

ภาคผนวกที่ 4

สรุปเอกสารสอบเทียบอุปกรณ์เครื่องมือ

เอกสารการสอบเทียบเครื่องมือตรวจวัดระดับเสียงในบรรยากาศ



Certificate No.: CP20260112EA
Operation No.: CP2026020049

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: ACO
Model/Type: 6236 (Meter), 7052NR (Microphone), - (Preamplifier)
Serial No.: 222186 (Meter), 84150 (Microphone), - (Preamplifier)
ID No.: NS-03-016
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: 19 - 24 March 2026
Issued Date: 25 March 2026
Calibrated by: Ms. Juntaporn Kunhakom



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Certificate No.: CP20260112EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: ACO
Model/Type: 6236 (Meter), 7052NR (Microphone), - (Preamplifier)
Serial No.: 222186 (Meter), 84150 (Microphone), - (Preamplifier)
ID No.: NS-03-016
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	F0640003	CL1-P250034 CD20250096EA	10 April 2026 29 March 2026
6) Performance Audio Analyzer	U8903B	MY56510003	CB20260043EA CK20250065EA	10 March 2027 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
 - IIPC Metrology Center, IIPC 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.: CP20260112EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Measured value (dB)
22.7

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	18.6
C-weighting	40.7
Z-weighting	42.1

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	0.3	0.2	0.2	±1.5
1000	-0.2	-0.2	-0.2	±1.0
8000	0.5	0.6	0.7	±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	-0.2	-0.2	0.0	±2.0
125	0.1	-0.2	0.1	±1.5
250	0.0	-0.1	0.0	±1.5
500	0.0	-0.1	0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	-0.1	0.1	±2.0
4000	-0.3	-0.3	0.0	±3.0
8000	-0.4	-0.5	-0.1	±5.0



Certificate No.: CP20260112EA

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	99.0	104.0		
94.0	94.0	99.0	104.0	0.0	±1.1
99.0	99.0	104.0	109.0	0.0	±1.1
104.0	104.0	109.0	114.0	0.0	±1.1
109.0	109.0	114.0	119.0	0.0	±1.1
114.0	114.0	119.0	120.0	0.0	±1.1
119.0	119.0	120.0	121.0	0.0	±1.1
120.0	120.0	121.0		0.0	±1.1
121.0	121.0			0.0	±1.1



Certificate No.: CP20260112EA

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	53.9	-0.1	±1.1
49.0	48.9	-0.1	±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
33.0	33.2	0.2	±1.1
32.0	32.3	0.3	±1.1
31.0	31.5	0.5	±1.1
30.0	30.7	0.7	±1.1
29.0	29.8	0.8	±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	25.8	0.8	±1.1
20-90	25.0	26.0	1.0	±1.1
20-100	25.0	26.0	1.0	±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



Certificate No.: CP20260112EA

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	116.1	0.1	±1.0
	2	99.0	0.0	+1.0 ; -2.5
	0.25	89.9	-0.1	+1.5 ; -5.0
Slow	200	109.5	-0.1	±1.0
	2	89.8	-0.2	+1.0 ; -5.0
	0.25	110.0	0.0	±1.0
LAE	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	125.4	0.0	±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

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



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Certificate No.: CP20260112EA

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 --



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



ISO 9001:2015
CALIBRATION 0119

Certificate No.: CP20260142EA
Operation No.: CP2026040100

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: ACO
Model/Type: 6236 (Meter), 7052NR (Microphone), - (Preamplifier)
Serial No.: 222195 (Meter), 84163 (Microphone), - (Preamplifier)
ID No.: NS-03-025
Customer: C.E.M. Technology (Thailand) Co.,Ltd.
Address: 31/8 Moo 13 T.Rai Khung, A.Sam Phran,
Nakorn Phathom 73210
Received Date: 23 April 2026
Calibrated Date: 5 - 6 May 2026
Issued Date: 8 May 2026
Calibrated by: Ms. Juntaporn Kunhakorn



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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.



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Certificate No.: CP20260142EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: ACO
Model/Type: 6236 (Meter), 7052NR (Microphone), - (Preamplifier)
Serial No.: 222195 (Meter), 84163 (Microphone), - (Preamplifier)
ID No.: NS-03-025
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	18 March 2027
6) Performance Audio Analyzer	U8903B	MY56510003	CD20250221EA	8 August 2026
			CB20260043EA	10 March 2027
			CK20250065EA	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)
-	-	-	-



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20260142EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Measured value (dB)
18.3

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	15.8
C-weighting	23.6
Z-weighting	31.1

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)
125	0.0	-0.2	-0.1
1000	-0.1	0.0	-0.1
8000	-1.1	-1.1	-0.8
			Acceptance limits (dB)
			±1.5
			±1.0
			±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)
63	0.0	0.0	0.0
125	0.1	-0.1	0.0
250	0.1	0.0	0.0
500	0.1	0.0	0.1
1000	0.0	0.0	0.0
2000	0.1	-0.1	0.0
4000	-0.2	-0.3	-0.1
8000	-0.5	-0.4	-0.2
			Acceptance limits (dB)
			±2.0
			±1.5
			±1.5
			±1.0
			±2.0
			±3.0
			±5.0



Certificate No.: CP20260142EA

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



Certificate No.: CP20260142EA

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	38.7	-0.3	± 1.1
34.0	33.7	-0.3	± 1.1
33.0	32.7	-0.3	± 1.1
32.0	31.8	-0.2	± 1.1
31.0	30.9	-0.1	± 1.1
30.0	30.1	0.1	± 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	25.3	0.3	± 1.1
20-90	25.0	25.3	0.3	± 1.1
20-100	25.0	25.3	0.3	± 1.1
20-110	25.0	25.2	0.2	± 1.1
30-120	35.0	35.0	0.0	± 1.1
40-130	45.0	45.1	0.1	± 1.1



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Certificate No.: CP20260142EA

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	109.5	-0.1	±1.0
	2	89.8	-0.2	+1.0 ; -5.0
	0.25	109.9	-0.1	±1.0
LAE	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	125.2	-0.2	±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

Positive one-half cycle	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	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.: CP20260142EA

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 --



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-ITESTS 10285
CALIBRATION 0119

Certificate No.: CP20250138EA
Operation No.: CP2025040133

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: ACO
Model/Type: 6236 (Meter), 7052NR (Microphone), - (Preamplifier)
Serial No.: 222195 (Meter), 84163 (Microphone), - (Preamplifier)
ID No.: NS-03-025
Customer: C.E.M. Technology (Thailand) Co.,Ltd.
Address: 31/8 Moo 13 T.Rai Khung, A.Sam Phran,
Nakorn Phatom 73210

Received Date: 21 April 2025

Calibrated Date: 28 - 29 April 2025

Issued Date: 30 April 2025

Calibrated by: Ms. Juntaporn Kunhakom



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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20250138EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: ACO
Model/Type: 6236 (Meter), 7052NR (Microphone), - (Preamplifier)
Serial No.: 222195 (Meter), 84163 (Microphone), - (Preamplifier)
ID No.: NS-03-025
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-1007-24	6 June 2025
2) Arbitrary Function Generator	AFG2021	CO10063	CK20240048EA	23 June 2025
3) Programmable Attenuator	PA5	2913	EF-0021-24	3 June 2025
4) 6.5 Digit precision multimeter	8846A	9609027	CB20240128EA	31 July 2025
5) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P250028 CD20240180EA	23 March 2026 7 August 2025
6) Performance Audio Analyzer	U8903B	MY56510003	CB20250030EA CK20240069EA	13 February 2026 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)
- Electrical and Electronics Institute; NSC Accredited Calibration No.0119
- Reference standards instrument for Electrical function
- National Institute of Metrology (Thailand)
- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

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



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20250138EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone installed

Measured value (dB)
18.7

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	12.2
C-weighting	17.4
Z-weighting	23.5

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			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
125	0.2	-0.1	0.2	±1.5
1000	-0.1	-0.1	-0.2	±1.0
8000	-1.6	-1.5	-0.8	±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			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
63	0.0	-0.1	-0.1	±2.0
125	0.0	-0.1	-0.1	±1.5
250	0.0	0.0	0.0	±1.5
500	0.1	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	-0.4	-0.3	-0.1	±3.0
8000	-0.3	-0.4	-0.2	±5.0



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20250138EA

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
LAcq	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		Deviated value (dB)	Acceptance limits (dB)
	Value (dB)	(dB)		
94.0	94.0	0.0	0.0	±1.1
99.0	99.0	0.0	0.0	±1.1
104.0	104.0	0.0	0.0	±1.1
109.0	108.9	-0.1	-0.1	±1.1
114.0	113.9	-0.1	-0.1	±1.1
119.0	119.0	0.0	0.0	±1.1
120.0	120.0	0.0	0.0	±1.1
121.0	121.0	0.0	0.0	±1.1



Certificate No.: CP20250138EA

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	68.9	-0.1	±1.1
64.0	63.8	-0.2	±1.1
59.0	58.8	-0.2	±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	32.8	-0.2	±1.1
32.0	31.8	-0.2	±1.1
31.0	31.0	0.0	±1.1
30.0	30.1	0.1	±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	25.3	0.3	±1.1
20-90	25.0	25.4	0.4	±1.1
20-100	25.0	25.5	0.5	±1.1
20-110	25.0	25.5	0.5	±1.1
30-120	35.0	35.0	0.0	±1.1
40-130	45.0	45.1	0.1	±1.1

Certificate No.: CP20250138EA

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	109.5	-0.1	±1.0
	2	89.8	-0.2	+1.0 ; -5.0
	0.25	109.9	-0.1	±1.0
LAE	200	90.0	0.0	+1.0 ; -2.5
	2	80.9	-0.1	+1.5 ; -5.0
	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	125.6	0.2	±3.0
Positive half cycle	124.4	124.3	-0.1	±2.0
Negative half cycle	124.4	124.2	-0.2	±2.0

Function : 11. Overload indication

Positive one-half cycle	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	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.: CP20250138EA

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	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
- Free field sound pressure response level		
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 --



SMART TECH CALIBRATION & SERVICES CO., LTD.
14/508 MOO 3, RANGSIT-NAKHON NAYOK ROAD, LAM PHAK KUT,
THANYABURI, PATHUM THANI 12110, THAILAND
Tel. +662-114-3148 Email : stcal.mtg@gmail.com Website : stc-cal.com



Certificate of Calibration

Certificate No. STCR-2506142-16
Work Order No. STCR-2506142

Page 1 of 3

Customer Name : CEM Technology Thailand Co., Ltd.
31/8 Moo.13 Raikhing Sub-district, Samphran District,
Nakhonpathom, 73210

Equipment Name : Sound Level Meter
Manufacturer : Scarlett Tech
Model : ST-250
Serial Number : 10340901
Control Number : NS-09-012
Received Date : Jun 24, 2025
Calibration Date : Jun 25, 2025
Recommended Due Date : Jun 25, 2026
Calibration Method : Calibration Procedure No. CPE-04-01

Environmental Conditions
Ambient Temperature : $(25 \pm 2) ^\circ\text{C}$
Ambient Relative Humidity : $(50 \pm 15) \% \text{RH}$
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 : Jun 27, 2025
Calibrated by : C. Jirayu

Approved by :



(Mr. Chayut Wongkang)
Laboratory Manager

Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506142-16

Page 2 of 3

Standards Equipment Used

Equipment Name: Sound Calibrator
Serial No.: N975185
Certificate No.: 5523631031354566
Due Date: Nov 6, 2025
Traceability to: 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-2506142-16

Page 3 of 3

UUC Range : (30 to 130) 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 114.07 dB	84.5 dB 105.1 dB	94.0 dB 114.1 dB	0.09 dB -0.03 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	84.6 dB 105.1 dB	94.0 dB 114.1 dB	0.09 dB -0.03 dB	0.40 dB 0.40 dB

Sound Level Calibration @ Frequency 1 kHz Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	84.6 dB 105.1 dB	94.0 dB 114.2 dB	0.09 dB -0.13 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	84.6 dB 105.1 dB	94.0 dB 114.2 dB	0.09 dB -0.13 dB	0.40 dB 0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -



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.ms@gmail.com Website : stc-call.com



Certificate of Calibration

Certificate No. STCR-2509019-6
Work Order No. STCR-2509019
Page 1 of 3

Customer Name : CEM Technology Thailand Co., Ltd.
31/8 Moo.13 Raikhing Sub-district, Samphran District,
Nakhonpathom, 73210

Equipment Name : Sound Level Meter
Manufacturer : SOUNDTEK
Model : ST-109R
Serial Number : 221201934
Control Number : NS-11-001
Received Date : Sep 1, 2025
Calibration Date : Sep 8, 2025
Recommended Due Date : Sep 8, 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

- 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%.
- 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
- The working standard is indicated in page 2 of this certificate.
- 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.
- This results of this report only to the items calibrated.



Date of Issue : Sep 11, 2025
Calibrated by : Y. Perapon
Approved by :
(Mr.Chayut Wongjeng)
Laboratory Manager



Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2509019-6
Page 2 of 3

Standards Equipment Used

Equipment Name : Sound Calibrator
Serial No. : N975185
Certificate No. : 5523631031354566
Due Date : Nov 6, 2025
Traceability to : 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-2509019-6

Page 3 of 3

UUC Range : (30 to 130) 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 114.07 dB	90.1 dB 109.9 dB	94.2 dB 114.0 dB	-0.11 dB 0.07 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	90.1 dB 109.9 dB	94.2 dB 114.0 dB	-0.11 dB 0.07 dB	0.40 dB 0.40 dB

Sound Level Calibration @ Frequency 1 kHz Select : C

Response times	STD. Value	UUC. Reading		Correction	(±) Uncertainty
		Before Adjustment	After Adjustment		
FAST	94.09 dB 114.07 dB	90.1 dB 109.9 dB	94.1 dB 114.0 dB	-0.01 dB 0.07 dB	0.40 dB 0.40 dB
SLOW	94.09 dB 114.07 dB	90.1 dB 109.9 dB	94.1 dB 114.0 dB	-0.01 dB 0.07 dB	0.40 dB 0.40 dB

STD = Standard

UUC = Unit Under Calibration

- End of Certificate -



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



INDUSTRIAL AG
CALIBRATION 0119

Certificate No.: CP20260088EA
Operation No.: CP2026020051

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: SCARLET TECH
Model/Type: ST11D (Meter), AWA14425 (Microphone), - (Preamplifier)
Serial No.: 820892 (Meter), 57258 (Microphone), - (Preamplifier)
ID No.: NS-12-003
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



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.





ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20260088EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: SCARLET TECH
Model/Type: ST11D (Meter), AWA14425 (Microphone), - (Preamplifier)
Serial No.: 820892 (Meter), 57258 (Microphone), - (Preamplifier)
ID No.: NS-12-003
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	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 CD20250221EA	23 March 2026 8 August 2026
6) Pressure Humidity and Temperature Transmitter	PTU301	F0640003	CL1-P250034 CD20250096EA	10 April 2026 29 March 2026
7) Performance Audio Analyzer	U89038	MY56510003	CB20260043EA CK20250065EA	10 March 2027 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)
-	-	-	-



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20260088EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone installed

Measured value (dB)
15.3

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting (dB)	Measured value (dB)
A-weighting	7.4
C-weighting	7.7
Z-weighting	14.6

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	0.3	0.1	0.1	±1.0
1000	-0.1	-0.1	-0.1	±0.7
8000	-1.0	-1.0	-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	0.0	-0.1	0.0	±1.0
125	0.0	-0.1	0.0	±1.0
250	0.0	-0.2	0.0	±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	0.1	0.0	0.0	±1.0
8000	-0.1	-0.1	-0.1	+1.5;-2.5
16000	-5.3	-5.3	0.0	+2.5;-16.0



Certificate No.: CP20260088EA

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.: CP20260088EA

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	33.8	-0.2	±0.8
29.0	28.8	-0.2	±0.8
24.0	23.7	-0.3	±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
Slow	0.25	109.6	-0.4	+1.0 ; -3.0
	200	129.6	0.0	±0.5
SEL	2	110.0	0.0	+1.0 ; -3.0
	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	135.0	-0.4	±2.0
Positive half cycle	134.4	134.2	-0.2	±1.0
Negative half cycle	134.4	134.2	-0.2	±1.0



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.: CP20260088EA

Calibration Report

Function : 10. Overload indication

Positive one-half cycle	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	Negative one-half cycle	142.8		
142.5			0.3	±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-L 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 IEC 61672-3:2013 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



Certificate No.: CP20250254EA

Operation No.: CP2025080247

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: SCARLET TECH
Model/Type: ST11D (Meter), AWA14425 (Microphone), - (Preamplifier)
Serial No.: 820388 (Meter), 79928 (Microphone), - (Preamplifier)
ID No.: NS-12-001
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



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The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor (k)

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ELECTRICAL AND ELECTRONICS INSTITUTE
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Certificate No.: CP20250254EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: SCARLET TECH
Model/Type: ST11D (Meter), AWA14425 (Microphone), - (Preamplifier)
Serial No.: 820388 (Meter), 79928 (Microphone), - (Preamplifier)
ID No.: NS-12-001
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	CL14P250034 CD20250096EA	10 April 2026 29 March 2026
6) Performance Audio Analyzer	U8903B	MY56510003	CB20250030EA CK20240069EA	13 February 2026 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)
-	-	-	-



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20250254EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed	Measured value (dB)
	15.7

2.2 Microphone replaced by the electrical input signal device

Frequency	Weighting	Measured value
	(dB)	(dB)
A-weighting		11.0
C-weighting		12.1
Z-weighting		14.8

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)
125	0.4	0.3	0.4
1000	0.0	0.0	0.0
8000	0.0	0.1	-0.1
			Acceptance limits (dB)
			±1.0
			±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)
63	0.0	-0.1	0.0
125	0.0	-0.2	0.0
250	0.0	-0.1	-0.1
500	0.0	-0.1	0.0
1000	0.0	0.0	0.0
2000	0.1	0.0	-0.1
4000	0.1	-0.1	0.0
8000	-0.1	-0.1	0.0
16000	-5.3	-5.2	0.1
			Acceptance limits (dB)
			±1.0
			±1.0
			±1.0
			±1.0
			±1.0
			±1.0
			+1.5; -2.5
			+2.5; -16.0



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Certificate No.: CP20250254EA

CP20250254EA

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.: CP20250254EA

CP20250254EA

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	26.0	0.0	±0.8
25.0	25.0	0.0	±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	109.5	-0.5	+1.0 ; -3.0
Slow	200	129.5	-0.1	±0.5
	2	109.9	-0.1	+1.0 ; -3.0
	200	130.0	0.0	±0.5
SEL	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	135.2	-0.2	±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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Certificate No.: CP20250254EA

Calibration Report

Function : 10. Overload indication

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

เอกสารการสอบเทียบเครื่องมือตรวจวัดความชื้นสะท้อน



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 Kunhakorn

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ELECTRICAL AND ELECTRONICS INSTITUTE
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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



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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	

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	



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

- UUC: Unit Under Calibration
- The coverage factor $k = 2.00$

-- End of Report --



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 Kunhakorn

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ELECTRICAL AND ELECTRONICS INSTITUTE
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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



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

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	Vertical (V)
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	

Remark

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

-- End of Report --



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	Vertical (V)
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 --

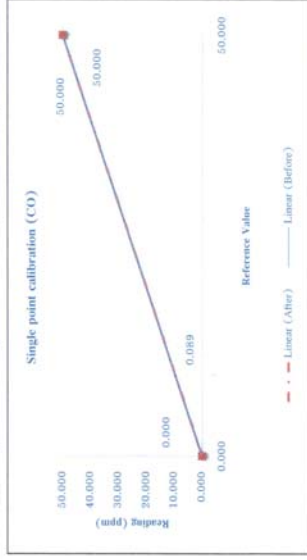
เอกสารการสอบเทียบเครื่องมือตรวจวัดคุณภาพอากาศในบรรยากาศ

Certificate of Analyzer Performance Testing

Calibrated Date : 18-Aug-25 Certificate No. : 0825-005
 Page : 1/1
 Analyzer Instruments : CO Analyzer : Thermo Environmental
 Model : 48C : 508011061
 Environmental :
 Temperature : 26.5 °C
 Humidity : 36.4 %RH
 Calibration System :
 Calibrator Units : Thermo Environmental : API
 Gas Calibration : 146C : 701
 Model : 514811458 : 179
 Serial No. :
 Standard Gas :
 NO Conc. : 2 ppm : 307199
 SO2 Conc. : 2 ppm : 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 (%)
CO	Before					
	0.089	0.000	0.09	50.0	50.000	0.00
CO	After					
	0.000	0.000	0.00	50.0	50.000	0.00

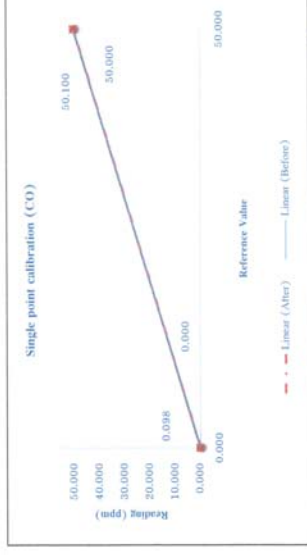


Certificate of Analyzer Performance Testing

Calibrated Date : 20-Aug-25 Certificate No. : 0825-008
 Page : 1/1
 Analyzer Instruments : CO Analyzer : Thermo Environmental
 Model : 48C : 508011064
 Environmental :
 Temperature : 25.7 °C
 Humidity : 36.7 %RH
 Calibration System :
 Calibrator Units : Thermo Environmental : API
 Gas Calibration : 146C : 701
 Model : 514811458 : 179
 Serial No. :
 Standard Gas :
 NO Conc. : 2 ppm : 307199
 SO2 Conc. : 2 ppm : 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 (%)
CO	Before					
	0.098	0.000	0.10	50.1	50.000	0.20
CO	After					
	0.000	0.000	0.00	50.0	50.000	0.00

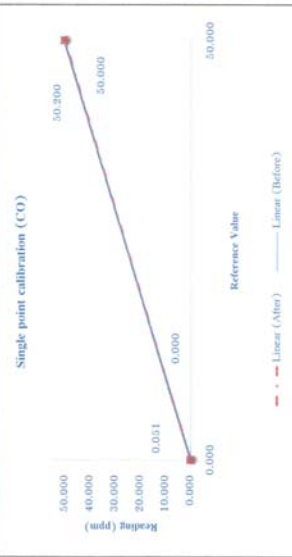


Certificate of Analyzer Performance Testing

Calibrated Date : 2-Jun-25
 Certificate No. : 0825-001
 Page : 1/1
 Analyzer Instruments :
 Analyzer Type : CO Analyzer
 Model : 48C
 Manufacturer : Thermo Environmental
 Serial No. : 506011068
 Environmental :
 Temperature : 25.0 °C
 Humidity : 51.5 %RH
 Calibration System :
 Calibrator Units :
 Gas Calibration :
 Model : 146C
 Serial No. : 514811458
 Zero Air Generator : API
 Model : 701
 Serial No. : 179
 Standard Gas :
 NO Conc. : 2 ppm
 SO2 Conc. : 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 (%)
CO	Before					
	0.051	0.000	0.05	50.2	50.000	0.40
CO	After					
	0.000	0.000	0.00	50.0	50.000	0.00

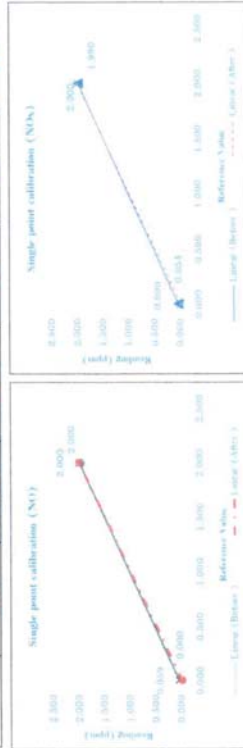


Certificate of Analyzer Performance Testing

Calibrated Date : 20-Aug-25
 Certificate No. : 0825-004
 Page : 1/1
 Analyzer Instruments :
 Analyzer Type : NO/NO2/NOx Analyzer
 Model : 42C
 Manufacturer : Thermo Environmental
 Serial No. : 06103-351
 Environmental :
 Temperature : 26.3 °C
 Humidity : 45.0 %RH
 Calibration System :
 Calibrator Units :
 Gas Calibration :
 Model : 146A
 Serial No. : 514811458
 Zero Air Generator : API
 Model : 701
 Serial No. : 179
 Standard Gas :
 NO Conc. : 2 ppm
 SO2 Conc. : 2 ppm
 CO Conc. : 50 ppm
 Cylinder No. : 307199
 Expire Date : 10-Aug-25

Calibration Check

Gas	Zero			Span		
	Reading Value (ppm)	Expected Value (ppm)	Drift (%)	Reading Value (ppm)	Expected Value (ppm)	Drift (%)
NO	Before					
	0.053	0.000	0.06	2.00	2.00	0.00
NOx	Before					
	0.054	0.000	0.05	1.99	2.00	-0.50
NO	After					
	0.000	0.000	0.00	2.00	2.00	0.00
NOx	After					
	0.000	0.000	0.00	2.00	2.00	0.00



Certificate of Analyzer Performance Testing

Calibrated Date : 29-Jul-23 Certificate No. : 0723-002 Page : 1/1

Analyzer Instruments

Analyzer Type : NO/NO2/NOx Analyzer Manufacturer : Thermo Environmental
Model : 43C Serial No. : 000011073

Environmental

Temperature : 26.1 °C Humidity : 46.2 %RH

Calibration System

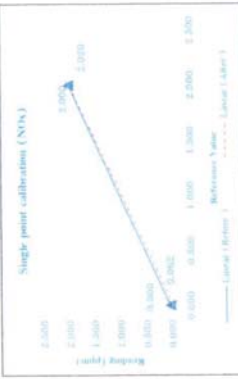
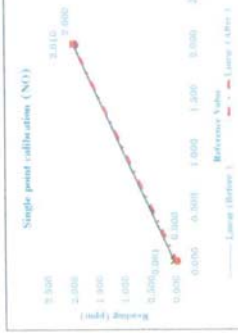
Calibrator Units : Thermo Environmental Zero Air Generator : API
Gas Calibration : 146C Model : 701
Serial No. : 514811458 Serial No. : 179

Standard Gas

NO Conc. : 2 ppm Cylinder No. : 307199
NO2 Conc. : 2 ppm Expire Date : 10-Oct-25
CO Conc. : 5.0 ppm

Calibration Check

Gas	Zero			Span		
	Reading Value (ppm)	Expected Value (ppm)	Drift (%)	Reading Value (ppm)	Expected Value (ppm)	Drift (%)
NO	0.001	0.000	0.00	Before		
				0.01	0.01	0.00
NOx	0.002	0.000	0.00	After		
				0.00	0.00	0.00
NO	0.000	0.000	0.00	Before		
				0.00	0.00	0.00
NOx	0.000	0.000	0.00	After		
				0.00	0.00	0.00



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-62201-234

Environmental

Temperature : 25.2 °C Humidity : 43.3 %RH

Calibration System

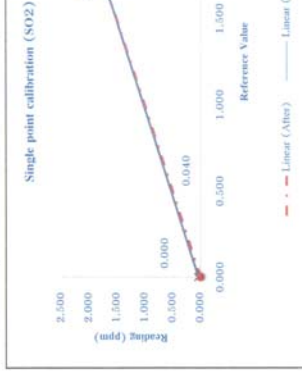
Calibrator Units : Thermo Environmental Zero Air Generator : API
Gas Calibration : 146C Model : 701
Serial No. : 514811458 Serial No. : 179

Standard Gas

NO Conc. : 2 ppm Cylinder No. : 307199
SO2 Conc. : 2 ppm Expire Date : 10-Oct-25
CO Conc. : 5.0 ppm

Calibration Check

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



Certificate of Analyzer Performance Testing

Calibrated Date : 18-Aug-25 Certificate No. : 0825-004 Page : 1/1

Analyzer Instruments
 Analyzer Type : SO2 Analyzer
 Model : 43C
 Manufacturer : Thermo Environmental
 Serial No. : 43C-77419-385

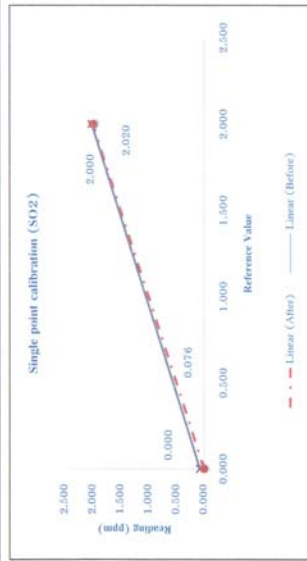
Environmental
 Temperature : 24.5 °C
 Humidity : 35.9 %RH

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 Conc. : 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 (%)
SO2	Before					
	0.076	0.000	0.08	2.02	2.000	1.00
SO2	After					
	0.000	0.000	0.00	2.00	2.000	0.00



Certificate of Analyzer Performance Testing

Calibrated Date : 8-Jan-26 Certificate No. : 0126-001 Page : 1/1

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

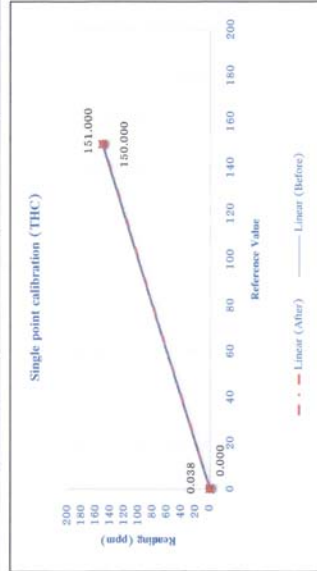
Environmental
 Temperature : 25.0 °C
 Humidity : 46.2 %RH

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

Standard Gas
 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 (%)
THC	Before					
	0.038	0.000	0.038	151	150	0.667
THC	After					
	0.000	0.000	0.000	150	150	0.000



Certificate of Analyzer Performance Testing

Calibrated Date : 8-Jan-26 Certificate No. : 0126-002 Page : 1/1

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

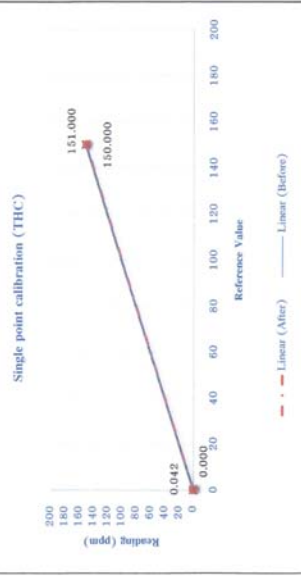
Environmental
Temperature : 25.0 °C
Humidity : 46.1 %RH

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



Certificate of Calibration

Calibrated Date : 1-Sep-25 Certificate No. : 0925-003 Page : 1/1

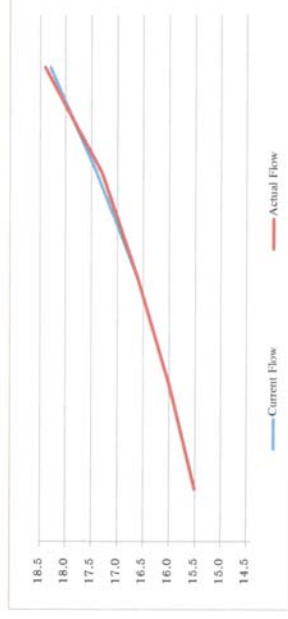
Instruments
Instruments : PM2.5-PN10 Air Sampler
Model : 1400a
Manufacturer : TIGOM Control Unit (RP)
Serial No. : 140A10254490411

Environmental
Temperature : 26.3 °C
Humidity : 45.6 %RH

Calibration System
Instruments : Dpysl
Model : DCL-H
Serial No. : 102591
Manufacturer : Flow
Calibration due date : 18-Dec-25

Flow Testing

Filter	Set Flow Instrument (L/min)	Current Flow Instrument reading (L/min)	Actual Flow Reference Standard (L/min)
47 mm.	16.5	16.6	16.6
	17.3	17.4	17.3
	15.9	16.0	16.0
	18.4	18.3	18.4
	15.5	15.5	15.5





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): 75.6 Average Temp. (deg K): 297.3

Calibration Orifice

Make: Tisch Environmental, Inc. Qstd Slope: 1.57894
Model: TE-5028A Qstd Intercept: -0.01520
Serial#: 1178 Calibration Due Date: 22 Oct 25

Calibration Data

Plate or Test #	In H2O	Qa (m3/min)	I (chart)	IC (corrected)	Linear Regression
1	9.30	1.280	60.1	39.53	Slope 32.5138
2	7.70	1.166	57.5	37.82	Intercept -1.1790
3	6.60	1.080	52.7	34.66	Corr. Coeff 0.9523
4	5.75	1.037	50.4	33.15	SFR 1.115
5	5.10	1.006	45.6	29.99	SSP 53.35

of Observations: 5

Calculations

$Qa = 1/m(\sqrt{(Ps/Pa)(Ta/Pa))}-b)$
 $IC = I(\sqrt{(Ta/Pa)})$
 $SFR = 1.13(Ps/Pa)(Ta/Ts)$
 $SSP = (m \cdot SFR + b)(\sqrt{(Pa/Ta)})$
 m = sampler slope
 b = sampler intercept
 I = chart response
 Tav = daily average temperature
 Pav = daily average pressure
 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)

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 use

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PM10 High Volume Sampler Verification

Site Information

Location: - Site ID: - Date: 24 September 2025
Sampler: TE-6070 PM10 Serial No: 3211 Tech: Tong P.

Site Conditions

Barometric Pressure (in Hg): 27.19 Corrected Pressure (mm Hg): 650.6
Temperature (deg F): 76.2 Temperature (deg K): 297.6
Average Press. (in Hg): 26.75 Corrected Average (mm Hg): 679.5
Average Temp. (deg F): 76.3 Average Temp. (deg K): 297.6

Calibration Orifice

Make: Tisch Environmental, Inc. Qstd Slope: 1.57894
Model: TE-5028A Qstd Intercept: -0.01520
Serial#: 1178 Calibration Due Date: 12 Oct 25

Calibration Data

Plate or Test #	In H2O	Qa (m3/min)	I (chart)	IC (corrected)	Linear Regression
1	9.50	1.291	61.3	40.24	Slope 30.2242
2	7.55	1.152	56.5	37.09	Intercept 1.6407
3	6.50	1.069	52.4	34.39	Corr. Coeff 0.9876
4	5.45	1.037	50.3	33.02	SFR 1.112
5	5.05	1.006	47.8	31.38	SSP 53.68

of Observations: 5

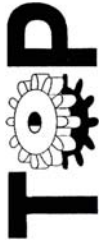
Calculations

$Qa = 1/m(\sqrt{(Ps/Pa)(Ta/Pa))}-b)$
 $IC = I(\sqrt{(Ta/Pa)})$
 $SFR = 1.13(Ps/Pa)(Ta/Ts)$
 $SSP = (m \cdot SFR + b)(\sqrt{(Pa/Ta)})$
 m = sampler slope
 b = sampler intercept
 I = chart response
 Tav = daily average temperature
 Pav = daily average pressure
 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)

Average I (chart): 53.7
Average Flow over Sample (m3/min): 1.120724666
Enter Total Time (Hrs): 24.0
Total flow over sample (m3/min): 1613.843807
Total flow over sample (CFM): 56984.82491

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: 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)	Linear Regression
1	8.05	1.739	60.2	57.94	Slope: 39.3862
2	6.60	1.576	55.6	53.51	Intercept: -9.6675
3	5.20	1.400	47.9	46.10	Corr. Coeff: 0.9958
4	4.60	1.317	43.1	41.48	
5	4.05	1.112	35.3	33.97	# of Observations: 5

Calculations

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$
$$IC = [(\text{Sqrt}(Pa/Pstd)(Tstd/Ta))]$$

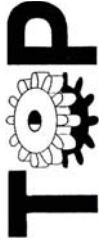
Qstd = standard flow rate
IC = corrected chart response
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept

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:
 $1/m[(1)\text{Sqrt}(298/Tav)(Pav/760)]-b$

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: 3272	Tech: Tong, P

Site Conditions

Barometric Pressure (in Hg): 28.20	Corrected Pressure (mm Hg): 716.3
Temperature (deg F): 75.4	Temperature (deg K): 297.3
Average Press. (in Hg): 27.30	Corrected Average (mm Hg): 693.4
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)	Linear Regression
1	8.30	1.783	61.4	59.68	Slope: 37.0610
2	6.55	1.585	55.9	54.34	Intercept: -5.7152
3	5.45	1.447	48.7	47.34	Corr. Coeff: 0.9964
4	4.60	1.330	45.0	43.74	
5	4.10	1.112	36.3	35.28	# of Observations: 5

Calculations

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$
$$IC = [(\text{Sqrt}(Pa/Pstd)(Tstd/Ta))]$$

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept

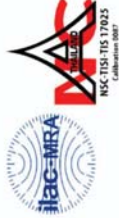
Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)
Tstd = 298 deg K
Pstd = 760 mm Hg
For subsequent calculation of sampler flow:
 $1/m[(1)\text{Sqrt}(298/Tav)(Pav/760)]-b$

Enter Average I (chart):	49.5
Average Flow Calculation m3/min	1.430793958
Average Flow Calculation in cfm	50.52238487
Sample Time (Hrs):	24.0
Total flow in 24 hours m3/min	2060.3433
Total flow in 24 hours cfm	72752.23421

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

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เอกสารการสอบเทียบเครื่องมือตรวจวัดคุณภาพน้ำ



Certificate of Calibration

Equipment: Electronic Balance
Manufacturer: Sartorius
Model: QUINTIX 224-1S
Serial No.: 0035009070
ID No.: CH-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. (หนองแขม)
219/43 Moo 12 Petchkasem Road, Omnoi,
Krathum Baen, Samut Sakhon 74130 Thailand

Calibration By: Mr. Wasan Nuchabee
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



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 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 สุขุมวิท ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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CAL-FM-C01-15: 30 Jun 2025



Certificate No.: C01261658
Page: 2 of 2

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 (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 ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
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CAL-FM-C01-15: 30 Jun 2025



ใบตรวจสอบสภาพเครื่องชั่ง Electronic Balance Checklist

Equipment: Electronic Balance
Model: QUINTIX 224-1S
Serial No.: 0035009070
Certificate No.: C01261658
Job No.: WO-00124610

Check date		รายการตรวจเช็ค (Description)	Check before delivery		หมายเหตุ (Remark)
11 Jun 2026			11 Jun 2026		
(Normal)	(Defective)		(Normal)	(Defective)	
		General			
☒	☐	1. สายไฟ/ อะแดปเตอร์ (Electrical wire/ Adaptor)	☒	☐	
☒	☐	2. ความสมบูรณ์ชุดกระงกกันลม (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. การทำงานของฟังก์ชัน (Internal/ External Function)	☒	☐	
☒	☐	10. ความสะอาดของตัวเครื่องภายนอก (External cleanliness of the balance)	☒	☐	
☒	☐	11. สภาพแวดล้อม ณ สถานที่ตั้งเครื่องชั่ง (Environment at the location of the balance)	☒	☐	

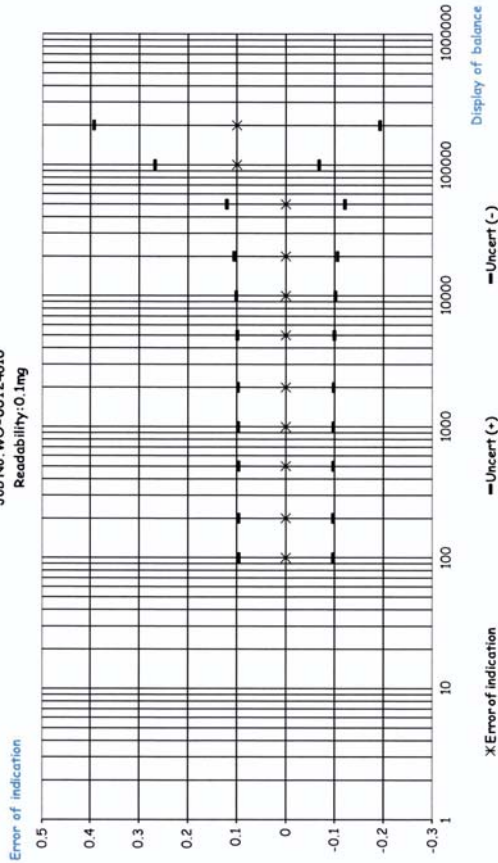
ข้อแนะนำ/ Note :

Mr. Wasan Nuchabee
Service Engineer

บริษัท ดีเคเอสเอ เอเชีย จำกัด
DKSH Technology Limited
2533 สุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangkok, Prachinong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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Without Adjustment
Job No. WO-00124610
Readability: 0.1mg



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DKSH Technology Limited
2533 สุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangkok, Prachinong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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THAI CALIBRATION SERVICES CO., LTD.
19/8 Moo 9 Soi Raikhang 30, Phuthamonthon 5 Rd., Raikhang,
Samphran, Nakhonpathom 73210 Tel. 0-3439-7682-5, 08-6341-8613
www.thaicall.com E-mail : sales@thaicalibration.com, lab@thaicalibration.com



NSC-TISU-TIS 17025
CALIBRATION 0189

CALIBRATION CERTIFICATE

Certificate No.S2602960S

page 1 of 2

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

Model :

BSA224S-CW

Accuracy class :

69S0915-1

Capacity :

220 g

Resolution :

0.0001 g

Serial No. :

3139614148

ID No. :

CI-01-003

Place of calibration :

หน้าตึก 3 ชั้น

Order No. :

Ambient temperature :

Relative humidity :

Received date :

Date of calibration :

Date of issue :

Condition of the balance :

Calibration method

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

Condition of reference standard weight

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

Traceability of the reference standard weight

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

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



THAI CALIBRATION SERVICES CO., LTD.
19/8 Moo 9 Soi Raikhang 30, Phuthamonthon 5 Rd., Raikhang,
Samphran, Nakhonpathom 73210 Tel. 0-3439-7682-5, 08-6341-8613
www.thaicall.com E-mail : sales@thaicalibration.com, lab@thaicalibration.com



NSC-TISU-TIS 17025
CALIBRATION 0189

CALIBRATION CERTIFICATE

Certificate No.S2602960S

page 2 of 2

The repeatability of indication

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

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

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



The error of indication

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

Remark : Adjustment, Internal weight

Uncertainty of measurement

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

This report will certify of the calibrated equipment only.

--End--



Certificate of Calibration



Equipment: Electronic Thermo-Hygrometer
Manufacturer: testo
Model: testo 608-H1
Serial No.: 45186322
ID No.: CH-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, Bangkok,
Phrakhanong, Bangkok 10260 Thailand

Calibration By: Mr. Tweewong Thaitiang
Calibration Date: 28 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.

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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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



Certificate No. : C19262637
Page: 2 of 2

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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CAL-FM-C19-12: 30 Jun 2025



ใบตรวจสอบสภาพเครื่องมือวัดอุณหภูมิ (Thermo-Hygrometer Checklist)

Equipment : Electronic Thermo-Hygrometer

Serial No. : 45186322

Certificate No. : C19262637

Model : testo 608-H1

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

Note :

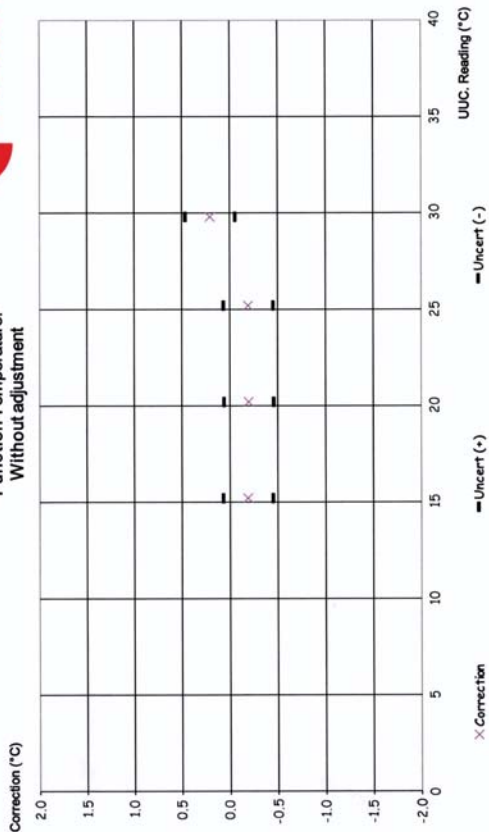
Mr. Tweewong Thaitiang
Service Engineer

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

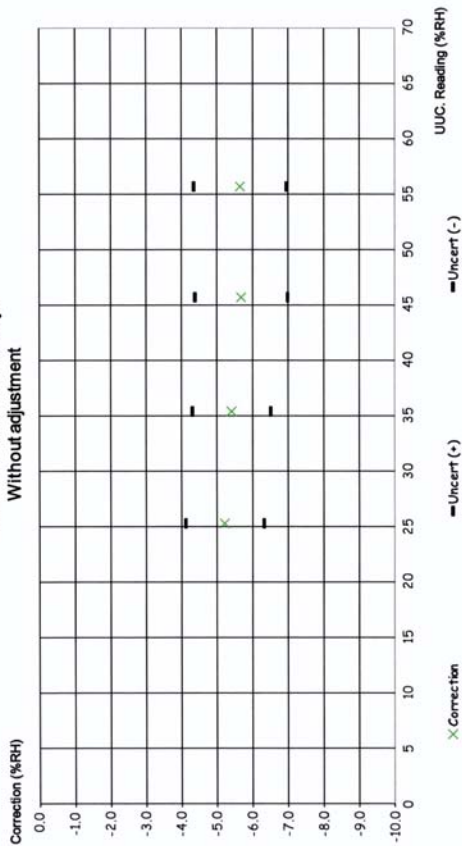
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C19262637 Function Temperature: Without adjustment



C19262637 Function Relative Humidity: Without adjustment



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Certificate of Calibration



Equipment: Electronic Thermo-Hygrometer
Manufacturer: testo
Model: testo 608-H1
Serial No.: 45186324
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 Thaitiang
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.

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
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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



Certificate No. : C19262638
Page: 2 of 2

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

บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 สุขุมวิท ถนน, แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
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CAL-FM-C19-12: 30 Jun 2025



ใบตรวจสอบสภาพเครื่องมือวัดอุณหภูมิ
(Thermo-Hygrometer Checklist)

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

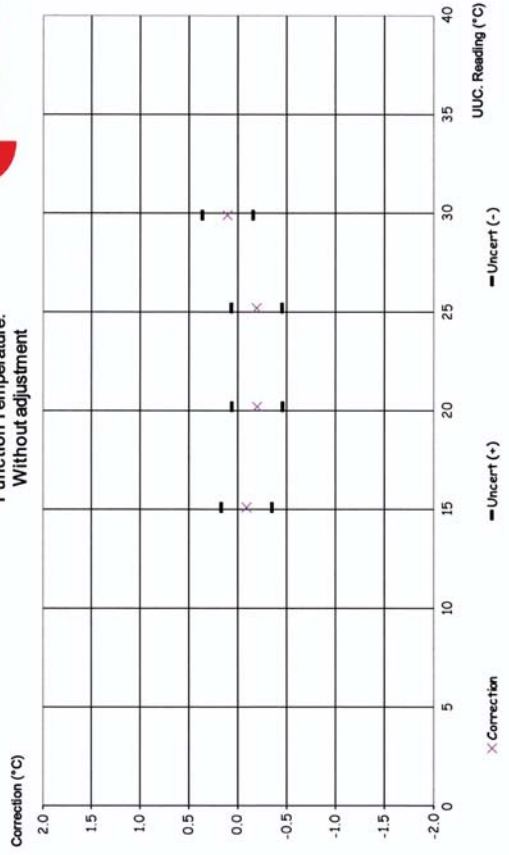
Check Date		รวมการตรวจเช็ค		Check before delivery		หมายเหตุ (Remark)
26 May 2026				26 May 2026		
Normal	Defective			Normal	Defective	
		General				
☐	☐	1. สายไฟ (Electric wire)		☐	☐	ไม่มี
☐	☐	2. การทำงาน (On/Off Switch)		☐	☐	ไม่มี
☒	☐	3. การทำงานปุ่มกดต่างๆ (Selector Key)		☒	☐	
☒	☐	4. การแสดงผลหน้าจอ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

Note :

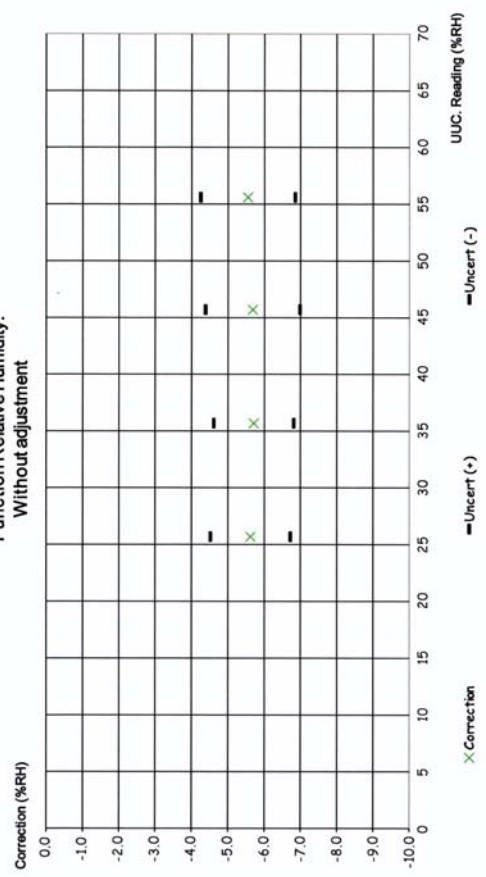
Mr. Tweewong Thaitiang
Service Engineer



C19262638
Function Temperature:
Without adjustment



C19262638
Function Relative Humidity:
Without adjustment



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-03-002Environment : 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 2026Date of Issue : 24 February 2026
Calibrated by : Permpon Chianpu

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

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

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 : GoodFunction : 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-



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

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

-o00-



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 :

Permpoon 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)

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-





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

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



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 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, Bangkok 10260
Phone: +66 2539 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

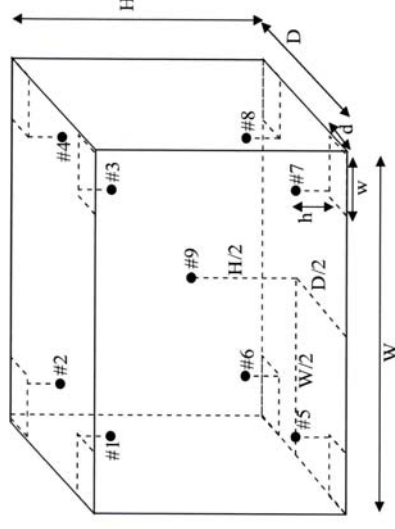
Delivering Growth - in Asia and Beyond.

CAL-FM-C31-11: 30 Jun 2025



Certificate No.: C31260296

Page: 2 of 4



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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2533 Sukhumvit Road, Bangkok 10260
Phone: +66 2539 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



Calibration Results:

Before adjustment

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



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



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



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.



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

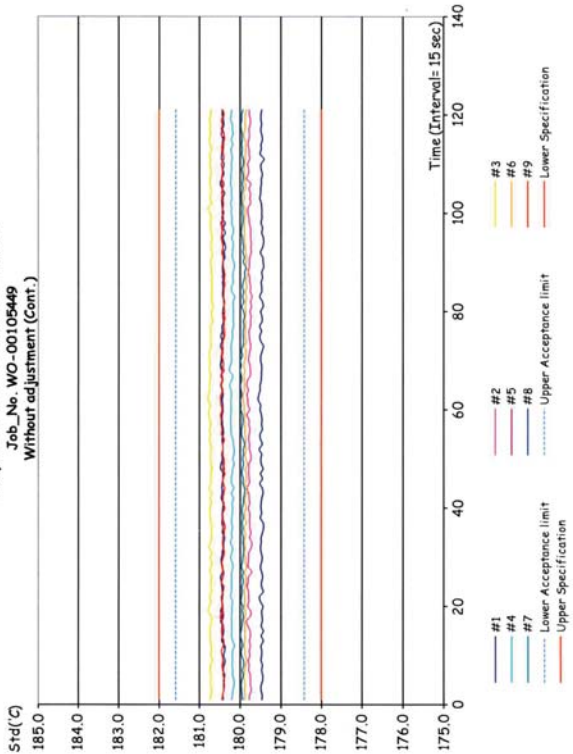
Locations	Measured (°C)	Correction* (°C)	Guard band (w) (± °C)	Tolerance (± °C)	Conformity
#1	179.47	-0.53	0.42	2.0	Pass
#2	179.77	-0.23	0.42	2.0	Pass
#3	180.72	0.72	0.42	2.0	Pass
#4	180.19	0.19	0.42	2.0	Pass
#5	180.42	0.42	0.42	2.0	Pass
#6	179.87	-0.13	0.42	2.0	Pass
#7	179.94	-0.06	0.42	2.0	Pass
#8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

Correction* = Measured Temperature - Desired Temperature

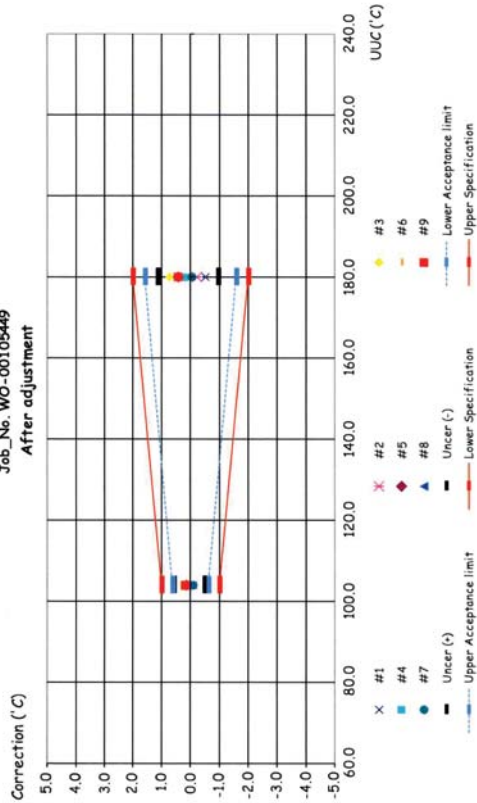
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity

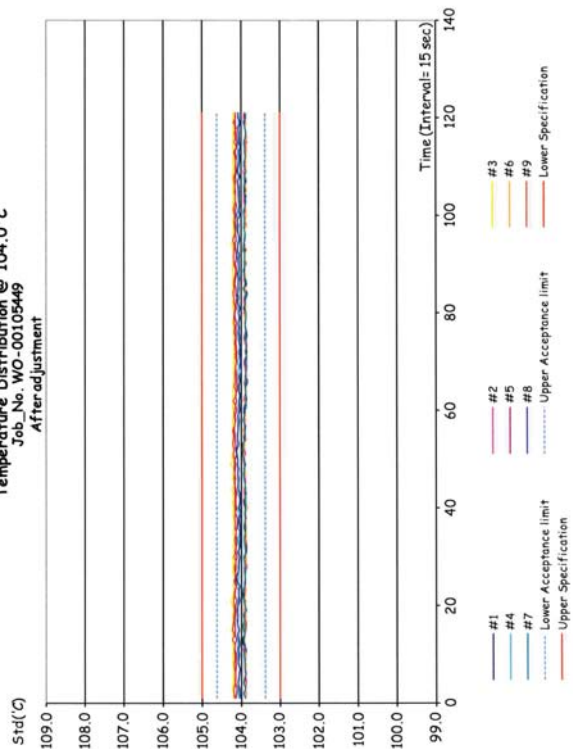
Temperature Distribution @ 180.0°C
Job_No. WO-00105449
Without adjustment (Cont.)



Corr_Distribution & Max_Measurement Uncertainty
Job_No. WO-00105449
After adjustment



Temperature Distribution @ 104.0°C
Job_No. WO-00105449
After adjustment





ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

ชนิดเครื่องมือ: Hot Air Oven
หมายเลขเครื่อง: B219.0142
เลขที่ใบงาน: WO-00105449
รุ่น: UF 55

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

ข้อแนะนำ:

Mr. Sittiphong Lekfu
Service Engineer

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

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Certificate of Calibration

Equipment: Cooled Incubator
Manufacturer: Binder
Model: KB 240
Serial No.: 20180000012164
ID No.: WW-16-001
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

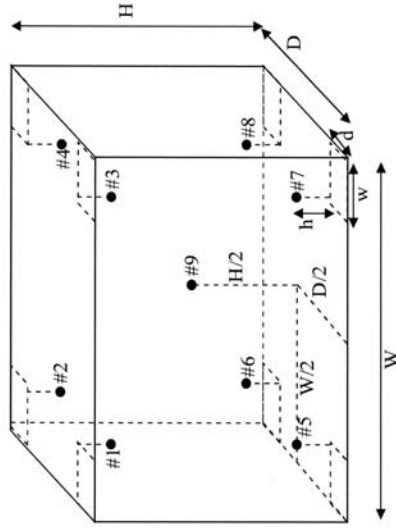
Calibration By: Mr. Sittiphong Lekfu
Calibration Date: 09 February 2026
In house method, CAL-WI-16, base on TLAS-G20
The Method Used: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Traceability: Certificate No. C10250013

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to International or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with Evaluation of measurement data - Guide to the expression of uncertainty in measurement (JCGM 100).
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

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

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CAL-FM-C31-11; 30 Jun 2025



Standard Installation Locations

Volume (Calibration Zone)= 122 (Liters)

Inside chamber:

W = 65 (cm) D = 50 (cm) H = 76 (cm)

Standard Locations (#1, #2, #3, #4): w = 7 (cm) d = 5 (cm) h = 8 (cm)

Standard Locations (#5, #6, #7, #8): w = 7 (cm) d = 5 (cm) h = 8 (cm)

#9: Geometric center of the chamber

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

Definitions

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

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

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

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

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

Calibration Results: Without adjustment

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

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

Temperature Distribution

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

Chamber Characterization

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

Note: * Maximum uncertainty of the each position

The End of Certificate



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:

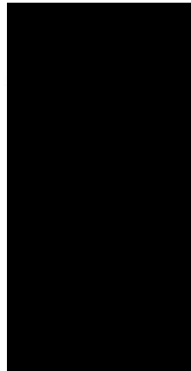
Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

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



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

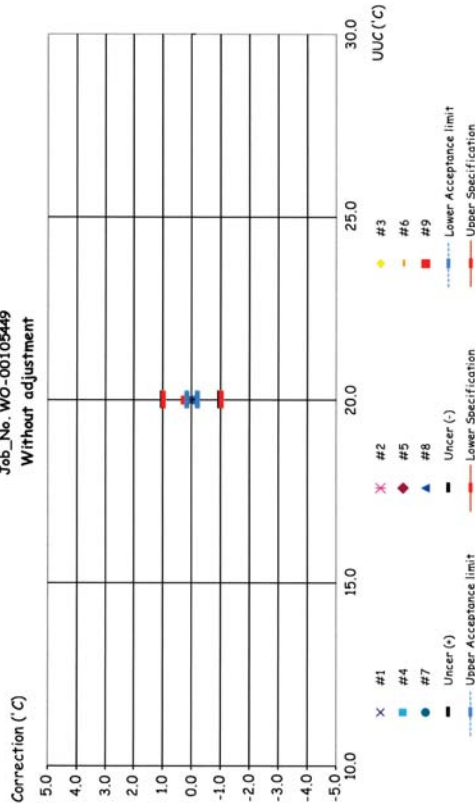
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity

Corr_Distribution & Max_Measurement Uncertainty

Job_No. WO-00105449

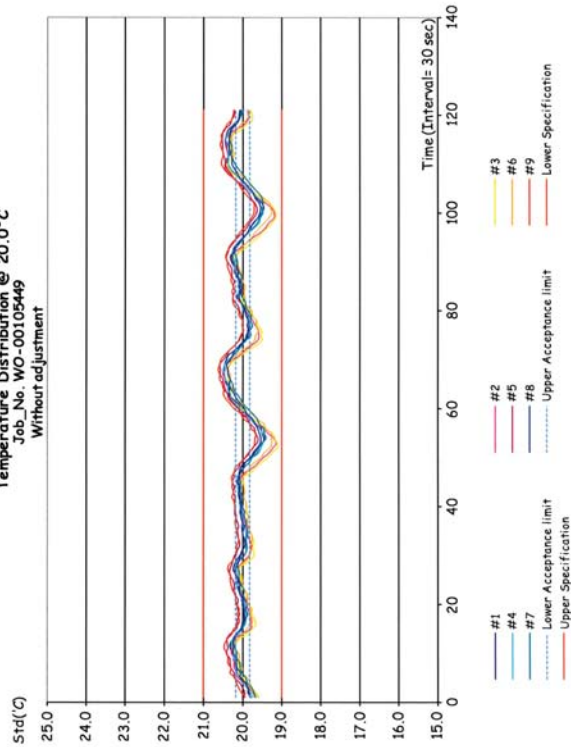
Without adjustment



Temperature Distribution @ 20.0 °C

Job_No. WO-00105449

Without adjustment



ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

ชดเครื่องชื่อ: Cooled Incubator

หมายเลขเครื่อง: 20180000012164

รุ่น: KB 240

เลขที่ใบงาน: WO-00105449

ตรวจสอบ (รับ)	09 Feb 2026	รายการตรวจสอบ		หมายเหตุ
		ปกติ	ไม่ปกติ	
ปกติ	ไม่ปกติ			
General				
☒	☐	1. สายไฟ	☒	
☒	☐	2. การทำงาน Main Switch	☒	
☒	☐	3. การทำงาน Selector Key	☒	
☒	☐	4. การแสดงผล Display	☒	
☒	☐	5. การทำงาน ฟัดลม	☒	
☐	☐	6. สภาว Lever of Ventilation valve	☐	ไม่มี
☒	☐	7. สภาว Lever door open / close	☒	
☒	☐	8. สภาว Door seal	☒	
☒	☐	9. การทำงานของระบบ Safety	☒	
☒	☐	10. การทำงานของระบบทำความเย็น	☒	
☐	☐	11. การทำงานของระบบทำความชื้น	☐	ไม่มี
☒	☐	12. สภาวด้านเครื่อง	☒	
☒	☐	13. สภาวแวดล้อม ณ สถานที่ตั้งเครื่อง	☒	

ข้อแนะนำ :

Mr. Sitthiphong Lekfu
Service Engineer

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 coverage factor k = 2 , providing a level of confidence approximately 95 %

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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

Standard Solution	UUC Reading	Error	Unit : NTU	
			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 ****



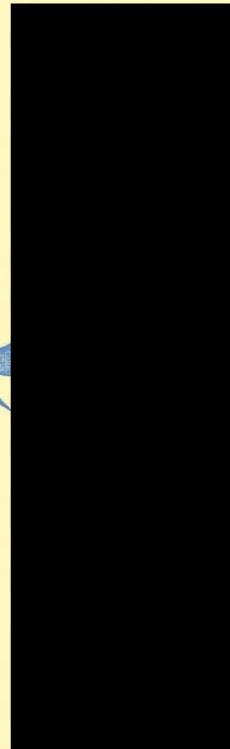
Certificate of Calibration

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.



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 RFI: 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



Customer

Date



General ICS Maintenance Checklist

No.	Description	Checked	Cleaned	Replaced	Result
Power on & Connection					
1	Instrument power on	☒	-	-	N.A.
2	Instrument connection	☒	-	-	
Injection Valve Rebuild					
3	Rebuilt injection valve 6 port	☒	Cleaned	Replaced	N.A.
4	- Rotor seal	☒			
5	- Stator face	☒			
(Optional) Auxiliary Valve Rebuild					
6	Rebuilt auxiliary valve 0 port	☒	Cleaned	Replaced	N.A.
7	- Rotor seal	☒			
8	- Stator face	☒			
Check Valve Cartridge					
9	Inlet check valve assembly	☒	Cleaned	Replaced	N.A.
10	Outlet check valve assembly	☒			
11	Verified correct flow orientation	☒	-	-	
Pump Piston Rinse Seal, Piston Seal and Piston					
12	Piston rinse seal in primary pump head	☒	Cleaned	Replaced	N.A.
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					
18	Waste valve	☒	Cleaned	Replaced	N.A.
19	Priming valve	☒			
Cell Detector					
20	Check conductivity cell	☒	Cleaned	Replaced	N.A.
21	Check electrochemical cell	☒			
22	- Working electrode	☒			
23	- Reference electrode	☒			
24	- Gasket	☒			
25	- Cell body	☒			
Other					
26	Sample Loop	☒	Cleaned	Replaced	N.A.
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

ThermoFisher SCIENTIFIC Chromeleon Operational Qualification

General Information

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

Overall Test Result: **Passed**

Comparison Format:

All Parameters:	Significant Digits:	10
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Chromeleon Operational Qualification, Part 1
Verification of Selected Results

Detection Algorithm:	Cobra		
Calibration Type:	Lin. With Offset		
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 Coeff.	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	



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
S C I E N T I F I C

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

ThermoFisher
S C I E N T I F I C

Chromeleon Operational Qualification, Part 2

Most Frequently Used Parameters: Comparison with Expected Results

Detection Algorithm: Calibration Type: Evaluation Type: Standard Method: Calibration Mode:	Cobra		
	Lin, WithOffset		
	Area		
	External		
	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
	Channel		ok
	No. of Peaks		ok
Chromatogram	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
	Ret.Time	Propiophenone	ok

ThermoFisher S C I E N T I F I C

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

ThermoFisher S C I E N T I F I C

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
	Cal. Mode	Acetanilide	ok
	Cal. Mode	Acetophenone	ok
Peak Calibration	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

ThermoFisher SCIENTIFIC

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
	Cal.Type	Acetanilide	ok
Component	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
			ok

ThermoFisher SCIENTIFIC

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



Chromeleon Operational Qualification, Part 3
System Suitability Test: Comparison with Expected Results

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

Test Result: Passed

PQ

Performance Qualification

Service Summary

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

IQOQ Results

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

Service Representative

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

Customer

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



Service Details

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	Apr/2026
Nitrate	Thermo Scientific	10	060254	250414	Apr/2026
Nitrate	Thermo Scientific	25	060254	250414	Apr/2026
Nitrate	Thermo Scientific	50	060254	250414	Apr/2026
Nitrate	Thermo Scientific	100	060254	250414	Apr/2026
Nitrate	Thermo Scientific	1000	060254	250414	Apr/2026

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 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 (uS*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

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 (uS*min)
Blank	25	0.185	0.021
High	25	0.1833	43.512
Carryover	25	0.1833	0.02

Carryover Area Results

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

Pump Aquion 1

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

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

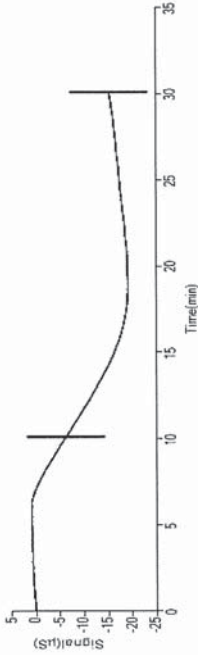
Sample Name	Injection Volume (uL)	Retention Time (min)
Repeatability 1	25	0.185
Repeatability 2	25	0.1833
Repeatability 3	25	0.1833
Repeatability 4	25	0.185
Repeatability 5	25	0.1833
Repeatability 6	25	0.1833

Repeatability Results

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

Detector Information

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



System Information

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

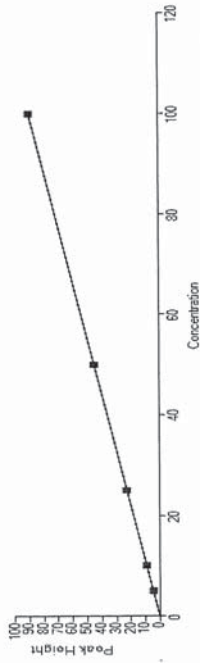
Data Entry Mode

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



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

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

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
1.00 mM	1.61 mA	1.6100 mA	0.00 mA	± 0.01 mA
5.00 mM	8.04 mA	8.0400 mA	0.00 mA	± 0.05 mA
10.00 mM	16.08 mA	16.0800 mA	0.00 mA	± 0.10 mA
50.00 mM	80.41 mA	80.4200 mA	0.01 mA	± 0.50 mA
100.00 mM	160.81 mA	160.8300 mA	0.02 mA	± 1.00 mA

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

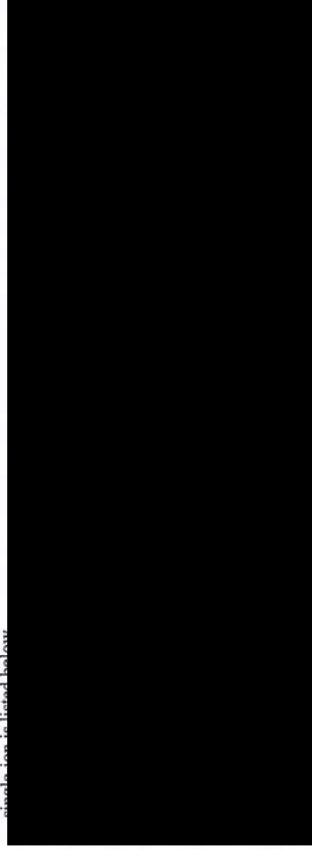
Dionex Nitrate OQ/PQ IC Standards Kit (Set of 6)

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



The concentration value is based on 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

thermo scientific

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19/11-12, Sukhumvit Rd., Nernphra, Muang Rayong, Rayong 21160, Thailand
Tel: +66(0)30 694 145-8, 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: : 32220105
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	E202500317	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 $k = 2$.



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CERTIFICATE OF CALIBRATION

Certificate No.: EL251725
Page: 2 of 5

(±) Uncertainty

Range	Standard Value	UUC*Reading	Error
Function : DC Voltage Measurement (Without Adjustment)			
50 mV	0.0000 mV	0.0000 mV	0.0027 mV
50 mV	5.0000 mV	4.991 mV	-0.009 mV
50 mV	45.0000 mV	44.991 mV	-0.009 mV
50 mV	45.0000 mV	-45.011 mV	-0.011 mV
500 mV	50.0000 mV	50.00 mV	0.0047 mV
500 mV	50.0000 mV	49.96 mV	-0.04 mV
500 mV	450.000 mV	449.96 mV	-0.04 mV
500 mV	450.000 mV	-450.01 mV	-0.01 mV
5 V	0.500000 V	0.5000 V	0.00063 V
5 V	4.50000 V	4.4998 V	-0.0002 V
5 V	4.50000 V	-4.4996 V	-0.0004 V
5 V	4.50000 V	5.0000 V	0.00063 V
50 V	5.00000 V	-5.000 V	0.00063 V
50 V	25.00000 V	25.0000 V	0.0012 V
50 V	45.0000 V	44.999 V	-0.001 V
50 V	45.0000 V	-44.998 V	-0.002 V
500 V	50.000 V	50.00 V	0.0063 V
500 V	450.000 V	449.99 V	-0.01 V
500 V	450.000 V	-449.98 V	-0.02 V
1000 V	100.000 V	100.0 V	0.0024 V
1000 V	900.000 V	899.9 V	-0.1 V
1000 V	-900.000 V	-899.9 V	0.1 V
Function : DC Voltage Measurement LoZ (Without Adjustment)			
1000 V	0.0000000 V	0.0 V	0.058 V
1000 V	100.0000 V	100.0 V	0.058 V
1000 V	900.000 V	900.5 V	0.5 V
1000 V	-900.000 V	-900.5 V	-0.5 V

Function : AC Voltage Measurement (Without Adjustment)

50 mV	5.000 mV	50 Hz	4.983 mV	-0.007 mV
50 mV	45.000 mV	50 Hz	44.997 mV	-0.003 mV
50 mV	45.000 mV	1 kHz	44.99 mV	-0.01 mV
500 mV	50.000 mV	50 Hz	49.99 mV	-0.01 mV
500 mV	450.00 mV	50 Hz	449.98 mV	-0.02 mV
500 mV	450.00 mV	1 kHz	449.87 mV	-0.13 mV
5 V	0.50000 V	50 Hz	0.4999 V	-0.0001 V
5 V	4.5000 V	50 Hz	4.5022 V	0.0022 V
5 V	4.5000 V	1 kHz	4.5012 V	0.0012 V
50 V	5.0000 V	50 Hz	5.009 V	0.009 V
50 V	25.0000 V	50 Hz	25.018 V	0.018 V
50 V	45.000 V	50 Hz	45.031 V	0.031 V
50 V	45.000 V	1 kHz	45.020 V	0.020 V
500 V	50.000 V	50 Hz	50.00 V	0.00 V
500 V	450.00 V	50 Hz	450.26 V	0.26 V
500 V	450.00 V	1 kHz	450.17 V	0.17 V
1000 V	100.000 V	50 Hz	100.0 V	0.0 V
1000 V	900.00 V	50 Hz	900.5 V	0.5 V

Remark : (*) UUC : Unit Under Calibration

ARCHIMECHA LAB. CO., LTD.
19/11-12, Sukhumvit Rd., North Klongton,
Wattana, Bangkok 10110
Tel: +66(0)30 694 145-8, Email: calibration@systronics.co.th

Traceability Information



SYSTRONICS INSILAB COMPANY LIMITED
19/11-12, Sukhumvit Rd., Nonthaburi, Muang Rayong, Rayong 21150, Thailand
Tel: +66(0)30 694 145-8, 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	0.073 V	0.073 V
1000 V	900.00 V	50 Hz	4.2 V	4.2 V
Function : DC Current Measurement (Without Adjustment)				
500 uA	0.00 uA		0.040 uA	0.040 uA
500 uA	50.02 uA		0.045 uA	0.045 uA
500 uA	450.00 uA		0.085 uA	0.085 uA
5000 uA	500.0 uA		0.11 uA	0.11 uA
5000 uA	4499.6 uA		0.57 uA	0.57 uA
50 mA	5.0000 mA		0.00082 mA	0.00082 mA
50 mA	45.0000 mA		0.0061 mA	0.0061 mA
400 mA	39.99 mA		0.0081 mA	0.0081 mA
400 mA	199.96 mA		0.019 mA	0.019 mA
400 mA	359.96 mA		0.12 mA	0.12 mA
400 mA	-359.94 mA		0.06 mA	0.06 mA
5 A	4.5000 A		0.00017 A	0.00017 A
5 A	4.5010 A		0.0010 A	0.0010 A
10 A	1.0000 A		0.0004 A	0.0004 A
10 A	9.001 A		0.0045 A	0.0045 A
Function : AC Current Measurement (Without Adjustment)				
500 uA	50.00 uA	50 Hz	0.25 uA	0.25 uA
500 uA	449.63 uA	50 Hz	0.59 uA	0.59 uA
5000 uA	449.86 uA	50 Hz	0.14 uA	0.14 uA
5000 uA	500.0 uA	50 Hz	0.63 uA	0.63 uA
5000 uA	4499.9 uA	50 Hz	5.5 uA	5.5 uA
5000 uA	4500.3 uA	50 Hz	5.5 uA	5.5 uA
50 mA	4.991 mA	50 Hz	0.0059 mA	0.0059 mA
50 mA	44.955 mA	50 Hz	0.055 mA	0.055 mA
50 mA	44.963 mA	50 Hz	0.052 mA	0.052 mA
400 mA	40.00 mA	50 Hz	0.17 mA	0.17 mA
400 mA	199.93 mA	50 Hz	0.52 mA	0.52 mA
400 mA	359.92 mA	50 Hz	0.08 mA	0.08 mA
400 mA	360.08 mA	50 Hz	0.0063 A	0.0063 A
5 A	0.50000 A	50 Hz	0.0009 A	0.0009 A
5 A	4.5000 A	50 Hz	0.0038 A	0.0038 A
5 A	4.5000 A	50 Hz	0.014 A	0.014 A
10 A	1.00000 A	50 Hz	0.0012 A	0.0012 A
10 A	9.0000 A	50 Hz	0.0059 A	0.0059 A
10 A	9.0000 A	1 kHz	0.006 A	0.006 A

Remark : (*) UUC : Unit Under Calibration



SYSTRONICS INSILAB COMPANY LIMITED
19/11-12, Sukhumvit Rd., Nonthaburi, Muang Rayong, Rayong 21150, Thailand
Tel: +66(0)30 694 145-8, Email: calibration@systronics.co.th



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	0.0085 Ω
500 Ω	50.00 Ω		0.05 Ω	0.017 Ω
500 Ω	450.00 Ω		-0.04 Ω	0.079 Ω
5 kΩ	0.50000 kΩ		-0.0001 kΩ	0.00010 kΩ
5 kΩ	4.9991 kΩ		-0.0009 kΩ	0.00079 kΩ
50 kΩ	4.5000 kΩ		0.0000 kΩ	0.00010 kΩ
50 kΩ	45.000 kΩ		0.0000 kΩ	0.0086 kΩ
500 kΩ	50.00 kΩ		0.01 kΩ	0.011 kΩ
500 kΩ	499.77 kΩ		-0.23 kΩ	0.096 kΩ
5 MΩ	0.50000 MΩ		-0.0004 MΩ	0.00012 MΩ
5 MΩ	4.9972 MΩ		-0.0028 MΩ	0.00026 MΩ
30 MΩ	3.00000 MΩ		-0.002 MΩ	0.00070 MΩ
30 MΩ	26.964 MΩ		-0.036 MΩ	0.022 MΩ
30 MΩ	27.0000 MΩ		0.0000 MΩ	0.0064 MΩ
50 MΩ	5.0000 MΩ		-0.01 MΩ	0.18 MΩ
50 MΩ	44.92 MΩ		-0.08 MΩ	0.058 MΩ
100 MΩ	10.000 MΩ		0.0 MΩ	0.36 MΩ
100 MΩ	89.7 MΩ		-0.3 MΩ	0.60 MΩ
500 MΩ	149.4 MΩ		-0.6 MΩ	4.4 MΩ
500 MΩ	327.4 MΩ		-2.6 MΩ	
Function : Resistance Measurement LoZ (Without Adjustment)				
50 Ω	0.000 Ω		0.000 Ω	0.0063 Ω
50 Ω	5.000 Ω		5.003 Ω	0.0067 Ω
50 Ω	25.000 Ω		25.004 Ω	0.004 Ω
50 Ω	45.000 Ω		45.009 Ω	0.015 Ω
Function : Capacitance Measurement (Without Adjustment)				
1 nF	0.0000 nF		0.000 nF	0.0078 nF
1 nF	0.5000 nF		0.499 nF	0.0098 nF
1 nF	0.9000 nF		-0.001 nF	0.012 nF
10 nF	1.0000 nF		0.000 nF	0.013 nF
10 nF	9.000 nF		0.00 nF	0.044 nF
100 nF	10.000 nF		0.0 nF	0.075 nF
100 nF	90.0 nF		0.1 nF	0.29 nF
100 nF	0.10000 uF		0.000 uF	0.00064 uF
1 uF	0.9000 uF		0.000 uF	0.0029 uF
1 uF	0.9000 uF		0.00 uF	0.0064 uF
10 uF	1.0000 uF		0.00 uF	0.033 uF
10 uF	9.00 uF		0.0 uF	0.068 uF
100 uF	90.0 uF		0.0 uF	0.44 uF
1000 uF	100.0 uF		0 uF	0.75 uF
1000 uF	899 uF		-1 uF	7.3 uF
10 mF	900.0 mF		0.0099 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	9.0000 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	90.000 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	K Type (Without Adjustment)	Error	(±) Uncertainty
Function : Thermocouple Measurement					
-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



Teeraporn P. 11/19/2564



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19/11-12, Sukhumvit Rd., Nernphra, Muang Rayong, Rayong 21160, Thailand
Tel. +66(39) 694 145-8, Email : calibration@systronics.co.th



CERTIFICATE OF CALIBRATION

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

Customer Name : Archimica Lab Co., Ltd.
Customer Address : 39 Soi Sukhumvit 63 (Ehamai) 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 Procedures
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-101825 28 Apr 2027
Thermometer Readout 1529 B29730 23E4020 22 Dec 2025
ARCHIMICA LAB CO., LTD.

Traceability Information.

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

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%.

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

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CERTIFICATE OF CALIBRATION

Certificate No. TL259426

Page. 2 of 2

Result of Calibration :

(Without Adjustment)

Parameter Setting : OFFSET = 0.0
Sensor of UUC* : Thermocouple Wire Type : K Serial No. : 32320105
Dimension : Length : 930 mm Diameter : 1.5 mm

Immersion Depth	Standard Reading	UUC* Reading	Correction Value	Uncertainty of Measurement ($\pm$)	Coverage Factor
mm	$^{\circ}\text{C}$	$^{\circ}\text{C}$	$^{\circ}\text{C}$	$^{\circ}\text{C}$	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



ARCHIMECA LAB
บริษัท อีเคมิคัล แล็บ จำกัด
ARCHIMECA LAB CO.,LTD.

Teerapong B. / 19 Feb 11

Thermo SCIENTIFIC CERTIFICATE OF CONFORMITY

IC QUALIFICATION TEST BOX II

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

Instrument Serial Number: 22109053

Instrument Part Number: 22000-60001

TEST BOX LOADS AND FUNCTIONS

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

ThermoFisher
S C I E N T I F I C

Certificate of Completion

This certifies that

Teerapat Boonla

Has successfully completed

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

ThermoFisher
S C I E N T I F I C

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.

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