

**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

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

CERTIFICATE OF CALIBRATION

Certificate No. EL251725
Page. 2 of 5

| 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 | 5.0000 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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Tel.+66(38) 694 145-8, Email : calibration@systronics.co.th

CERTIFICATE OF CALIBRATION

Certificate No. EL251725
Page. 3 of 5

| 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 | 0.0024 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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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 MΩ | 0.50000 MΩ | 0.4996 MΩ | -0.0004 MΩ | 0.00012 MΩ |
| 5 MΩ | 4.5000 MΩ | 4.4972 MΩ | -0.0028 MΩ | 0.0026 MΩ |
| 30 MΩ | 3.00000 MΩ | 2.998 MΩ | -0.002 MΩ | 0.00070 MΩ |
| 30 MΩ | 27.0000 MΩ | 26.964 MΩ | -0.036 MΩ | 0.022 MΩ |
| 50 MΩ | 5.0000 MΩ | 4.99 MΩ | -0.01 MΩ | 0.0064 MΩ |
| 50 MΩ | 45.000 MΩ | 44.92 MΩ | -0.08 MΩ | 0.18 MΩ |
| 100 MΩ | 10.0000 MΩ | 10.0 MΩ | 0.0 MΩ | 0.058 MΩ |
| 100 MΩ | 90.000 MΩ | 89.7 MΩ | -0.3 MΩ | 0.36 MΩ |
| 500 MΩ | 150.000 MΩ | 149.4 MΩ | -0.6 MΩ | 0.60 MΩ |
| 500 MΩ | 330.000 MΩ | 327.4 MΩ | -2.6 MΩ | 4.4 MΩ |
| **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 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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Tel.+66(38) 694 145-8, Email : calibration@systronics.co.th

# 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 | 829730 | 23E4020 | 22 Dec 2025 |
| - | - | - | - | |

**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

Page. 2 of 2

**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:** 22105265
**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:** Kua Boyd Sea 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
IC/SP Product Marketing
Dionex Products
1214 Oakmead Pkwy
Sunnyvale, CA 94085-4024
408-737-0700
408-481-6508 fax
www.thermofisher.com

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Valid for 3 years from:

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

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