

ภาคผนวกที่ 4

สรุปเอกสารสอบเทียบอุปกรณ์เครื่องมือ



SMART TECH CALIBRATION & SERVICES CO., LTD.
14506 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-csl.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.
3118 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

- 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 : Jun 27, 2025
Calibrated by : C. Jirayu

Approved by :



(M. 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

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.
14506 MOO 3, RANGSIT-NAKHON NAYOK ROAD, LAM PHAK KUT,
THANYABURI, PATHUM THANI 12110, THAILAND
Tel. +662-114-3149 Email : stcal.m@gmail.com Website : st-cal.com



Certificate of Calibration

Certificate No. STCR-2506142-17
Work Order No. STCR-2506142

Page 1 of 3

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

Equipment Name : Sound Level Meter
Manufacturer : Scarlett Tech
Model : ST-250
Serial Number : 10340903
Control Number : NS-09-014
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

- 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 : Jun 27, 2025
Calibrated by : C. Jirayu

Approved by :
(Signature)
Laboratory Manager

Calibration Report

Smart Tech Calibration & Services Co., Ltd.

Certificate No.: STCR-2506142-17

Page 2 of 3

Standards Equipment Used

Equipment Name : Sound Calibrator
Serial No. : N975185
Certificate No. : 5523631031354566
Due Date : Nov 8, 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-2508142-17

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	92.0 dB	94.1 dB	-0.01 dB	0.40 dB
	114.07 dB	112.1 dB	114.0 dB	0.07 dB	0.40 dB
SLOW	94.09 dB	92.0 dB	94.1 dB	-0.01 dB	0.40 dB
	114.07 dB	112.1 dB	114.0 dB	0.07 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	92.5 dB	94.1 dB	-0.01 dB	0.40 dB
	114.07 dB	112.6 dB	114.1 dB	-0.03 dB	0.40 dB
SLOW	94.09 dB	92.5 dB	94.1 dB	-0.01 dB	0.40 dB
	114.07 dB	112.6 dB	114.1 dB	-0.03 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



Certificate No.: CP20260087EA
Operation No.: CP2026020050

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: SCARLET TECH
Model/Type: ST11D (Meter), AWA14425 (Microphone), - (Preamplifier)
Serial No.: 820891 (Meter), 60237 (Microphone), - (Preamplifier)
ID No.: NS-12-002
Customer: C.E.M. Technology (Thailand) Co.,Ltd.
Address: 31/8 Moo 13 T Raj 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 Kun-akom

Approved by:

(Mr. Sittichai Swaksunyawong)
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of this 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.: CP2026/087EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: SCARLET TECH
Model/Type: ST11D (Meter), AWA14425 (Microphone), - (Preamplifier)
Serial No.: B20891 (Meter), 60257 (Microphone), - (Preamplifier)
ID No.: NS-12-002
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61572-3:2013.

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	C010663	CK20250037EA	25 June 2026
3) Programmable Attenuator	PAS	29113	EF-0025-25	9 June 2026
4) 6.5 Digit precision multimeter	8846A	9609027	CB20250141EA	20 August 2026
5) Pressure humidity and Temperature Transmitter	PTU301	FC640002	CLLP250028 CD20250221EA	23 March 2026 8 August 2025
6) Pressure humidity and Temperature Transmitter	PTU301	FC640003	CLLP250034 CD20250096EA	10 April 2026 29 March 2027
7) Performance Audio Analyzer	U89036	MY56510003	CB20260045EA 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.: CP2026/087EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone installed

Measured value (dB)
15.5

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	5.8
C-weighting	5.9
Z-weighting	13.0

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

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

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

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

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



Certificate No.: CP20260087EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

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

5.2 Time weighting at 1 kHz

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

Function : 6. Long-Term Stability

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

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

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

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

7.2 Level Linearity on the reference level range, Lower

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

Certificate No.: CP20260087EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

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

Function : 8. Tone burst response

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

Function : 9. Peak C sound level

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



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20260087EA

Calibration Report

Function : 10. Overload Indication

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

Function : 11. High-Level Stability

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

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

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal, tests of frequency weightings	0.30	0.60 (10Hz to 4kHz)
4) Electrical signal tests of frequency weightings	0.20	0.70 (>4kHz to 10kHz)
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 --



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,

Phraek Si, Mueang Samut Prakan, Samut Prakan 10280

Tel: +66 2709 4860 Fax: +66 2328 0517



Certificate No.: CP20260095EA

Operation No.: CP2026030064

Certificate of Calibration

Equipment: Sound Level Meter

Manufacturer: SCARLET TECH

Model/Type: ST120 (Meter), AWA14425 (Microphone), - (Preamplifier)

Serial No.: 1035.425 (Meter), H-80567 (Microphone), - (Preamplifier)

ID No.: NS-14-001

Customer: C.E.M. Technology (Thailand) Co.,Ltd.

Address: 31/8 Moo 13 T.Rai Khung, A.Sam Phran,
Nakorn Phatom 73210

Received Date: 2 March 2026

Calibrated Date: 12 - 13 March 2026

Issued Date: 16 March 2026

Calibrated by: Ms. Juntaporn Kunhakom

Approved by:

(Mr. Sittichai Swaksuriyawong)

Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of this 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 99%. 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



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CF20260095EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: SCARLET TECH
Model/Type: ST120 (Meter), AWA14225 (Microphone), - (Preamplifier)
Serial No.: 10351425 (Meter), H-80567 (Microphone), - (Preamplifier)
ID No.: NS-14-001
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	PAS	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
- IPRC Metrology Center, IPRC 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.: CF20260095EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Measured value (dB)
19.6

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	10.8
C-weighting	12.8
Z-weighting	17.6

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

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

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

Deviation from various Frequency Weighting Response Curve				
Frequency (Hz)	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
63	0.1	-0.1	0.1	±1.0
125	0.0	-0.2	0.0	±1.0
250	0.1	0.0	0.0	±1.0
500	0.1	0.0	0.0	±1.0
1000	0.0	0.0	0.0	±0.7
2000	0.1	0.0	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	-0.2	-0.3	-0.1	+1.5; -2.5
15000	-5.6	-5.6	-0.2	+2.5; -16.0



Certificate No.: CP20260095EA

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.: CP20260095EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
69.0	69.0	0.0	± 0.8
64.0	64.0	0.0	± 0.8
59.0	59.0	0.0	± 0.8
54.0	54.0	0.0	± 0.8
49.0	49.0	0.0	± 0.8
44.0	44.0	0.0	± 0.8
39.0	39.0	0.0	± 0.8
34.0	33.9	-0.1	± 0.8
29.0	29.0	0.0	± 0.8
28.0	28.0	0.0	± 0.8
27.0	27.0	0.0	± 0.8
26.0	26.0	0.0	± 0.8
25.0	25.0	0.0	± 0.8
24.0	24.1	0.1	± 0.8
23.0	23.3	0.3	± 0.8
22.0	22.3	0.3	± 0.8
21.0	21.4	0.4	± 0.8
20.0	20.5	0.5	± 0.8
19.0	19.5	0.5	± 0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	136.0	0.0	± 0.5
	2	118.7	-0.3	$+1.0 ; -1.5$
Slow	0.25	109.7	-0.3	$+1.0 ; -3.0$
	200	129.5	-0.1	± 0.5
SEL	2	109.8	-0.2	$+1.0 ; -3.0$
	200	130.0	0.0	± 0.5
	2	109.7	-0.3	$+1.0 ; -1.5$
	0.25	100.6	-0.4	$+1.0 ; -3.0$

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	134.2	-0.2	± 1.0
Negative half cycle	134.4	134.2	-0.2	± 1.0



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20260095EA

Calibration Report

Function : 10. Overload Indication

	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	Positive one-half cycle	Negative one-half cycle		
	142.5	142.7	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)
4) Electrical signal tests of frequency weightings	0.20	0.70 (>4kHz to 10kHz)
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	0.26	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.

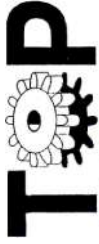
2. The acceptance limit is for the deviated value.

3. Acceptance limits was IEC61672-3:2013 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --

เอกสารการสอบเทียบเครื่องมือตรวจวัดคุณภาพอากาศในบรรยากาศ



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

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

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

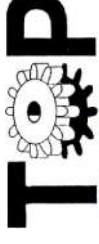
Sample Time (Hrs): 24.0

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

Tisch Environmental 145 South Miami Ave, Cleves OH 45002 • 877-263.7610 • sales@tisch-env.com • www.tisch-env.com



Trade & Engineering

TSP High Volume Sampler
TE-5000 TSP Sampler Verification

Site Information

Location:	-	Site ID:	-	Date:	10 Oct 25
Sampler:	TE-5000 TSP	Serial No:	3270	Tech:	Tong, P

Site Conditions

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

Calibration Orifice

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

Calibration Information

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)	Linear Regression
1	8.20	1.782	60.4	59.03	Slope: 38.8216
2	6.55	1.594	55.6	54.34	Intercept: -9.3751
3	5.60	1.474	47.9	46.81	Corr. Coeff: 0.9935
4	4.55	1.330	43.3	42.32	
5	4.10	1.112	34.5	33.72	# of Observations: 5

Calculations

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

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): 48.3
Average Flow Calculation m3/min
1.433237179

Average Flow Calculation in cfm
50.60865679

Sample Time (Hrs): 24.0

Total flow in 24 hours m3/min
2063.861538

Total flow in 24 hours cfm
72876.46578

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

Tisch Environmental 145 South Miami Ave, Cleves OH 45002 • 877-263.7610 • sales@tisch-env.com • www.tisch-env.com



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): 27.03 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 Certificate

Make: Tisch Environmental, Inc.
Model: TE-5028A Qstd Slope: 1.57854
Serial#: 1179 Qstd Intercept: -0.01520
Calibration Due Date: 22 Oct 25

Calibration Data

Plate or Test #	In H2O	Qa (m3/min)	I (chart) (corrected)	IC (corrected)	Linear Regression
1	9.30	1.260	60.1	39.53	Slope 32.5138
2	7.70	1.166	57.5	37.82	Intercept -1.1750
3	6.60	1.090	52.7	34.66	Corr. Coeff 0.9923
4	5.75	1.037	50.8	33.15	SFR 1.115
5	5.10	1.006	45.6	29.99	SSP 53.35

of Observations: 5

Calculations

$Qa = 1/m(\sqrt{(H_2O)(Ta/Pa)}) - b$
 $IC = I(\sqrt{(Ta/Pa)})$
 $SFR = 1.13(Ps/Pa)(Ta/Ts)$
 $SSP = (m^2SFR + b) / \sqrt{(Pa/Ta)}$
 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)
For subsequent calculation of sampler flow:
 $Qa = actual flow rate$
 $IC = corrected chart response$
 $m = calibrator slope$
 $b = calibrator intercept$
 $Ta = actual temperature (deg K)$
 $Pa = actual pressure (mm Hg)$
 $Ts = average temperature (deg K)$
 $Ps = average pressure (mm Hg)$

Average I (chart): 53.3
Average Flow over Sample (m3/min): 1.12069352
Enter Total Time (Hrs): 24.0
Total flow over sample (m3/min): 26.9046436
Total flow over sample (CFM): 56983.0816

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



PM10 High Volume Sampler Verification

Site Information

Location: - Site ID: - Date: 24 October 2025
Sampler: TE-6070 PM10 Serial No: 3524 Tech: Tong P.

Site Conditions

Barometric Pressure (in Hg): 27.20 Corrected Pressure (mm Hg): 690.9
Temperature (deg F): 75.8 Temperature (deg K): 297.3
Average Press. (in Hg): 26.71 Corrected Average (mm Hg): 678.4
Average Temp. (deg F): 76.2 Average Temp. (deg K): 297.6

Calibration Certificate

Make: Tisch Environmental, Inc.
Model: TE-5028A Qstd Slope: 1.57854
Serial#: 1179 Qstd Intercept: -0.01520
Calibration Due Date: 12 Oct 25

Calibration Data

Plate or Test #	In H2O	Qa (m3/min)	I (chart) (corrected)	IC (corrected)	Linear Regression
1	9.45	1.287	61.1	40.48	Slope 27.3975
2	7.50	1.147	56.8	37.26	Intercept 5.2654
3	6.25	1.048	53.5	35.10	Corr. Coeff 0.9634
4	5.50	1.037	51.2	33.59	SFR 1.109
5	4.90	1.006	48.3	31.69	SSP 54.33

of Observations: 5

Calculations

$Qa = 1/m(\sqrt{(H_2O)(Ta/Pa)}) - b$
 $IC = I(\sqrt{(Ta/Pa)})$
 $SFR = 1.13(Ps/Pa)(Ta/Ts)$
 $SSP = (m^2SFR + b) / \sqrt{(Pa/Ta)}$
 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)
For subsequent calculation of sampler flow:
 $Qa = actual flow rate$
 $IC = corrected chart response$
 $m = calibrator slope$
 $b = calibrator intercept$
 $Ta = actual temperature (deg K)$
 $Pa = actual pressure (mm Hg)$
 $Ts = average temperature (deg K)$
 $Ps = average pressure (mm Hg)$

Average I (chart): 51.2
Average Flow over Sample (m3/min): 1.117476082
Enter Total Time (Hrs): 21.0
Total flow over sample (m3/min): 23.4663557
Total flow over sample (CFM): 56619.63583

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

Certificate of Calibration

Calibrated Date : 1-Sep-25 Certificate No. : 0926-003 Page : 1/1

Instruments :
 Instruments : PMS-5-PM10 Air Sampler
 Model : 1400a
 Manufacturer : TECUM Control Unit (RP)
 Serial No. : 140A1254490411

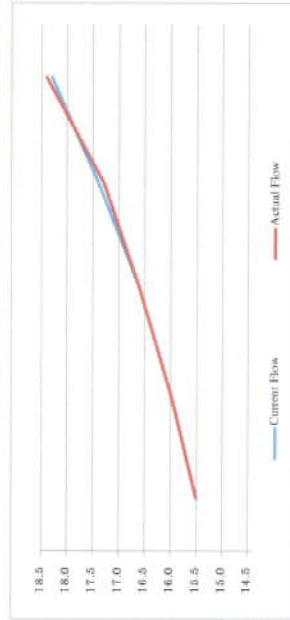
Environmental
 Temperature : 26.3 °C
 Humidity : 43.6 %RH

Calibration System
 Instruments : Physical
 Model : EXL-H
 Manufacturer : Bica
 Serial No. : 102591

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	16.5
	17.3	17.4	17.3
	15.9	16.0	16.0
	18.4	18.3	18.4
	15.5	15.6	15.5



Calibrated by : *Taylor*
 (Mr. Tong Prima)

Certificate of Analyzer Performance Testing

Calibrated Date : 8-Jan-24 Certificate No. : 0126-001 Page : 1/1

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

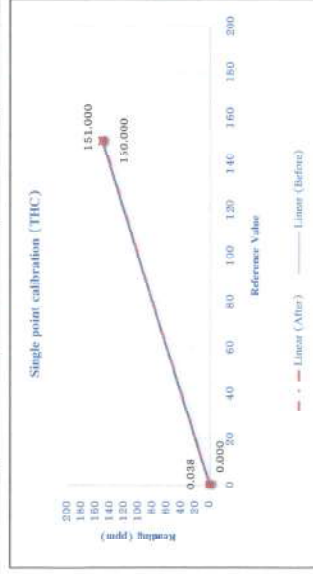
Environmental
 Temperature : 25.0 °C
 Humidity : 46.2 %RH

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-28

Calibration Check

Gas	Zero			Span		
	Reading Value (ppm)	Expected Value (ppm)	Drift (ppm)	Reading Value (ppm)	Expected Value (ppm)	Drift (ppm)
THC	Before			After		
	8.038	0.300	0.038	151	150	0.607
THC	8.000	0.300	0.000	150	150	0.000



Calibrated by : *Taylor*
 (Mr. Tong Prima)

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 8460
 Manufacturer : Baseline
 Serial No. : 584

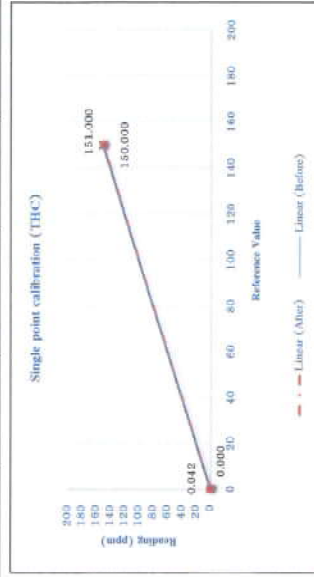
Environmental
 Temperature : 25.0 °C
 Humidity : 46.1 %RH

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

Standard Gas
 Prepare Conc. : 150 ppm
 Cylinder No. : CGA350
 Expiry Date : 10-Apr-28

Calibration Check

Gas	Zero			Span		
	Reading Value (ppm)	Expected Value (ppm)	Drift (%)	Reading Value (ppm)	Expected Value (ppm)	Drift (%)
THC	Before					
	0.042	0.040	0.042	151	150	0.667
THC	After					
	0.000	0.000	0.000	150	150	0.000



Calibrated by : *Tong*
(Mr. Tong Puma)

Certificate of Analyzer Performance Testing

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

Analyzer Instruments
 Analyzer Type : CO Analyzer
 Model : 48C
 Manufacturer : Thermo Environmental
 Serial No. : E06011064

Environmental
 Temperature : 22.4 °C
 Humidity : 40.5 %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
 Cylinder No. : 207189
 SC2 Conc. : 2 ppm
 Expiry Date : 10-Oct-25
 CO Conc. : 50 ppm

Calibration Check

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



Calibrated by : *Tong*
(Mr. Tong Puma)

Certificate of Analyzer Performance Testing

Calibrated Date : 20-Aug-23 Certificate No. : 0825-006 Page : 1/1

Analyzer Instruments
 Analyzer Type : CO Analyzer
 Model : 43C
 Manufacturer : Thermo Environmental
 Serial No. : 508111064

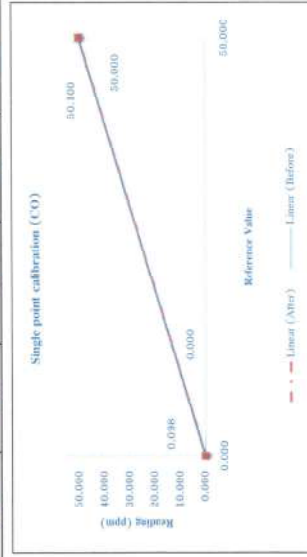
Environmental
 Temperature : 25.7 °C
 Humidity : 38.7 %RH

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. : 8 ppm
 CO Conc. : 50 ppm
 Cylinder No. : 307199
 Expiry 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					
	0.008	0.000	0.12	50.1	50.000	0.20
CO	After					
	0.000	0.000	0.00	50.0	50.000	0.00



Calibrated by : *[Signature]*
 (Mr. Jeng Pinna)

Certificate of Analyzer Performance Testing

Calibrated Date : 16-Aug-23 Certificate No. : 0825-003 Page : 1/1

Analyzer Instruments
 Analyzer Type : SO2 Analyzer
 Model : 43C
 Manufacturer : Thermo Environmental
 Serial No. : 43C-70832-357

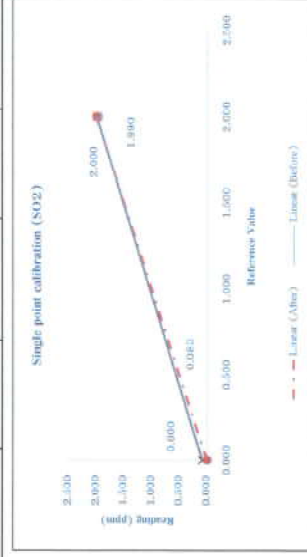
Environmental
 Temperature : 26.4 °C
 Humidity : 45.2 %RH

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

Standard Gas
 NO Conc. : 2 ppm
 SO2 Conc. : 8 ppm
 CO Conc. : 50 ppm
 Cylinder No. : 307199
 Expiry 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					
	0.083	0.000	0.08	1.99	2.000	-0.50
SO2	After					
	0.000	0.000	0.00	2.000	2.000	0.00



Calibrated by : *[Signature]*
 (Mr. Jeng Pinna)

Certificate of Analyzer Performance Testing

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

Analyzer Instruments : SO2 Analyzer Manufacturer : Thermo Environmental Model : 43C Serial No. : 43C-42201-234

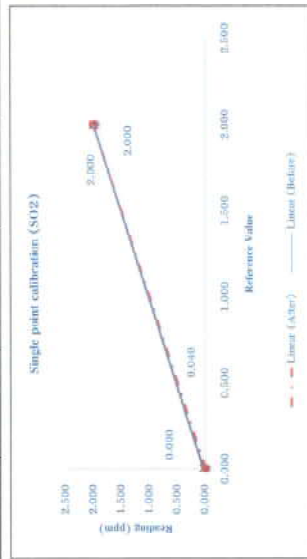
Environmental : Temperature : 25.2 °C Humidity : 43.3 %RH

Calibrator System : Thermo Environmental Zero Air Generator : API Model : 146C Serial No. : 514611458

Standard Gas : NO Conc. : 2 ppm : 207199 SO2 Conc. : 0 ppm : 10-524-25 CO Conc. : 10 ppm

Calibration Check

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



Calibrated by : *Tong*
(Mr. Tong Paima)

Certificate of Analyzer Performance Testing

Calibrated Date : 29-Aug-25 Certificate No. : 0825-006 Page : 1/1

Analyzer Instruments : NO/NO2/NOx Analyzer Manufacturer : Thermo Environmental Model : 43C Serial No. : 43C-42201-234

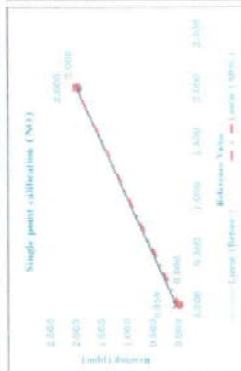
Environmental : Temperature : 25.3 °C Humidity : 43.0 %RH

Calibrator System : Thermo Environmental Zero Air Generator : API Model : 146C Serial No. : 514611458

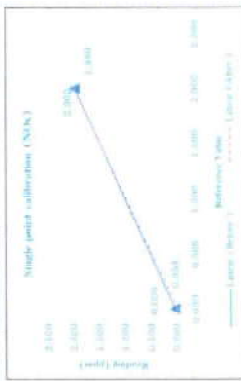
Standard Gas : NO Conc. : 2 ppm : 207199 NO2 Conc. : 0 ppm : 10-524-25 CO Conc. : 10 ppm

Calibration Check

Gas	Zero			Span		
	Reading Value (ppm)	Expected Value (ppm)	Drift (s)	Reading Value (ppm)	Expected Value (ppm)	Drift (s)
NO	Before					
	0.014	0.000	0.01	2.000	2.000	0.00
NO	After					
	0.000	0.000	0.00	2.000	2.000	0.00



Calibrated by : *Tong*
(Mr. Tong Paima)



Certificate of Analyzer Performance Testing

Calibrated Date : 19-Jan-25 Certificate No. : 0125-002
 Page : 1 of 1

Analyzer Instruments
 Analyzer Type : NGA-NAG-NGS Analyzer
 Model : 42C
 Manufacturer : Thermo Environmental
 Serial No. : 100911077

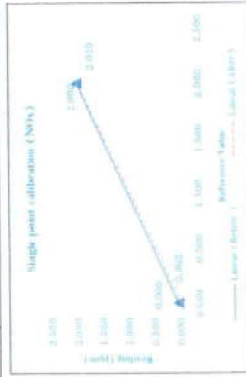
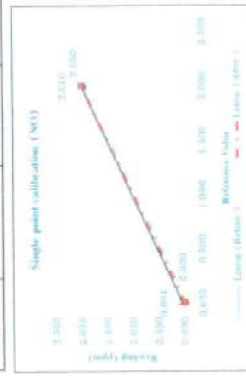
Environmental
 Temperature : 36.1 °C
 Humidity : 64.2 %RH

Calibration System
 Calibrator Units : Thermo Environmental
 Gas Calibration : 140C
 Model : 761
 Serial No. : 179
 Zero Air Generator : 307

Standard Gas
 NOx Conc. : 2 ppm
 NO Conc. : 2 ppm
 CO Conc. : 50 ppm
 Cylinder No. : 1007109
 Expiry Date : 10-Feb-25

Calibration Check

Gas	Zero		Span	
	Reading Value (ppm)	Expected Value (ppm)	Reading Value (ppm)	Expected Value (ppm)
Before				
NO	0.061	0.000	2.51	2.00
NOx	0.062	0.000	2.52	2.00
After				
NO	0.000	0.000	2.50	2.00
NOx	0.000	0.000	2.50	2.00



Calibrated by :

Tong
(Mr. Tong Pimma)

เอกสารทดสอบเทียบเครื่องมือตรวจวัดความชื้นสะท้อน



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 12280
Tel: +66 2709 4860 Fax: +66 2224 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. Sai 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

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

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



Certificate No.: CP20250269EA

Calibration Report

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

Condition of this result of calibration

1. Reference standards instrument :-

Instrument

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard Accelerometer	8305-001	30120	AV-0028-25	3-Jul-2025
2) Measuring Amplifier	2525	3016651	AV-00250A-25	15-Aug-2026
3) LAN Xi Analyzer	3160-4-042	3060-106135	CQ20240016EA	1-Dec-2025

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



Certificate No.:

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	10.831	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	10.368	0.362	1.5	
40.0	10.000	9.998	10.365	0.367	1.5	
52.0	10.000	9.998	10.617	0.619	1.5	
63.0	10.000	10.011	10.577	0.566	1.5	
80.0	10.000	10.013	10.867	0.854	1.5	



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20250269EA

Calibration Report

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

Frequency (Hz)	Nominal (mm/s)	Standard (mm/s)	UUC (mm/s)	Deviation (mm/s)	Uncertainty ± (%)	Direction
4.0	10.000	10.006	10.097	0.091	1.5	Vertical (V)
5.0	10.000	9.997	10.112	0.115	1.5	
6.3	10.000	10.006	10.349	0.343	1.5	
8.0	10.000	10.006	10.097	0.091	1.5	
10.0	10.000	9.998	10.199	0.201	1.5	
12.5	10.000	10.000	10.238	0.238	1.5	
16.0	10.000	9.994	10.136	0.142	1.5	
	20.000	19.997	20.256	0.259	1.5	
	30.000	29.995	30.392	0.397	1.5	
20.0	50.000	49.992	50.770	0.778	1.5	
	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	11.259	1.253	1.5	

Remark

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

-- End of Report --

เอกสารการสอบเทียบเครื่องมือตรวจวัดคุณภาพน้ำ



Certificate of Calibration

Equipment: Electronic Balance
Manufacturer: Sartorius
Model: QUINTIX 224-1S
Serial No.: 0035009070
ID No.: CL-01-002
Condition of the item: Normal
Certificate No.: C01261658
Job No.: WO-00124610
Issued Date: 12 June 2025
Page: 1 of 2
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 Places: C.E.M Technology (Thailand) Co., Ltd. (นวัตกรรม)
219/43 Moo 12 Petchkasem Road, Omnoi,
Krathum Baen, Samut Sakhon 74130 Thailand
Calibration By: Mr. Wasan Nuchnabee
Calibration Date: 11 June 2025
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. C02260045

Person in charge
(Mr. Wasan Nuchnabee)
Authorized signatory
(Mr. Adisai Maknoi)
This certificate is issued in 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 (GUM 100).
These results may be affected by deviations from specific 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.

DKSH Technology Limited
2533 Rungtaniyos Road, Bangkok 10250
Phone: +66-2658 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth - In Asia and Beyond.

CAL-FM-C01-15: 30 Jun 2025



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)
	A	B	C	D	E	
	-	0.0	0.0	-0.1	-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	199999.37	200000.0	0.1	0.29	2.00

The End of Certificate

DKSH Technology Limited
2533 Rungtaniyos Road, Bangkok 10250
Phone: +66-2658 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth - In Asia and Beyond.

CAL-FM-C01-15: 30 Jun 2025



ใบตรวจสอบสภาพเครื่องชั่ง Electronic Balance Checklist

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

Check date		รายการตรวจเช็ค (Description)	Check before delivery		หมายเหตุ (Remark)
11 Jun 2026			11 Jun 2026		
(Normal)	(Defective)		(Normal)	(Defective)	
General					
☒	☐	1. สายไฟ/ อะแดปเตอร์ (Electrical wire/ Adaptor)	☒	☐	
☒	☐	2. ความสมบูรณ์ชุดกระจกกันลม (Cover)	☒	☐	
☒	☐	3. ความสมบูรณ์ของระดับน้ำ (Bubble spirit level)	☒	☐	
☒	☐	4. ความสมบูรณ์ของชุดขาตั้งเครื่อง (Leveling foot)	☒	☐	
☒	☐	5. การตอบสนองของปุ่มกด (Keys)	☒	☐	
☒	☐	6. ความสมบูรณ์จอแสดงผล (Display)	☒	☐	
☒	☐	7. การแสดงผลของหน้าจอ (Screen display)	☒	☐	
☒	☐	8. ชุดรองจานแข็ง (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)	☒	☐	

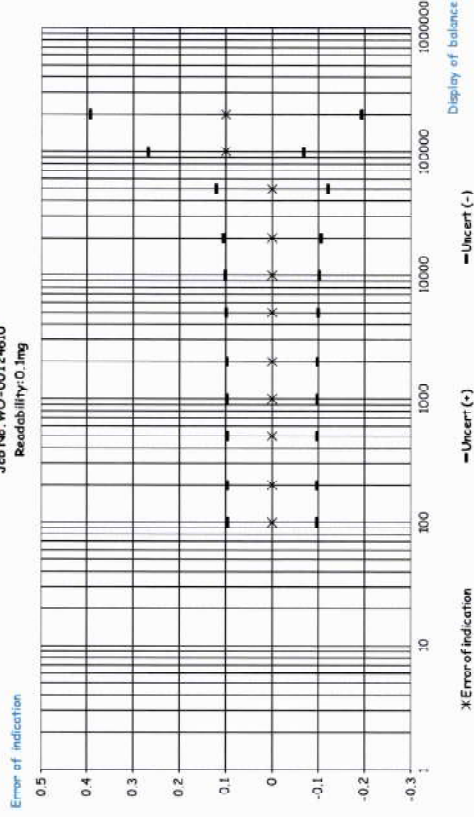
หมายเหตุ/ Note :

Mr. Wasan Nuchabee
Service Engineer

บริษัท ดีเคเอส อีเซีย เทคโนโลยี จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
Phone +66 2636 7000 Email info@dkshlogistics.com Website www.dksh.com/asia-pacific-thailand

Delivering Growth - In Asia and Beyond.

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



บริษัท ดีเคเอส อีเซีย เทคโนโลยี จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
Phone +66 2636 7000 Email info@dkshlogistics.com Website www.dksh.com/asia-pacific-thailand

Delivering Growth - In Asia and Beyond.



THAI CALIBRATION SERVICES CO., LTD.

198 Moo 9 Soi Raikhang 30, Phuthamonthon 5 Rd., Raikhang,
Samphran, Nakhonpathom 73210 Tel. 0-3439-7682-5, 08-6341-8613
www.thaicat.com E-mail : sales@thaicalibration.com, lab@thaicalibration.com



THAI CALIBRATION SERVICES CO., LTD.

198 Moo 9 Soi Raikhang 30, Phuthamonthon 5 Rd., Raikhang,
Samphran, Nakhonpathom 73210 Tel. 0-3439-7682-5, 08-6341-8613
www.thaicat.com E-mail : sales@thaicalibration.com, lab@thaicalibration.com

CALIBRATION CERTIFICATE

Customer :

C.E.M TECHNOLOGY (THAILAND) CO., LTD.

219/43 Moo 12 Perchakasem Road, Omnoi,

Krathumbun, Samutprakarn 74110

Equipment :

Non-automatic weighing instrument (Electronic instrument)

Manufacturer :

Sartorius

Model :

BSA224S-CW

Accuracy class :

-

Capacity :

220 g

Resolution :

0.0001 g

Serial No. :

3119614148

ID No. :

CI-01-003

Place of calibration :

หน้าห้องเครื่อง

Order No. :

6980915-1

Ambient temperature :

(25.1 ± 5.0) °C

Relative humidity :

(52.5 ± 10.0) %

Received date :

27-Feb-2026

Date of calibration :

27-Feb-2026

Date of issue :

02-Mar-2026

Condition of the balance :

Good working conditions

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/cm 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-ONS accredited no. Calibration 0189.

Calibrated By :

Satiporn Rueangplupla

Technician

Approved Signatory :

Somwang Wongduang

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

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



THAI CALIBRATION SERVICES CO., LTD.

198 Moo 9 Soi Raikhang 30, Phuthamonthon 5 Rd., Raikhang,
Samphran, Nakhonpathom 73210 Tel. 0-3439-7682-5, 08-6341-8613
www.thaicat.com E-mail : sales@thaicalibration.com, lab@thaicalibration.com



THAI CALIBRATION SERVICES CO., LTD.

198 Moo 9 Soi Raikhang 30, Phuthamonthon 5 Rd., Raikhang,
Samphran, Nakhonpathom 73210 Tel. 0-3439-7682-5, 08-6341-8613
www.thaicat.com E-mail : sales@thaicalibration.com, lab@thaicalibration.com

CALIBRATION CERTIFICATE

Certificate No.S2602960S

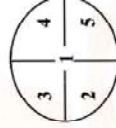
page 2 of 2

The repeatability of indication

Nominal Value (g)	Standard Deviation of reading (g)	Maximum difference between successive reading (g)	n
200	0.00064	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.: CI-02-003
Condition of the item: Normal

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

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

Calibration Place: Thermo-Hygro Laboratory, DKSH Technology Limited,
2533 Sukhumvit Road, Bangkok,
Phraekhanong, Bangkok 10260 Thailand

Calibration By: Mr. Tiewwong 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.

(Mr. Tiewwong Thaitiang)
Person in charge

(Mr. Pramote Ramrong)
Authorized signatory

This certificate is issued in 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.

DKSH Technology (Thailand) Co., Ltd.
DKSH Technology Limited
2533 Sukhumvit Road, Phraekhanong, Bangkok 10260
Phone: 06-2537 1960 Email: info@dksh.com Website: www.dksh.com/solutions-thailand

Delivering Growth - In Asia and Beyond.

CAL-FM-C16-12: 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

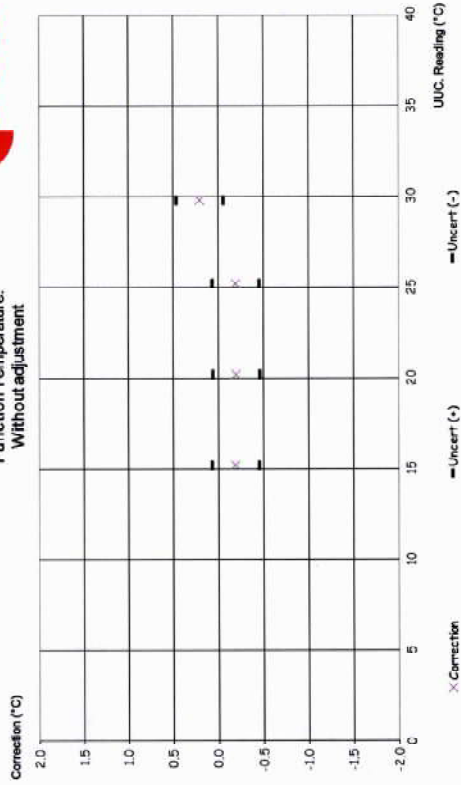
DKSH Technology (Thailand) Co., Ltd.
DKSH Technology Limited
2533 Sukhumvit Road, Phraekhanong, Bangkok 10260
Phone: 06-2537 1960 Email: info@dksh.com Website: www.dksh.com/solutions-thailand

Delivering Growth - In Asia and Beyond.

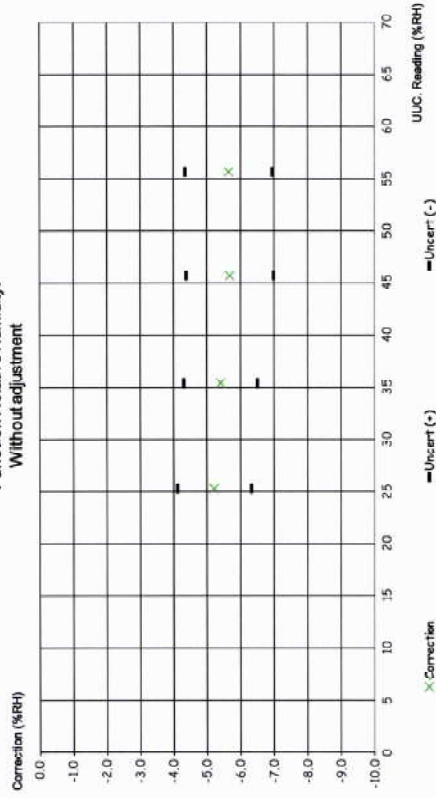
CAL-FM-C16-12: 30 Jun 2025



C19262637
Function Temperature:
Without adjustment



C19262637
Function Relative Humidity:
Without adjustment



Delivering Growth – in Asia and Beyond.



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.	การฟังก์ชันปุ่มกดต่าง (Selector Key)	☒	☐	
☒	☐	4.	การแสดงผลหน้าจอ (Display)	☒	☐	
☒	☐	5.	แบตเตอรี่ (Battery)	☒	☐	
☒	☐	6.	สภาพตัวเครื่อง (Equipment Body)	☒	☐	
☐	☐	7.	หัววัดเซ็นเซอร์ (Sensor External)	☐	☐	ไม่มี
☒	☐	8.	ฝาปิดแบตเตอรี่ (Battery cover)	☒	☐	

Note :

Mr. Tweewong Thathiang
Service Engineer



Certificate of Calibration



Equipment: Electronic Thermo-Hygrometer
Manufacturer: testo
Model: testo 608-H1
Serial No.: 45188324
ID No.: CI-02-004
Condition of the item: Normal

Customer: C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road,
Omniel 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,
Phrakharong, Bangkok 10260 Thailand

Calibration By: Mr. Tweewong Thaihiang
Calibration Date: 26 May 2026
The Method Used: In house method, CAL-WI-42, by comparison with standard thermometer and standard hygrometer
Traceability: This certificate is traceable to the International System of Unit maintained by:
DKSH Technology Limited and Quality Reborn Co., LTD.

(Mr. Tweewong Thaihiang)

Person in charge

(Mr. Pramote Ramrong)

Authorized signatory

This certificate is issued in 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.

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

Delivering Growth – In Asia and Beyond.

CAL-FM-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

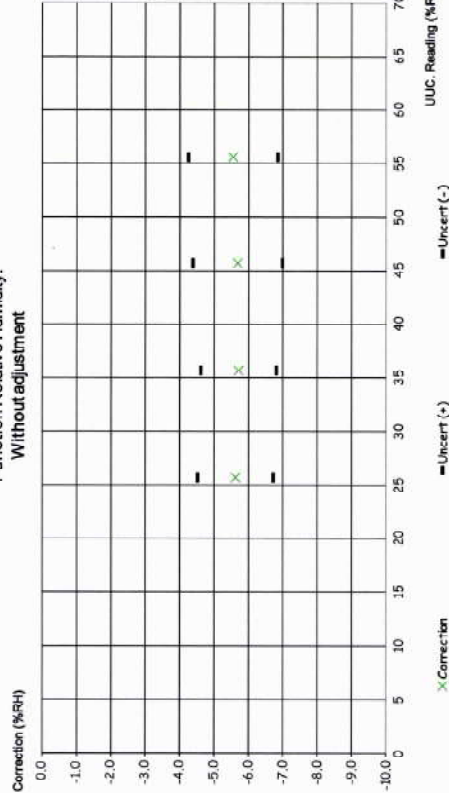
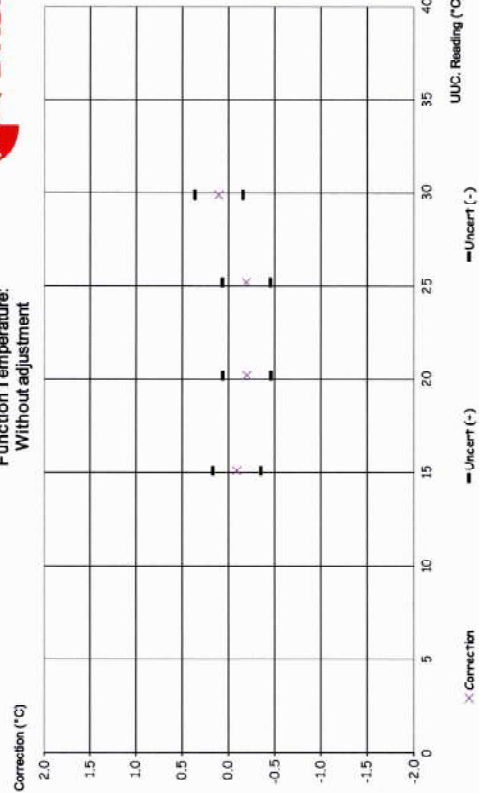
DKSH Technology Limited
2533 Sukhumvit Road, Bangkok, Phrakharong, Bangkok 10260
Phone: +66 2639 7000 Email: info@calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth – In Asia and Beyond.

CAL-FM-C19-12 30 Jun 2025



040763630



Delivering Growth – in Asia and Beyond.



ใบตรวจสอบสภาพเครื่องมือวัดอุณหภูมิ
(Thermo-Hygrometer Checklist)

Equipment : Electronic Thermo-Hygrometer

Serial No. : 45186324

Certificate No. : C19262638

Model : testo 608-H1

Check Date		รายการตรวจเรื่อง	Check before delivery	หมายเหตุ (Remark)
26 May 2026	26 May 2026			
Normal	Defective			
		General		
☐	☐	1. สายไฟ (Electric wire)	☐	ไม่มี
☐	☐	2. การทำงาน (On/Off Switch)	☐	ไม่มี
☒	☐	3. การทำงานแป้นกดต่าง (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 ดิจิตอล เทคโนโลยี จำกัด (มหาชน)
DISH Technology Limited
2533 หมู่ 10 ตำบลบ้านใหม่ อำเภอมวกเหล็ก จังหวัดสระบุรี 10260
2533 Sukhumvit Road, Bangkok, Phrakhang, Bangkok 10260
Phone: +66 2839 7000 Email: rfo.calibrator@dish.com Website: www.dish.com/scientific-thailand

Delivering Growth - in Asia and Beyond.

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, Krasihumban, Samutsakorn 74130 (Head Office)

Equipment : Digital Conductivity meter with probe

Manufacturer : Apera Model : PC 910
Serial No. : PC910X1220811001 ID No. : WV-03-002
Electrode:
Model : N/A Serial No. N/A
ID No. : WV-03-002

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

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

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

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

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

Approved by : 
(Pernpon Chanpu)
Supervisor

Certificate of Calibration

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

Result of Calibration :
UUC Condition As-Received : Good
Function : Conductivity measurement

Before Adjustment

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

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

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

Remark
UUC : Unit Under Calibration

* This parameter are out of accreditation's scope.
This report 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%





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, Krathumburi, 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. : PC910X122081001

ID No. : WW-03-002

Electrode

Model : N/A

Serial No. : VV1-158-3

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 :

Pemporn 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	61338150	1146796	25 Oct 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61332674	1146795	30 Oct 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

(Pemporn Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co., Ltd.



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		Correction (mV)	Uncertainty (± mV)
			(pH)	(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		Correction (pH)	Uncertainty (± pH)
		(pH)	(mV)		
4, 7, 10	4.008	4.00	0.01	0.0097	0.0097
	6.988	7.00	-0.01	0.011	0.011
	10.010	10.01	0.00	0.014	0.014

Retrack

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%

- 000 -



Certificate of Calibration

Certificate No. : 69-400074-1
Submitted by : C.E.M Technology (Thailand) Co.,Ltd.
219/43 Moo.12 Peichkasem 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 : Pempon Champu

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. 400016
Cert.No. T1-1019-25
Due Date 13 May 2027
Traceability National Institute of Metrology Thailand (NIMT)
2. Standard Digital Thermometer
ID.No. 400033
Cert.No. 24E633
Due Date 21 Feb 2026
Traceability National Institute of Metrology Thailand (NIMT)

Approved by :
(Pempon Champu)
Supervisor

The Uncertainties are for a confidence probability of approximately 95%
This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.



Certificate No. : 69-400074-1

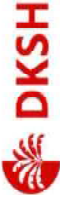
Result of Calibration : Without Adjustment
UUC Condition As-Received : Good
Function : Temperature measurement

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

Remark
UUC : Unit Under Calibration

This result of calibration was found accurate as shown on date and place of calibration only.
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2,
providing a level of confidence of approximately 95%





Certificate of Calibration

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

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

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

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

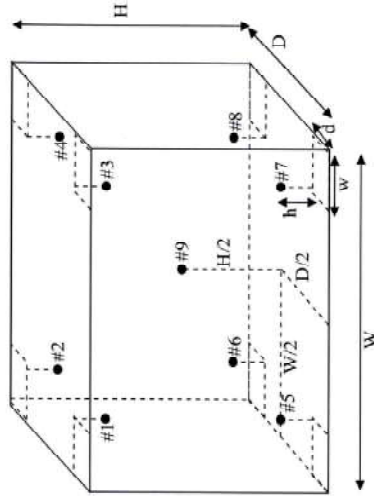
Calibration By: Mr. Sitiphong Lekfu
Calibration Date: 09 February 2026
The Method Used: In house method, CAL-WJ-16, base on TLAS-G20
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Certificate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


(Mr. Sitiphong Lekfu)
Person in charge


(Mr. Pramote Ramrong)
Authorized signatory

This certificate is issued in the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standards 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.

DKSH Technology (Thailand) Co., Ltd.
2533 Sukhumvit Road, Bangkok 10250
Phone: +66 2659 1000 Email: info@dksh.com Website: www.dksh.com/scientific-thailand
Delivering Growth - In Asia and Beyond.



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.

DKSH Technology (Thailand) Co., Ltd.
2533 Sukhumvit Road, Bangkok 10250
Phone: +66 2659 1000 Email: info@dksh.com Website: www.dksh.com/scientific-thailand
Delivering Growth - In Asia and Beyond.



Calibration Results:

Before adjustment

Setting: 180.0
Indicating: #1: #2: #3: #4: #5: #6: #7: #8: #9:
179.68 173.97 180.88 180.46 180.66 180.07 180.16 180.55 180.64

After adjustment

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

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

Temperature Distribution

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

Chamber Characterization

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

Note: * Maximum uncertainty of the each position



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, "LAS-G20. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

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

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

(Mr. Premote Ramrong)
Authorized signatory

After adjustment

Desired Temperature : 104.0 °C Tolerances : 1.0 °C

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

Locations	Measured (°C)	Correction* (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	103.89	-0.11	0.36	1.0	Pass
#2	103.90	-0.10	0.36	1.0	Pass
#3	104.20	0.20	0.36	1.0	Pass
#4	104.07	0.07	0.36	1.0	Pass
#5	104.13	0.13	0.36	1.0	Pass
#6	103.89	-0.11	0.36	1.0	Pass
#7	103.90	-0.10	0.36	1.0	Pass
#8	104.06	0.06	0.36	1.0	Pass
#9	104.17	0.17	0.36	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

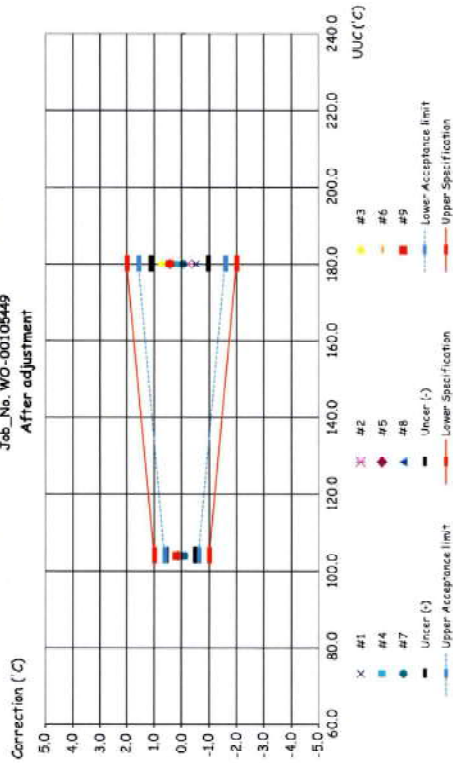
Locations	Measured (°C)	Correction* (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	179.47	-0.53	0.42	2.0	Pass
#2	179.77	-0.23	0.42	2.0	Pass
#3	180.72	0.72	0.42	2.0	Pass
#4	180.19	0.19	0.42	2.0	Pass
#5	180.42	0.42	0.42	2.0	Pass
#6	179.87	-0.13	0.42	2.0	Pass
#7	179.94	-0.06	0.42	2.0	Pass
#8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

Correction* = Measured Temperature - Desired Temperature

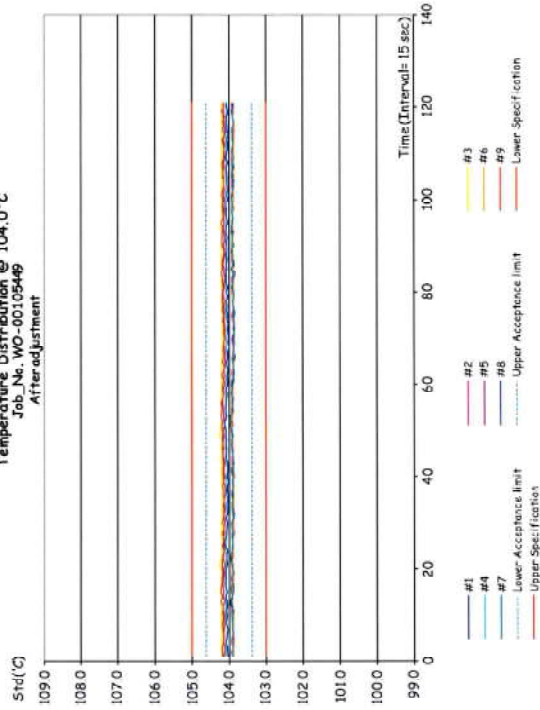
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity

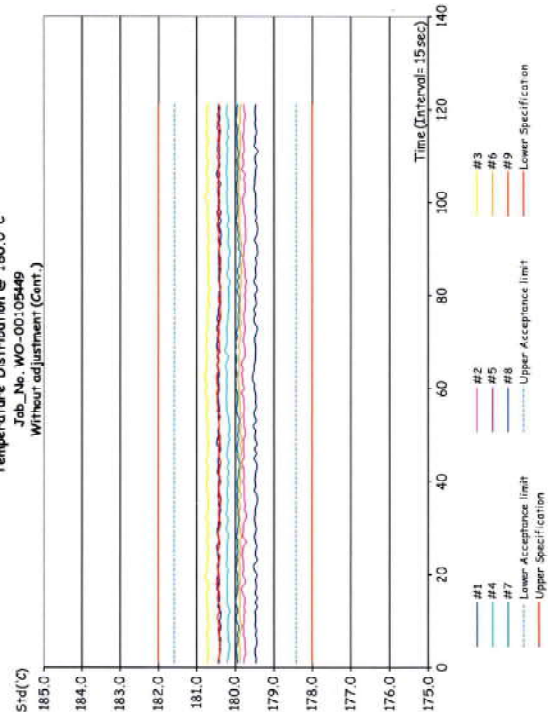
Correlation Distribution & Max_Measurement Uncertainty
 Job No. WO-00105449
 After adjustment



Temperature Distribution @ 104.0°C
 Job No. WO-80105449
 After adjustment



Temperature Distribution @ 180.0°C
 Job No. WO-00105449
 Without adjustment (Cont.)





ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

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

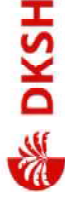
ตรวจสอบ (รุ่น)		รายการตรวจสอบ	ตรวจสอบ (รุ่น)		หมายเหตุ
09 Feb 2026			09 Feb 2026		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
☒	☐	1. สายไฟ	☒	☐	
☒	☐	2. การทำงาน Main Switch	☒	☐	
☒	☐	3. การทำงาน Selector Key	☒	☐	
☒	☐	4. การแสดงผล Display	☒	☐	
☒	☐	5. การทำงาน ฟัดลม	☒	☐	
☒	☐	6. สวิทช์ Lever of Ventilation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

ข้อแนะนำ:

Mr. Sitthiphong Lekfu
Service Engineer

บริษัท ดีเคเอส อีซี จำกัด
DKSH Technology Limited
2533 หมู่ 10 ตำบลบางพลีใหญ่ อำเภอบางพลี จังหวัดสมุทรปราการ 10260
2533 Sukhumvit Road, Bangkok, Prachinburi, Bangkok 10260
Phone: +66 2655 1000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth - In Asia and Beyond.



Certificate of Calibration

Equipment: Cooled Incubator
Manufacturer: Binder
Model: KB 240
Serial No.: 20180000012164
ID No.: VW-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. Sitthiphong Lekfu
Calibration Date: 09 February 2026
The Method Used: In house method, CAL-WI-16, base on TLAS-G20
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Certificate No. C10250013

(Mr. Sitthiphong Lekfu)

Person in charge

(Mr. Pramote Ramrong)

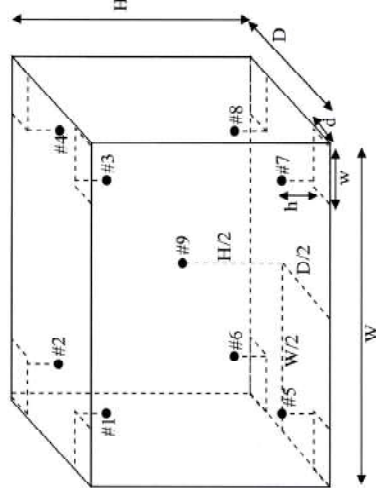
Authorized signatory

This certificate is issued in 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 (GUM 1995).
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 ดีเคเอส อีซี จำกัด
DKSH Technology Limited
2533 หมู่ 10 ตำบลบางพลีใหญ่ อำเภอบางพลี จังหวัดสมุทรปราการ 10260
2533 Sukhumvit Road, Bangkok, Prachinburi, Bangkok 10260
Phone: +66 2655 1000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth - In Asia and Beyond.

CAL-FHC31-11: 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	19.97	-0.13	0.76
#4	20.03	0.03	0.66
#5	20.18	0.18	0.62
#6	19.99	-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	19.97	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 < 5% PFA.
- ☐ Choice C: Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r$ U).
- : PFA – Probability of False Accept

(Mr. Pramda Ramrong)
Authorized signatory

Without adjustment:

Desired Temperature : 20.0°C Tolerances : 1.0 °C

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

Locations	Measured (°C)	Correction* (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	20.06	0.06	0.64	1.0	Pass
#2	19.96	-0.04	0.82	1.0	Pass
#3	19.87	-0.13	0.76	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.

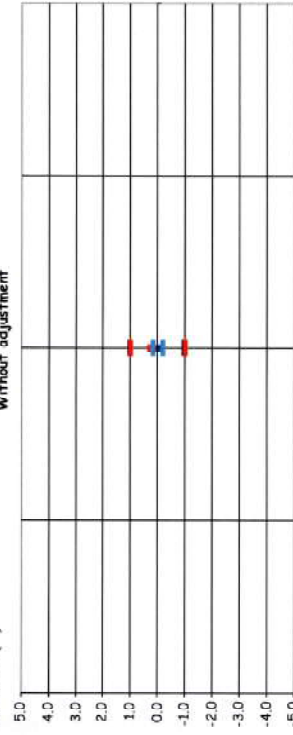
The End of Statements of Conformity

Corr. Distribution & Max. Measurement Uncertainty

Job_No. WO-00105449

Without adjustment

Correction (°C)

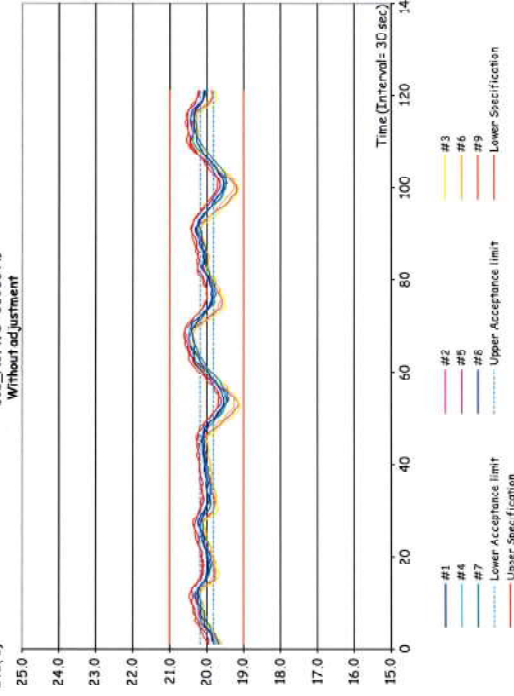


Temperature Distribution @ 20.0°C

Job_No. WO-00105449

Without adjustment

Std.(°C)





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

ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00105449

ชนิดเครื่อง: Cooled Incubator
หมายเลขเครื่อง: 20180000012164

รุ่น: KB 240

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

ข้อแนะนำ :

Mr. Sitthiphong Lekfu
Service Engineer

บริษัท ดีเคเอส อี. จำกัด
DKSH Technology Limited
2533 ถนนพหลโยธิน แขวงจตุจักร กรุงเทพฯ 10250
Phone: +66 2639 7000 Email: etc.calibration@dksh.com Website: www.dksh.com/scientific-thailand
Delivering Growth - In Asia and Beyond.

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

Reference Standard Instrument :

Instrument	Serial No.	Certificate No.	Due Date	Traceability to
Turbidity Solution	TD100NTU.L5	1202697	17-Mar-27	CPAchem Ltd.
Turbidity Solution	TD200NTU.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 %

Calibrated by : Ms Usa Phuangphiphat

Approved by :
Mr. Ratchadawut Rungreevee
Authorized Signatory

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

F5100

REV.00 27 Oct 16



WK Electric Co., Ltd.

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

Calibration Results

Certificate No. : WK2606-412-976

Page 2 of 2

Calibration Result of the Accuracy

Function : Turbidity Measurement at 25 °C

Resolution : 0.01 NTU, 0.1 NTU, 1 NTU

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	0.50	
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

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

**** 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.



Operator Signature: Teerapat B.

Date: Feb 19-20, 2026

(Mr. Teerapat Boonla)

Applications Chemist

Qualification Report

PM Check list, CM_OQ and PQ

Aquion RFIC: Anion (ID#1084)

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

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

PM

Preventive Maintenance Check List



Dionex Ion Chromatography Preventive Maintenance Report

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

Instrument Detail

Instrument Model	Application
Aquion RFIIC: Anion (ID# 084)	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



Archemica

Customer

Date

19/Feb/26

Date



General ICS Maintenance Checklist

No.	Description	Checked	Cleaned	Replaced	Result
Power on & Connection					
1	Instrument power on	☒	-	-	☐
2	Instrument connection	☒	-	-	☐
Injection Valve Rebuild					
3	Rebuild injection valve 6 port	☒	☐	Replaced	N.A.
4	Rotor seal	☒	☐	☐	☐
5	Stator face	☒	☐	☐	☐
(Optional) Auxiliary Valve Rebuild					
6	Rebuild auxiliary valve 0 port	☒	☐	Replaced	N.A.
7	Rotor seal	☒	☐	☐	☐
8	Stator face	☒	☐	☐	☐
Check Valve Cartridge					
9	Inlet check valve assembly	☒	☐	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	☒	☐	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	☒	☐	Replaced	N.A.
19	Priming valve	☒	☐	☐	☐
Cell Detector					
20	Check conductivity cell	☒	☐	Replaced	N.A.
21	Check electrochemical cell	☐	☐	☐	☒
22	Working electrode	☐	☐	☐	☒
23	Reference electrode	☐	☐	☐	☒
24	Gasket	☐	☐	☐	☒
25	Cell body	☐	☐	☐	☒
Other					
26	Sample Loop Size 25 ul	☐	☒	Replaced	N.A.
27	End-line filter	☒	-	☐	☐
28	Leak sensor	☒	☐	☐	☐
29	Lubricate pump mechanic	☐	☒	-	☐
30	Reconnected liquid lines to the valve	☒	Lubricated	-	☐
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: DESKTOP-32T6H3B
Client: DESKTOP-32T6H3B
Operator: IC-User
Computer Name: DESKTOP-32T6H3B
Version Number: 7.3.1 Build 6535
7.3.1.6535
Overall Test Result: **Passed**

Comparison Format:

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

Reviewer's Signature // Date

Operator's Signature // Date



Tested 18/19 Feb/21

ThermoFisher
S C I E N T I F I C
Chromeleon Operational Qualification, Part 1
Verification of Selected Results

Detection Algorithm: Cobra		Peak Name	Status
Calibration Type:	Lin, With Offset		
Evaluation Type:	Area	Acetanilide	ok
Standard Method:	External	Acetophenone	ok
Calibration Mode:	Total	Propiophenone	ok
Report Variable Offset (c0)	Slope (c1)	Acetanilide	ok
		Acetophenone	ok
		Propiophenone	ok
Report Variable Correlation Coeff.	Variance	Acetanilide	ok
		Acetophenone	ok
		Propiophenone	ok
Report Variable Std. Deviation	Rel. Std. Dev.	Acetanilide	ok
		Acetophenone	ok
		Propiophenone	ok
Report Variable Variance Coeff.	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

Calibration Point X		Peak Name	Status
Report Variable	Calibration Point Y		
Amount [ng]	Resolution (EP)	Acetanilide	ok
		Acetophenone	ok
		Propiophenone	ok
Report Variable	Resolution (USP)	Acetanilide	ok
		Acetophenone	ok
		Propiophenone	ok
Report Variable	Peak Asymmetry (EPI/USP)	Acetanilide	ok
		Acetophenone	ok
		Propiophenone	ok
Report Variable	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: Cobra
Calibration Type: Lin, With-Offset
Evaluation Type: Area
Standard Method: External
Calibration Mode: Total

Variable Category	Report Variable	Peak Name	Status
Injection	No.		ok
	Name		ok
	Type		ok
	Position		ok
	Status		ok
	Volume		ok
	Dilution Factor		ok
	Weight		ok
	IntStd		ok
	InstrumentMethod		ok
Chromatogram	ProcessingMethod		ok
	Channel		ok
	No. of Peaks		ok
	Chromatogram Start Time		ok
	Signal Min.		ok
	Signal Max.		ok
	Unit		ok
	Noise		ok
	No.	Acetanilide	ok
	No.	Acetophenone	ok
Peak Results	No.	Propiophenone	ok
	Peak Name	Acetanilide	ok
	Peak Name	Acetophenone	ok
	Peak Name	Propiophenone	ok
	RetTime	Acetanilide	ok
	RetTime	Acetophenone	ok
	RetTime	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
Peak Results	Ret.Dev.(abs)	Propiophenone	ok
	Ret.Ret.Dev.	Acetanilide	ok
Peak Results	Ret.Dev.(rel)	Acetophenone	ok
	Ret.Dev.(rel)	Propiophenone	ok
Area	Area	Acetanilide	ok
	Area	Acetophenone	ok
Area	Area	Propiophenone	ok
	Area	Acetanilide	ok
Rel.Area	Rel.Area	Acetophenone	ok
	Rel.Area (Total)	Propiophenone	ok
Height	Height	Acetanilide	ok
	Height	Acetophenone	ok
Height	Height	Propiophenone	ok
	Height	Acetanilide	ok
Rel.Height (Total)	Rel.Height (Total)	Acetophenone	ok
	Rel.Height (Total)	Propiophenone	ok
Amount	Amount	Acetanilide	ok
	Amount	Acetophenone	ok
Amount	Amount	Propiophenone	ok
	Amount	Acetanilide	ok
Concentration	Concentration	Acetophenone	ok
	Concentration	Propiophenone	ok
Rel.Amount	Rel.Amount	Acetanilide	ok
	Rel.Amount	Acetophenone	ok
Rel.Amount	Rel.Amount	Propiophenone	ok
	Rel.Amount	Acetanilide	ok
Peak Width (0%)	Peak Width (0%)	Acetophenone	ok
	Peak Width (0%)	Propiophenone	ok
Peak Width (5%)	Peak Width (5%)	Acetanilide	ok
	Peak Width (5%)	Acetophenone	ok
Peak Width (10%)	Peak Width (10%)	Acetanilide	ok
	Peak Width (10%)	Acetophenone	ok
Peak Width (10%)	Peak Width (10%)	Propiophenone	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 Results	Peak Width (50%)	Propiophenone	ok
	Peak Width (50%)	Acetanilide	ok
Left Width (0%)	Left Width (0%)	Acetophenone	ok
	Left Width (0%)	Propiophenone	ok
Left Width (0%)	Left Width (0%)	Acetanilide	ok
	Left Width (0%)	Acetophenone	ok
Right Width (0%)	Right Width (0%)	Propiophenone	ok
	Right Width (0%)	Acetanilide	ok
Peak Start	Peak Start	Acetophenone	ok
	Peak Start	Acetanilide	ok
Peak Start	Peak Start	Propiophenone	ok
	Peak Start	Acetanilide	ok
Peak Stop	Peak Stop	Acetophenone	ok
	Peak Stop	Acetanilide	ok
Peak Stop	Peak Stop	Propiophenone	ok
	Peak Stop	Acetanilide	ok
Peak Start Value	Peak Start Value	Acetanilide	ok
	Peak Start Value	Acetophenone	ok
Peak Start Value	Peak Start Value	Propiophenone	ok
	Peak Start Value	Acetanilide	ok
Peak Stop Value	Peak Stop Value	Acetophenone	ok
	Peak Stop Value	Acetanilide	ok
Peak Stop Value	Peak Stop Value	Propiophenone	ok
	Peak Stop Value	Acetanilide	ok
BL-Value Peak Start	BL-Value Peak Start	Acetanilide	ok
	BL-Value Peak Start	Acetophenone	ok
BL-Value Peak Start	BL-Value Peak Start	Propiophenone	ok
	BL-Value Peak Start	Acetanilide	ok
BL-Value Peak Stop	BL-Value Peak Stop	Acetanilide	ok
	BL-Value Peak Stop	Acetophenone	ok
BL-Value Peak Stop	BL-Value Peak Stop	Propiophenone	ok
	BL-Value Peak Stop	Acetanilide	ok
Type	Type	Acetophenone	ok
	Type	Propiophenone	ok
Resolution (EP)	Resolution (EP)	Acetanilide	ok
	Resolution (EP)	Acetophenone	ok
Resolution(USP)	Resolution(USP)	Acetanilide	ok
	Resolution(USP)	Acetophenone	ok
Asymmetry(EP)	Asymmetry(EP)	Acetanilide	ok
	Asymmetry(EP)	Acetophenone	ok
Asymmetry(EP)	Asymmetry(EP)	Propiophenone	ok
	Asymmetry(EP)	Propiophenone	ok

ThermoFisher
S C I E N T I F I C

Chromleon Operational Qualification, Part 2

Most Frequently Used Parameters: Comparison with Expected Results

Variable Category	Report Variable	Peak Name	Status
Peak Results	Asymmetry(A/A)	Acetanilide	ok
	Asymmetry(A/A)	Acetophenone	ok
	Asymmetry(A/A)	Propiophenone	ok
	Acetanilide	Acetanilide	ok
	Theor. Plates(EP)	Acetophenone	ok
	Theor. Plates(EP)	Propiophenone	ok
	Acetanilide	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
	No. of Points	Propiophenone	ok

ThermoFisher
S C I E N T I F I C

Chromleon 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
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 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
	Conc.Limit	Acetanilide	ok

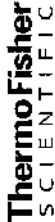
ThermoFisher
S C I E N T I F I C

Chromeleon Operational Qualification, Part 2

Most Frequently Used Parameters: Comparison with Expected Results:

Variable Category	Report Variable	Peak Name	Status
Peak 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
Rel.Max at	RSD Match	Acetophenone	ok
	RSD Match	Propiophenone	ok
	Rel.Max at	Acetanilide	ok
	Rel.Max at	Acetophenone	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	Name	ok
	Inj. Condition	ok
	Eval. Formula	ok
	Operator	ok
	Statistics	ok
	Rounding	ok
	Minimum Number Of Injections	ok
	Maximum Number Of Injections	ok
	Channel	ok
	Peak	ok
	Ref. Value Formula 1	ok
	Ref. Value Formula 2	ok
	N.A.	ok
	Inj. Eval. Result	ok
System Suitability Test Case Result	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.



Thermo Representative	
Signature: <u>Tetapatt B</u>	Date: <u>19/06/26</u>
Customer	
Signature:	Date:

Service Details

System Repairability OQ Autosampler AS-DV 1 Test 1	PASSED
Carryover OQ Autosampler AS-DV 1 Test 1	PASSED
Flow Rate Repairability 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 RFI C 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		leerepat.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

Equipment	Manufacturer	Model	Serial Number	Cal Ver Date	Good Until
IC Qualification Multimeter	Thermo Scientific	Test Box II 289	221D0053	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 Information

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

System Repeatability OQ Autosampler AS-DV 1 Test

Carryover OQ Autosampler AS-DV 1 Test

ThermoFisher
SCIENTIFIC

System Information

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

Data Entry Mode

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

Peak Results

Sample Name	Injection Volume (uL)	Retention Time (min)	Area (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	2.538
Repeatability 6	25	0.1833	2.555

Repeatability Results

Test	Measured	OQ Limit	Result
Retention Time Result	≤ 5.0 % 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

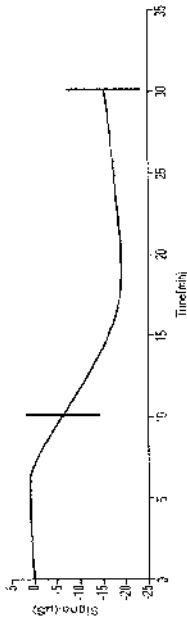
Repeatability Results			
Test	Measured	OQ Limit	Result
Retention Time Result	0.5 % RSD	≤ 5.0 % RSD	PASSED

Detector (Aquilon CD) Conductivity Detector 1

Detector Information

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

Noise Drift OQ Detector (Aquilon CD) Conductivity
Detector 1 Test 1



System Information

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

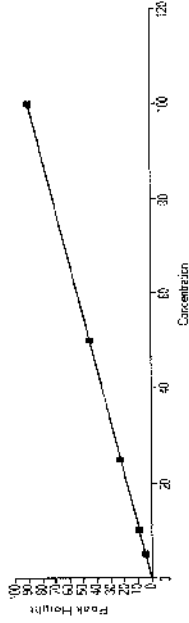
Data Entry Mode

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	221280053	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	99.968815

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	1.81 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

ThermoFisher
SCIENTIFIC

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

Product Number 060254
Certificate of Analysis

Lot Number 250414

Expiration of Certification
April 2026

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

Dionex Nitrate Standard

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



Tested by: 1/19/2016

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. 075694-01 20-Dec-2011

Learn more at thermofisher.com/documents

thermoscientific

Research the life. Not for Clinical. Patent or Diagnostic Use. © 2011 ThermoFisher Scientific, Inc. All rights reserved. All trademarks are the property of ThermoFisher Scientific and its subsidiaries unless otherwise specified. This information is presented as an example of the capabilities of ThermoFisher Scientific products. It is not intended to encourage use of these products in any manner that might infringe the intellectual property rights of others. Specifications, terms and pricing are subject to change. Not all products are available in all countries. Please consult your local sales representative for details. CDA 06-031510-0



SYSTRONICS INSILAB COMPANY LIMITED

19/11-12, Sukhumvit Rd., Nonthaburi, Bangkok 11160, Thailand
Tel: 0-2628 604 145-8, Email: calibration@systronics.co.th



CERTIFICATE OF CALIBRATION

Customer Name:	: Archimedes Lab Co., Ltd.	Certificate No.:	: EL251725
Customer Address:	: 39 Soi Sukhumvit 63 (Banal)	Job No.:	: 25120018
Instrument Description:	: Watani, Benjick 101.0	Page:	: 1 of 5
Manufacturer:	: FLUKE	Received Date:	: 08 Dec 2025
Model No.:	: 289	Calibrated Date:	: 09 Dec 2025
Serial Number:	: 32320105	Issued Date:	: 09 Dec 2025
Tag No.:	:	Tag No.:	:
Service:	: Used	Service:	: Used
Condition As Received:	: Used	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:
The reported uncertainty of measurement is based on standard uncertainty multiplied by a coverage factor $k = 2$, providing confidence level of approximately 95%.

Reference Standards Instrument	Model	Serial No.	Cert. No.	Due Date
Multi-Function Calibrator	Fluke 5520A	9395005	E20250317	05 Nov 2026
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

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

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

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

Calibrated by: Mr. Suttinart Pongvongrat

Approved by: Mr. Suttinart Pongvongrat

Signature: Mr. Suttinart Pongvongrat

Signature: Mr. Chanan Chanasit

This certificate may not be reproduced, except in full unless permission is obtained in writing from the calibration organization issuing this report.



SYSTRONICS INSILAB COMPANY LIMITED

19/11-12, Sukhumvit Rd., Nonthaburi, Bangkok 11160, Thailand
Tel: 0-2628 604 145-8, Email: calibration@systronics.co.th



CERTIFICATE OF CALIBRATION

Customer Name:	: Archimedes Lab Co., Ltd.	Certificate No.:	: EL251725
Customer Address:	: 39 Soi Sukhumvit 63 (Banal)	Job No.:	: 25120018
Instrument Description:	: Watani, Benjick 101.0	Page:	: 1 of 5
Manufacturer:	: FLUKE	Received Date:	: 08 Dec 2025
Model No.:	: 289	Calibrated Date:	: 09 Dec 2025
Serial Number:	: 32320105	Issued Date:	: 09 Dec 2025
Tag No.:	:	Tag No.:	:
Service:	: Used	Service:	: Used
Condition As Received:	: Used	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:
The reported uncertainty of measurement is based on standard uncertainty multiplied by a coverage factor $k = 2$, providing confidence level of approximately 95%.

Reference Standards Instrument	Model	Serial No.	Cert. No.	Due Date
Multi-Function Calibrator	Fluke 5520A	9395005	E20250317	05 Nov 2026
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

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

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

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

Calibrated by: Mr. Suttinart Pongvongrat

Approved by: Mr. Suttinart Pongvongrat

Signature: Mr. Suttinart Pongvongrat

Signature: Mr. Chanan Chanasit

This certificate may not be reproduced, except in full unless permission is obtained in writing from the calibration organization issuing this report.



SYSTRONICS INSILAB COMPANY LIMITED
19/11-12, Sukhumvit Rd., Nongprue, Muang Rayong, Rayong 21150, Thailand
Tel: +66(0) 894 145-8, Email: calibration@systronics.co.th



CERTIFICATE OF CALIBRATION

Certificate No. E-251725
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	0.03 V	0.073 V
100 V	980.00 V	50 Hz	4.2 V	0.42 V
Function : DC Current Measurement (Without Adjustment)				
500 uA	0.00 uA	0.00 uA	0.00 uA	0.040 uA
500 uA	50.00 uA	50.02 uA	0.02 uA	0.045 uA
500 uA	450.00 uA	450.00 uA	0.00 uA	0.085 uA
5000 uA	500.00 uA	500.00 uA	0.00 uA	0.085 uA
5000 uA	4500.0 uA	4499.6 uA	-0.4 uA	0.11 uA
50 mA	5.000 mA	5.000 mA	0.000 mA	0.00062 mA
50 mA	45.000 mA	44.995 mA	-0.005 mA	0.0061 mA
400 mA	40.000 mA	39.99 mA	-0.01 mA	0.0061 mA
400 mA	200.000 mA	199.96 mA	-0.04 mA	0.019 mA
400 mA	350.00 mA	349.96 mA	-0.04 mA	0.12 mA
400 mA	-350.00 mA	-349.94 mA	0.06 mA	0.12 mA
5 A	0.50000 A	0.49995 A	-0.00005 A	0.00017 A
5 A	4.5000 A	4.5010 A	0.0010 A	0.0004 A
10 A	1.00000 A	1.000 A	0.000 A	0.00004 A
10 A	9.0000 A	9.001 A	0.001 A	0.00045 A
Function : AC Current Measurement (Without Adjustment)				
500 uA	50.00 uA	50 Hz	49.96 uA	0.25 uA
500 uA	450.0 uA	50 Hz	449.63 uA	0.59 uA
500 uA	450.0 uA	1 kHz	449.86 uA	0.59 uA
5000 uA	500.0 uA	50 Hz	500.0 uA	0.63 uA
5000 uA	4500. uA	50 Hz	4499.9 uA	5.5 uA
5000 uA	4500. uA	1 kHz	4500.3 uA	5.5 uA
50 mA	5.000 mA	50 Hz	4.991 mA	0.0055 mA
50 mA	45.000 mA	50 Hz	44.955 mA	0.055 mA
50 mA	45.000 mA	1 kHz	44.953 mA	0.055 mA
400 mA	40.000 mA	50 Hz	40.00 mA	0.052 mA
400 mA	200.00 mA	50 Hz	199.93 mA	0.17 mA
400 mA	350.00 mA	50 Hz	349.92 mA	0.52 mA
400 mA	350.00 mA	1 kHz	350.08 mA	0.52 mA
5 A	0.50000 A	50 Hz	0.4991 A	0.00053 A
5 A	4.5000 A	50 Hz	4.4996 A	0.0038 A
5 A	4.5000 A	1 kHz	4.4996 A	0.014 A
10 A	1.00000 A	50 Hz	1.000 A	0.0012 A
10 A	9.0000 A	50 Hz	9.001 A	0.0059 A
10 A	9.0000 A	1 kHz	9.006 A	0.025 A

Remark : (*) UUC : Unit Under Calibration



SYSTRONICS INSILAB COMPANY LIMITED
19/11-12, Sukhumvit Rd., Nongprue, Muang Rayong, Rayong 21150, Thailand
Tel: +66(0) 894 145-8, Email: calibration@systronics.co.th



CERTIFICATE OF CALIBRATION

Certificate No. E-251725
Page 4 of 5

Range	Standard Value	UUC*Reading	Error	(±) Uncertainty
Function : Resistance Measurement (Without Adjustment)				
500 Ω	0.000 Ω	0.00 Ω	0.00 Ω	0.0085 Ω
500 Ω	50.000 Ω	50.05 Ω	0.05 Ω	0.017 Ω
500 Ω	450.00 Ω	449.96 Ω	-0.04 Ω	0.079 Ω
5 kΩ	0.50000 kΩ	0.49999 kΩ	-0.0001 kΩ	0.00010 kΩ
5 kΩ	4.5000 kΩ	4.4991 kΩ	-0.0009 kΩ	0.00079 kΩ
50 kΩ	5.0000 kΩ	5.0000 kΩ	0.000 kΩ	0.0010 kΩ
50 kΩ	45.000 kΩ	45.000 kΩ	0.000 kΩ	0.0086 kΩ
500 kΩ	50.000 kΩ	50.01 kΩ	0.01 kΩ	0.011 kΩ
500 kΩ	450.00 kΩ	449.77 kΩ	-0.23 kΩ	0.096 kΩ
5 MΩ	0.50000 MΩ	0.49996 MΩ	-0.00004 MΩ	0.00012 MΩ
5 MΩ	4.5000 MΩ	4.4972 MΩ	-0.0028 MΩ	0.0026 MΩ
30 MΩ	3.00000 MΩ	2.998 MΩ	-0.002 MΩ	0.00070 MΩ
30 MΩ	27.0000 MΩ	26.964 MΩ	-0.036 MΩ	0.022 MΩ
50 MΩ	5.0000 MΩ	4.99 MΩ	-0.01 MΩ	0.0064 MΩ
50 MΩ	45.000 MΩ	44.92 MΩ	-0.08 MΩ	0.18 MΩ
100 MΩ	10.0000 MΩ	10.0 MΩ	0.0 MΩ	0.058 MΩ
100 MΩ	90.000 MΩ	89.7 MΩ	-0.3 MΩ	0.36 MΩ
500 MΩ	150.000 MΩ	149.4 MΩ	-0.6 MΩ	0.60 MΩ
500 MΩ	330.000 MΩ	327.4 MΩ	-2.6 MΩ	4.4 MΩ
Function : Resistance Measurement LoZ (Without Adjustment)				
50 Ω	0.000 Ω	0.000 Ω	0.000 Ω	0.0003 Ω
50 Ω	5.000 Ω	5.003 Ω	0.003 Ω	0.0007 Ω
50 Ω	25.000 Ω	25.004 Ω	0.004 Ω	0.001 Ω
50 Ω	45.000 Ω	45.009 Ω	0.009 Ω	0.015 Ω
Function : Capacitance Measurement (Without Adjustment)				
1 nF	0.0000 nF	0.000 nF	0.000 nF	0.0078 nF
1 nF	0.5000 nF	0.499 nF	-0.001 nF	0.0098 nF
1 nF	0.9000 nF	0.899 nF	-0.001 nF	0.012 nF
10 nF	1.0000 nF	1.00 nF	0.00 nF	0.013 nF
10 nF	9.00 nF	9.00 nF	0.00 nF	0.044 nF
100 nF	10.00 nF	10.0 nF	0.0 nF	0.29 nF
100 nF	90.0 nF	90.1 nF	0.1 nF	0.075 nF
1 μF	0.10000 μF	0.100 μF	0.000 μF	0.00064 μF
1 μF	0.9000 μF	0.900 μF	0.000 μF	0.0029 μF
10 μF	1.0000 μF	1.00 μF	0.00 μF	0.0064 μF
10 μF	9.00 μF	9.00 μF	0.00 μF	0.033 μF
100 μF	10.00 μF	10.0 μF	0.0 μF	0.068 μF
100 μF	90.0 μF	90.0 μF	0.0 μF	0.44 μF
1000 μF	100.0 μF	100 μF	0 μF	0.75 μF
1000 μF	900.0 μF	899 μF	-1 μF	7.3 μF
10 mF	1.0 mF	1.00 mF	0.00 mF	0.0059 mF

Remark : (*) UUC : Unit Under Calibration



SYSTRONICS INSLAB COMPANY LIMITED

19/11-12, Sukhumvit Rd., Nongkro, Muang Rayong, Rayong 21150, Thailand
Tel: +66(0) 894 145-8, Email: calibration@systronics.co.th



CERTIFICATE OF CALIBRATION

Certificate No. E/251725
Page. 5 of 5

Range	Standard Value	UUC*Reading	Error	(±) Uncertainty
Function : Frequency Measurement (Without Adjustment)				
100 Hz	10.00 Hz	@ 1 V	0.000 Hz	0.0012 Hz
100 Hz	90.00 Hz	@ 1 V	0.000 Hz	0.0026 Hz
1000 Hz	100.00 Hz	@ 1 V	0.000 Hz	0.0064 Hz
1000 Hz	900.00 Hz	@ 1 V	0.000 Hz	0.020 Hz
10 kHz	1.0000 kHz	@ 1 V	0.0000 kHz	0.000062 kHz
10 kHz	9.0000 kHz	@ 1 V	0.0000 kHz	0.00019 kHz
100 kHz	10.0000 kHz	@ 1 V	0.0000 kHz	0.00061 kHz
100 kHz	90.0000 kHz	@ 1 V	0.0000 kHz	0.00019 kHz
1000 kHz	100.00 kHz	@ 1 V	0.0000 kHz	0.0061 kHz
1000 kHz	500.00 kHz	@ 1 V	0.0000 kHz	0.012 kHz

Range	Standard Value	Required UUC*Reading	Error	(±) Uncertainty
Function : Thermocouple Measurement K Type (Without Adjustment)				
-200 to 1550 °C	-5.550 mV	-180.0 °C	0.4 °C	0.40 °C
-200 to 1550 °C	0.000 mV	0.0 °C	0.2 °C	0.25 °C
-200 to 1550 °C	4.096 mV	100.0 °C	0.2 °C	0.22 °C
-200 to 1550 °C	24.905 mV	600.0 °C	0.2 °C	0.23 °C
-200 to 1550 °C	37.326 mV	900.0 °C	0.2 °C	0.24 °C
-200 to 1550 °C	48.836 mV	1200.0 °C	0.2 °C	0.26 °C

Remarks : (*) UUC : Unit Under Calibration

END OF CALIBRATION

SYSTRONICS INSLAB COMPANY LIMITED
19/11-12, Sukhumvit Rd., Nongkro, Muang Rayong, Rayong 21150, Thailand
Tel: +66(0) 894 145-8, Email: calibration@systronics.co.th



SYSTRONICS INSLAB COMPANY LIMITED

19/11-12, Sukhumvit Rd., Nongkro, Muang Rayong, Rayong 21150, Thailand
Tel: +66(0) 894 145-8, Email: calibration@systronics.co.th



CERTIFICATE OF CALIBRATION

Certificate No. E/251725
Page. 5 of 5

Range	Standard Value	UUC*Reading	Error	(±) Uncertainty
Function : Frequency Measurement (Without Adjustment)				
100 Hz	10.00 Hz	@ 1 V	0.000 Hz	0.0012 Hz
100 Hz	90.00 Hz	@ 1 V	0.000 Hz	0.0026 Hz
1000 Hz	100.00 Hz	@ 1 V	0.000 Hz	0.0064 Hz
1000 Hz	900.00 Hz	@ 1 V	0.000 Hz	0.020 Hz
10 kHz	1.0000 kHz	@ 1 V	0.0000 kHz	0.000062 kHz
10 kHz	9.0000 kHz	@ 1 V	0.0000 kHz	0.00019 kHz
100 kHz	10.0000 kHz	@ 1 V	0.0000 kHz	0.00061 kHz
100 kHz	90.0000 kHz	@ 1 V	0.0000 kHz	0.00019 kHz
1000 kHz	100.00 kHz	@ 1 V	0.0000 kHz	0.0061 kHz
1000 kHz	500.00 kHz	@ 1 V	0.0000 kHz	0.012 kHz

Range	Standard Value	Required UUC*Reading	Error	(±) Uncertainty
Function : Thermocouple Measurement K Type (Without Adjustment)				
-200 to 1550 °C	-5.550 mV	-180.0 °C	0.4 °C	0.40 °C
-200 to 1550 °C	0.000 mV	0.0 °C	0.2 °C	0.25 °C
-200 to 1550 °C	4.096 mV	100.0 °C	0.2 °C	0.22 °C
-200 to 1550 °C	24.905 mV	600.0 °C	0.2 °C	0.23 °C
-200 to 1550 °C	37.326 mV	900.0 °C	0.2 °C	0.24 °C
-200 to 1550 °C	48.836 mV	1200.0 °C	0.2 °C	0.26 °C

Remarks : (*) UUC : Unit Under Calibration

END OF CALIBRATION

SYSTRONICS INSLAB COMPANY LIMITED
19/11-12, Sukhumvit Rd., Nongkro, Muang Rayong, Rayong 21150, Thailand
Tel: +66(0) 894 145-8, Email: calibration@systronics.co.th



SYSTRONICS INSLAB COMPANY LIMITED

19/11-12, Sukhumvit Rd., Nongkro, Muang Rayong, Rayong 21150, Thailand
Tel: +66(0) 894 145-8, Email: calibration@systronics.co.th



CERTIFICATE OF CALIBRATION

Certificate No. E/251725
Page. 5 of 5

Range	Standard Value	UUC*Reading	Error	(±) Uncertainty
Function : Frequency Measurement (Without Adjustment)				
100 Hz	10.00 Hz	@ 1 V	0.000 Hz	0.0012 Hz
100 Hz	90.00 Hz	@ 1 V	0.000 Hz	0.0026 Hz
1000 Hz	100.00 Hz	@ 1 V	0.000 Hz	0.0064 Hz
1000 Hz	900.00 Hz	@ 1 V	0.000 Hz	0.020 Hz
10 kHz	1.0000 kHz	@ 1 V	0.0000 kHz	0.000062 kHz
10 kHz	9.0000 kHz	@ 1 V	0.0000 kHz	0.00019 kHz
100 kHz	10.0000 kHz	@ 1 V	0.0000 kHz	0.00061 kHz
100 kHz	90.0000 kHz	@ 1 V	0.0000 kHz	0.00019 kHz
1000 kHz	100.00 kHz	@ 1 V	0.0000 kHz	0.0061 kHz
1000 kHz	500.00 kHz	@ 1 V	0.0000 kHz	0.012 kHz

Range	Standard Value	Required UUC*Reading	Error	(±) Uncertainty
Function : Thermocouple Measurement K Type (Without Adjustment)				
-200 to 1550 °C	-5.550 mV	-180.0 °C	0.4 °C	0.40 °C
-200 to 1550 °C	0.000 mV	0.0 °C	0.2 °C	0.25 °C
-200 to 1550 °C	4.096 mV	100.0 °C	0.2 °C	0.22 °C
-200 to 1550 °C	24.905 mV	600.0 °C	0.2 °C	0.23 °C
-200 to 1550 °C	37.326 mV	900.0 °C	0.2 °C	0.24 °C
-200 to 1550 °C	48.836 mV	1200.0 °C	0.2 °C	0.26 °C

Remarks : (*) UUC : Unit Under Calibration

END OF CALIBRATION

SYSTRONICS INSLAB COMPANY LIMITED
19/11-12, Sukhumvit Rd., Nongkro, Muang Rayong, Rayong 21150, Thailand
Tel: +66(0) 894 145-8, Email: calibration@systronics.co.th

CERTIFICATE OF CALIBRATION

Certificate No. TL250426
Page. 2 of 2

Result of Calibration:

(Without Adjustment)

Parameter Setting : OFFSET = 0.0
Sensor of UUC* : Thermocouple Wire
Type : K Serial No.: 31221.05
Length : 530 mm Diameter : 1.5 mm

Immersion Depth	Standard Reading	UUC* Reading	Correction Value	Uncertainty of Measurement (±)	Coverage Factor
mm	°C	°C	°C	°C	k =
150	0.0041	0.7	-0.7	0.50	2.00
150	50.0053	-9.6	0.4	0.50	2.00
150	100.0055	99.4	0.6	0.50	2.00

UUC* : Unit Under Calibration

END OF CERTIFICATE

ARCHCHEMICAL LAB
ARCHCHEMICAL LAB CO., LTD.
Trevor B. 11/11/2011

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: 22109253
Instrument Part Number: 22000-60001

TEST BOX LOADS AND FUNCTIONS

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

Tester: *Kevin Angell* Date: *1 - March - 2011*
Trevor B. 11/11/2011
ARCHCHEMICAL LAB
ARCHCHEMICAL LAB CO., LTD.

P/N 22000-97001 C

ThermoFisher
SCIENTIFIC

The world leader
in serving science

May 15, 2018

To whom it may concern,

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

Sincerely,



Thomas Wu
ICSP Product Manager
Thermo Fisher Scientific



Teerapat Boonla
19/Feb/18

Chromatography and Mass Spectrometry Division
ICSP Product Manager
Diverse Products
Sunnyvale, CA
94085-4024
408-737-0700
408-481-4600 fax
www.thermo.com

ThermoFisher
SCIENTIFIC

Certificate of Completion

This certifies that

Teerapat Boonla

Has successfully completed

OJT RPG Mentoring: Ion Chromatography System Qualification Service Training

Issued electronically and
approved by:

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



Teerapat Boonla
19/Feb/18

Valid for 3 years from:
Aug/26/2024

The world leader in serving science

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