

ภาคผนวก ง

เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์

ANALYTICAL BALANCE (DU)

Model : XS205DU

Serial No. : B344940005

NSC-TISI-TIS17025
CALIBRATION 0152

Page 1 of 4

Certificate No. : 25-205716
Sample Code : 25-90375-006

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd, Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Analytical Balance Room)

Equipment : ELECTRONIC BALANCE

Manufacturer : METTLER TOLEDO

Model : XS205DU

Serial No. : B344940005

ID No. : LABE 05/3

Date of Receipt : 26 November 2025

Date of Calibration : 26 November 2025

Calibrated by Mr. Thanadol Pholthep
Scientist

Approved by

Signed for Director

Issue date 28 November 2025

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

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

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CALIBRATION 0152

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Certificate No. : 25-205716
Sample Code : 25-90375-006

REPORT OF CALIBRATION

Equipment : ELECTRONIC BALANCE
Manufacturer : METTLER TOLEDO
Model : XS205DU
Capacity : Max 81 g / 200 g
Resolution : 0.00001 g / 0.0001 g
Serial No. : B344940005
ID No. : LABE 05/3

Result of Calibration

1. Test weight and repeatability of reading

Repeatability is a measure of the ability of a balance to supply the same result in repetitive weighings with one and the same load under the same measurement condition. The measurement of the repeatability must include both the balance specifications and the ambient (vibration, fluctuating air current/temperature/humidity, etc.) Operator handling of the balance is also included in the standard deviation.

Unit : g	Range : 81	☐ Before adjustment	☐ After adjustment
	Nominal value	40	80
☒ No adjustment	Standard weight	40.000087	80.000088
☐ Adjustment	Average reading of indicator	40.00004	80.00004
	Standard deviation	0.000007	0.000007

Unit : g	Range : 200	☐ Before adjustment	☐ After adjustment
	Nominal value	100	200
☒ No adjustment	Standard weight	99.999988	200.000015
☐ Adjustment	Average reading of indicator	99.9999	199.9997
	Standard deviation	0.000005	0.000005

Certificate No. : 25-205716
Sample Code : 25-90375-006

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REPORT OF CALIBRATION

Result of Calibration

2. Sensitivity or value of a scale division

Change in the output variable of a measuring instrument divided by the associated change in the input variable.

Unit : g

Range : 81

Range : 200

Test Point	Sensitivity, S	Test Point	Sensitivity, S
0	1.00000	0	1.0000
40	1.00000	100	1.0000
80	1.00000	200	1.0000

3. Departure of indication from nominal value, Linearity

Unit : g

Nominal Value	Standard Value	Average Reading of Indicator	Correction Value	Expanded Uncertainty	Coverage Factor (k)
Unload	0.0000000	0.00000	0.00000	0.000011	2.04
0.01	0.0100016	0.01000	0.00000	0.000011	2.04
0.1	0.1000056	0.10000	0.00001	0.000012	2.02
1	1.0000110	1.00000	0.00001	0.000015	2.01
5	4.9999996	4.99998	0.00002	0.000020	2.00
10	9.9999994	9.99999	0.00000	0.000026	2.00
20	20.0000042	20.00000	0.00004	0.000037	2.00
50	50.0000052	50.00003	0.00002	0.000067	2.00
100	99.9999988	100.00000	0.00000	0.000016	2.00
150	150.0000040	150.00001	-0.00001	0.000022	2.00
200	200.0000015	200.00001	-0.00001	0.000027	2.00

The result expanded uncertainty of measurement U 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%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

Certificate No. : 25-205716
Sample Code : 25-90375-006

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REPORT OF CALIBRATION

Result of Calibration :

4. Eccentric or off-centre loading

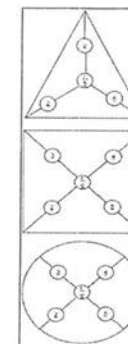
Deviation of the measurement value through off - center (eccentric) loading. The corner load increases with the weight of the load and its removal from the center of the pan support.

☐ Triangular☒ Rectangular☐ Circle

Test weight : 50 and 100

Unit : g

Range	81	200
Position	Reading of indicator	Reading of indicator
1	50.00000	100.0000
2	49.99997	100.0000
3	49.99993	99.9999
4	49.99999	100.0000
5	50.00003	99.9999
6	50.00000	100.0000
Maximum difference	0.00007	0.0001



Condition of Calibration

1. Calibration Method : WI-CL-004 base on UKAS LAB 14: 2019

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

3. Condition of Calibration item: Normal

4. This certification is traceable to the International System of Unit maintained at : -

- Through the reference standard laboratory of Asia Medical and Agricultural Laboratory and Research Center Public

Company Limited (Instrument number 1).

5. Reference standard instrument :

Instrument	Class	ID No.	Certificate No.	Due Date
1) STANDARD WEIGHT 1 mg to 1 kg	E2	LB-WE-78	25-134074	18 July 2026

6. Ambient conditions	Min	Max
Temperature (°C)	22.9	24.3
Relative Humidity (%Rh)	45.4	47.7
Air pressure (hPa)	1007.2	1011.0

- End of Report -

ANALYTICAL BALANCE

Model : SECURA224-1S

Serial No. : 0036707137

NSC-TISI-TIS17025
CALIBRATION 0152

Page 1 of 4

Certificate No. : 24-164695
Sample Code : 24-67405-005

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd, Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Analytical Balance Room)

Equipment : ELECTRONIC BALANCE

Manufacturer : SARTORIUS

Model : SECURA224-1S

Serial No. : 0036707137

ID No. : LABE 05/2

Date of Receipt : 19 December 2024

Date of Calibration : 19 December 2024

Calibrated by Mr. Thanadol Pholthep
Scientist

Approved by

Issue date 20 December 2024

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

The calibration result is applied only to the above calibrated item and was found accurate as shown on date

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

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CALIBRATION 0152

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Certificate No. : 24-164695
Sample Code : 24-67405-005

REPORT OF CALIBRATION

Equipment : ELECTRONIC BALANCE
Manufacturer : SARTORIUS
Model : SECURA224-1S
Capacity : Max 220 g
Resolution : 0.0001 g
Serial No. : 0036707137
ID No. : LABE 05/2

Result of Calibration

1. Test weight and repeatability of reading

Repeatability is a measure of the ability of a balance to supply the same result in repetitive weighings with one and the same load under the same measurement condition. The measurement of the repeatability must include both the balance specifications and the ambient (vibration, fluctuating air current/temperature/humidity, etc.) Operator handling of the balance is also included in the standard deviation.

Unit : g	Range : 220	☐ Before adjustment	☐ After adjustment
	Nominal value	100	200
☒ No adjustment	Standard weight	100.000016	200.000028
☐ Adjustment	Average reading of indicator	100.0000	200.0000
	Standard deviation	0.00005	0.00005

Unit : -	Range : -	☐ Before adjustment	☐ After adjustment
	Nominal value	-	-
☐ No adjustment	Standard weight	-	-
☐ Adjustment	Average reading of indicator	-	-
	Standard deviation	-	-

Certificate No. : 24-164695
Sample Code : 24-67405-005

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REPORT OF CALIBRATION

Result of Calibration

2. Sensitivity or value of a scale division

Change in the output variable of a measuring instrument divided by the associated change in the input variable.

Unit : g

Range : 220

Range :

Test Point	Sensitivity, S	Test Point	Sensitivity, S
0	0.9998		
100	0.9998		
200	0.8998		

3. Departure of indication from nominal value, Linearity

Unit : g

Nominal Value	Standard Value	Average Reading of Indicator	Correction Value	Expanded Uncertainty	Coverage Factor (k)
Unload	0.0000000	0.0000	0.0000	0.000094	2.01
0.01	0.0100015	0.0100	0.0000	0.000094	2.01
0.1	0.1000064	0.1000	0.0000	0.000094	2.01
1	1.0000017	1.0000	0.0000	0.000095	2.01
2	2.0000049	2.0000	0.0000	0.000095	2.01
5	5.0000012	5.0000	0.0000	0.000096	2.01
10	9.999992	10.0000	0.0000	0.000097	2.01
20	20.000042	20.0000	0.0000	0.00010	2.01
50	50.000046	50.0000	0.0000	0.00012	2.01
100	100.000016	100.0000	0.0000	0.00016	2.00
200	200.000028	200.0000	0.0000	0.00028	2.00

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k , which for a normal distribution corresponds to a probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

Certificate No. : 24-164695
Sample Code : 24-67405-005

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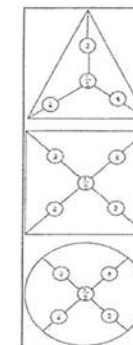
REPORT OF CALIBRATION

Result of Calibration :

4. Eccentric or off-centre loading

Deviation of the measurement value through off - center (eccentric) loading. The corner load increases with the weight of the load and its removal from the center of the pan support.

Weighing pan	☒ Circle ☐ Triangular ☐ Rectangular	Test weight : 100 Unit : g
Range	220	
Position	Reading of indicator	Reading of indicator
1	99.9999	-
2	100.0001	-
3	99.9999	-
4	99.9998	-
5	99.9999	-
6	99.9999	-
Maximum difference	0.0002	-



Condition of Calibration

1. Calibration Method : WI-CL-004 base on UKAS LAB 14: 2019
2. This result of calibration was found accurate as shown on date and place of calibration only.
3. Condition of Calibration item: Normal

4. This certification is traceable to the International System of Unit maintained at : -

- Through the reference standard laboratory of Asia Medical and Agricultural Laboratory and Research Center Public

Company Limited (Instrument number 1).

5. Reference standard instrument :

Instrument	Class	ID No.	Certificate No.	Due Date
1) STANDARD WEIGHT 1 mg to 1 kg	E2	LB-WF-78	24-097116	02 August 2025

- End of Report

6. Ambient conditions	Min	Max
Temperature (°C)	25.0	25.4
Relative Humidity (%Rh)	39.8	41.0
Air pressure (hPa)	1011.0	1012.1

BOD INCUBATOR

Model : LABE 19/3

CERTIFICATE OF CALIBRATION

Page 1 of 3

Certificate No. : 25-118065

Sample Code : 25-51697-001

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Laboratory)

Equipment : Temperature controlled enclosures (Incubator)

Manufacturer : พิกัด เครื่องเย็น Model : N/A

Serial No. : S43020027 ID No. : LABE 19/3

Date of Receipt : 25 June 2025 Date of Calibration : 25 June 2025

Condition of Calibration

1. Environment
- | | | | | | | |
|---------------------------|---|---------|-----------|---|---------|-----------|
| 1.1 Ambient temperature | : | Maximum | 34.6 °C | : | Minimum | 32.2 °C |
| 1.2 Relative humidity | : | Maximum | 64.0 % | : | Minimum | 58.7 % |
| 1.3 Line voltage supplied | : | Maximum | 224.5 VAC | : | Minimum | 223.8 VAC |

2. Calibration method

TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data Acquisition With Sensor (RTD-P1100)	LB-DA-08 (RTD-411 to RTD-419)	25-082913	18 May 2026

4. This certificate is traceable to the international system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

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

6. Condition of calibration item : Normal

Calibrated by Mr. Pattanapong Pulngern
Scientist

Issue date 26 June 2025

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

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

REPORT OF CALIBRATION

Page 2 of 3

Certificate No. : 25-118065

Sample Code : 25-51697-001

Results of Calibration

Resolution : 0.1 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)									Uncertainty ± (°C)	Coverage factor k
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9 ^{ref}		
20	20.0	20.0	20.61	20.42	19.97	19.90	20.29	20.47	20.25	19.96	20.18	0.24	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
20	0.09	0.46	0.89

Notes

- UUC* = Unit Under Calibration

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CALIBRATION 0152

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REPORT OF CALIBRATION

Certificate No. : 25-118065

Sample Code : 25-51697-001

Results of Calibration

Notes

1. Sensor installation locations

1.1 All sensors at any corners or walls should be positioned
5 cm (a x b x c) from the wall.

1.2 The reference sensor is preferably located of the geometric center
of the chamber.

2. Interior dimensions approx of chamber :

W = 70 cm ; D = 55 cm ; H = 140 cm

3. Air valve or fresh air level : Off

4. Fan level : Open

5. The quoted uncertainty includes "Stability of chamber and loading effect
in chamber at 20% of uniformity".6. Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference
location which are observed at the same time.

7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.

9. UUC* reading - the average reading of indicating device that forms the integral part of the enclosure.

10. Calibration results without adjustment.

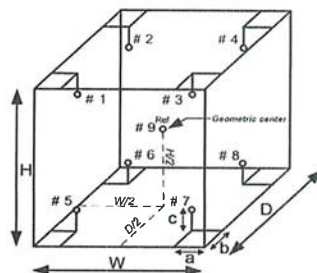


Figure: Example of sensor
installation Positions

The result expanded uncertainty of measurement U 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%. The standard uncertainty of measurement has been determined in accordance with UKAS M3.

- End of Report -

BOD INCUBATOR

Model : LABE 19/5



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CERTIFICATE OF CALIBRATION

Certificate No. : 25-042561

Sample Code : 25-18090-002

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Laboratory)

Equipment : Temperature controlled enclosures (Incubator)

Manufacturer : Lovibond Model : TC 445 S

Serial No. : 0520/005227 ID No. : LABE 19/5

Date of Receipt : 20 March 2025 Date of Calibration : 20 March 2025

Condition of Calibration

1. Environment
- 1.1 Ambient temperature : Maximum 29.9 °C ; Minimum 27.5 °C
- 1.2 Relative humidity : Maximum 51.9 % ; Minimum 43.4 %
- 1.3 Line voltage supplied : Maximum 239.4 VAC ; Minimum 232.8 VAC

2. Calibration method

TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data Acquisition With Sensor (RTD-P1100)	LB-DA-11 (RTD-148 to RTD-155, RTD-227)	24-040190	03 April 2025

4. This certificate is traceable to the international system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

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

6. Condition of calibration item : Normal

Calibrated by : Mr. Pattanapong Pulngern
Scientist

Issue date : 24 March 2025

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

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).



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REPORT OF CALIBRATION

Certificate No. : 25-042561

Sample Code : 25-18090-002

Results of Calibration

Resolution : 0.1 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)										Uncertainty ± (°C)	Coverage factor k
			#1	#2	#3	#4	#5	#6	#7	#8	#9 ^{ref}			
20	20.5	20.5	19.91	19.78	19.82	19.86	19.78	19.85	19.93	19.63	19.79		0.38	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
20	0.28	0.25	0.83

Notes

- UUC* = Unit Under Calibration



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CALIBRATION 0152

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REPORT OF CALIBRATION

Certificate No. : 25-042561

Sample Code : 25-18090-002

Results of Calibration

Notes

1. Sensor installation locations
 - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
 - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :
W = 60 cm ; D = 56 cm ; H = 146 cm
3. Air valve or fresh air level : Off
4. Fan level : Open
5. The quoted uncertainty includes* Stability of chamber and loading effect in chamber at 20% of uniformity*.
6. Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.
7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC* reading - the average reading of indicating device that forms the integral part of the enclosure.
10. Calibration results without adjustment.

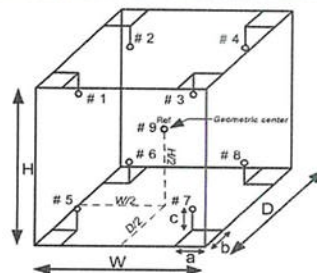


Figure: Example of sensor
installation Positions

The result expanded uncertainty of measurement U 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%. The standard uncertainty of measurement has been determined in accordance with UKAS M3.

- End of Report -

Hot Air Oven

Model : UM 400

Serial No. : 900982

CERTIFICATE OF CALIBRATION

Certificate No. : 24-164692

Sample Code : 24-67405-002

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarni 8 Rd, Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Hot Lab)

Equipment : Temperature controlled enclosures (Hot air oven)

Manufacturer : Memmert Model : UM 400

Serial No. : 900982 ID No. : LABE 17/1

Date of Receipt : 19 December 2024 Date of Calibration : 19 December 2024

Condition of Calibration

1. Environment
- | | | | | |
|---------------------------|-----------|-----------|-----------|-----------|
| 1.1 Ambient temperature | : Maximum | 32.1 °C | : Minimum | 30.4 °C |
| 1.2 Relative humidity | : Maximum | 48.9 % | : Minimum | 42.4 % |
| 1.3 Line voltage supplied | : Maximum | 226.3 VAC | : Minimum | 221.0 VAC |

2. Calibration method

TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data Acquisition With Sensor (RTD-Pt100)	LB-DA-11 (RTD-148 to RTD-155, RTD-227)	24-040190	03 April 2025

4. This certificate is traceable to the international system of unit (SI Unit).

The measurement is traceable to Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

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

6. Condition of calibration item : Normal

Calibrated by Mr. Nopanon Anusak
Scientist

Approved by

Issue date 20 December 2024

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

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

REPORT OF CALIBRATION

Certificate No. : 24-164692

Sample Code : 24-67405-002

Results of Calibration

Resolution : 0.1 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)									Uncertainty ± (°C)	Coverage factor k
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9 ^{ref}		
85	85.0	85.0	85.33	85.28	84.83	85.01	85.15	85.18	85.32	85.12	85.23	0.25	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
85	0.10	0.43	0.69

Notes

- UUC* = Unit Under Calibration

REPORT OF CALIBRATION

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Certificate No. : 24-164692

Sample Code : 24-67405-002

Results of Calibration

Notes

1. Sensor installation locations
 - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
 - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :
W = 40 cm ; D = 28 cm ; H = 39 cm
3. Air valve or fresh air level : Off
4. Fan level : Open
5. The quoted uncertainty includes "Stability of chamber and loading effect in chamber at 20% of uniformity".
6. Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.
7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC* reading - the average reading of indicating device that forms the integral part of the enclosure.
10. Calibration results without adjustment.

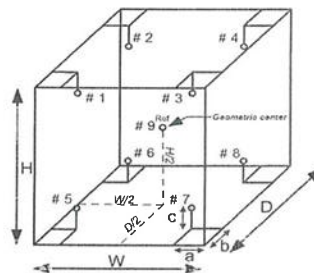


Figure: Example of sensor
installation Positions

The result expanded uncertainty of measurement U 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%. The standard uncertainty of measurement has been determined in accordance with UKAS M3.

- End of Report -

LIQUID IN GLASS THERMOMETER

Model / Type : 0-100 °C

Serial No. : 43560



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY CO., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : LIQUID IN GLASS THERMOMETER
MANUFACTURER : AA PRECISION
MODEL / TYPE : 0-100 °C
SERIAL NO. : 43560[LABE 16/1]
CLID. NO. : 232403905
JOB CONTROL NO. : 251115135334
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

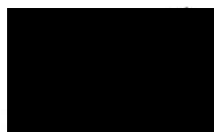
CUSTOMER : EASTERN THAI CONSULTING 1992 CO., LTD.
683 MOO 11, SUKHAPIBARN 8 RD,
NONGKHAM, SRIRACHA, CHONBURI 20230

DATE OF RECEIVED : 15 November 2025

DATE OF ISSUED : 18 November 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Pimsiri Hemtanon
Calibration Engineer



Approved By :

Authorized Signatory
18 November 2025



This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25135334

F3-011-05/12-23



@clccalibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY CO., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : LIQUID IN GLASS THERMOMETER
MANUFACTURER : AA PRECISION
MODEL / TYPE : 0-100 °C
SERIAL NO. : 43560[LABE 16/1]
DATE OF CALIBRATION : 17 November 2025

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$

Relative Humidity : $(55 \pm 10) \%$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPTH-02 based on ASTM E 77-07 as calibration guidelines.
The calibration was performed by comparison with Calibration Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Calibration Bath, Kambic Model OB-22/2 ULT,OB-22/2 S/N. 17115653,17115654.
2. Precision Thermometer, ASL Model F200-A-8 S/N. 014433/03 with IPRT S/N. L0193A-1-1,PO106346-1-13.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q24120999,Q25124610. Due Date 26 November 2025,07 November 2026.
2. The measurements are traceable to International System of Units (SI), through Thailand Institute of Scientific and Technological Research (TISTR) and National Institute of Metrology (Thailand). Certificate No. PSL-T 0177/68,TT-0169-24,TT-1008-25. Due Date 10 February 2026,11 December 2025,04 March 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q25135334

F3-011-05/12-23



@clccalibration



CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The DUC Reading were recorded and the means value were reported of four times measurement in the table below.

CALIBRATION DATA

CORRECTION OF TEMPERATURE

STD Reading (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty $\pm$ (°C)
0.01	0.00	+0.01	0.06
25.02	25.00	+0.02	
50.03	50.00	+0.03	
100.01	100.00	+0.01	

Range : 0 °C to 100 °C

Graduation : 0.1 °C

Immersion Type : Total Immersion.

Correction of Reference Temperature (0 °C) = 0.00 °C

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 016 Page 60 of 73

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q25135334

F3-011-05/12-23



@clccalibration

pH Meter

Model : SevenCompact S220

Serial No. : B835349235

Certificate Number CCP-0403-25**Calibration Certificate**
SevenCompact™ pH/Ion Meter S220**Customer**Company EASTERN THAI CONSULTING 1992 CO., LTD.Address 683 Moo 11, Sukhaphiban 8 Rd., Nong KhamSrirachaCHONBURI 20230Customer ID number 301608441Customer representative คุณ ศิริกรณ นาคฉันท**Instrument**Type SevenCompact™ S220Instrument Serial Number B835349235Internal Identification LASE 11/6Firmware version 1.20.06**Technical specifications**

Measuring Range -1999.9 ... 1999.9 mV -2.000 ... 20.000 pH
Resolution 0.1 mV 0.001 pH
Limit of Error ± 0.2 mV ± 0.002 pH

Temperature range MTC -30.0 ... 130.0 °C

Temperature range ATC -5.0 ... 130.0 °C

Resolution 0.1 °C

Limit of Error ± 0.1 °C

Procedure Statement

METTLER TOLEDO Certification SOP (Doc. No. ME-30027577B) will be used as referring documentation to adjust and certify the instrument indicated in the "Type" and "Serial number" section. The measurement results of this certification were obtained at ambient conditions.

Certificate Number CCP-0403-25**Certification Tools**

Certified digital voltmeter

Manufacturer KEYSIGHT TECHNOLOGIESType 34461AControl No. ANA143Serial number MY60036967Certificate number E1U2401054Due date March 10, 2025Certified Temperature
ResistorsManufacturer METTLER-TOLEDOType 51302410Control No. ANA114Serial number A275Certificate number 73757Due date February 12, 2026

Designation	Nominal value	Certified value
NTC 30 kΩ, 0 °C	94.980 kΩ	94.9730 kΩ
NTC 30 kΩ, 25 °C	30.000 kΩ	29.9950 kΩ
NTC 30 kΩ, 50 °C	10.969 kΩ	10.9704 kΩ
NTC 30 kΩ, 75 °C	4.528 kΩ	4.5275 kΩ
NTC 30 kΩ, 100 °C	2.070 kΩ	2.0714 kΩ
PT1000, 0 °C	1.000 kΩ	1.0001 kΩ
PT1000, 25 °C	1.0974 kΩ	1.0975 kΩ
PT1000, 50 °C	1.1940 kΩ	1.1942 kΩ
PT1000, 75 °C	1.2899 kΩ	1.2900 kΩ
PT1000, 100 °C	1.3851 kΩ	1.3851 kΩ

METTLER TOLEDO

Certificate Number **CCP-0403-25**

Certification Measurements

pH/mV Sensor Input	Designation	Certified value	Measured value	Max. Tolerance	Passed / Failed
	-1900 mV	-1900.0 mV	-1899.98 mV	0.2 mV	Passed
	-1000 mV	-1000.0 mV	-1000.00 mV	0.2 mV	Passed
	-500 mV	-500.0 mV	-499.98 mV	0.2 mV	Passed
	-180 mV	-180.0 mV	-180.00 mV	0.2 mV	Passed
	0 mV	0.0 mV	0.01 mV	0.2 mV	Passed
	180 mV	180.0 mV	179.98 mV	0.2 mV	Passed
	500 mV	500.0 mV	499.99 mV	0.2 mV	Passed
	1000 mV	1000.0 mV	1000.00 mV	0.2 mV	Passed
	1900 mV	1900.0 mV	1899.99 mV	0.2 mV	Passed

pH/mV Sensor Input at high Impedance	Designation	Measured low imp.	Measured high imp.	Max. Tolerance	Passed / Failed
	1900 mV	1900.0 mV	1899.8 mV	0.6 mV	Passed

Temperature Sensor Input	Designation	Nominal value	Measured value	Max. Tolerance	Passed / Failed
	NTC 30 kΩ, 0 °C	0.0 °C	0.0 °C	0.1 °C	Passed
	NTC 30 kΩ, 25 °C	25.0 °C	25.0 °C	0.1 °C	Passed
	NTC 30 kΩ, 50 °C	50.0 °C	50.0 °C	0.1 °C	Passed
	NTC 30 kΩ, 75 °C	75.0 °C	74.9 °C	0.1 °C	Passed
	NTC 30 kΩ, 100 °C	100.0 °C	100.0 °C	0.1 °C	Passed
	Pt1000, 0 °C	0.0 °C	0.1 °C	0.1 °C	Passed
	Pt1000, 25 °C	25.0 °C	25.0 °C	0.1 °C	Passed
	Pt1000, 50 °C	50.0 °C	50.0 °C	0.1 °C	Passed
	Pt1000, 75 °C	75.0 °C	74.9 °C	0.1 °C	Passed
	Pt1000, 100 °C	100.0 °C	99.9 °C	0.1 °C	Passed

Summary of Certification

Certification of instrument

Passed

The instrument referred to in this certificate has fulfilled the criteria of the certification. This is indicated by the notation Passed in the column above.

Remarks - Test high Impedance at 1900.0 mV, Results : 1899.8 mV

Difference = 0.005% Within MPE (0.033%)

Certification of the Instrument was performed by

Name Khomsan Pralaung Function Service

Place Mettler-Toledo (Thailand) Ltd.

Calibration Date: 29-Jan-2025 Signature 

Mettler-Toledo (Thailand) Limited

METTLER TOLEDO

Performance Test

Attachment to Certificate No. CCP-0403-25

pH Electrode

Type: InLab Expert Pro-ISM S/N: 2463982

Certified standards used

Standard 1:	Type: pH Buffer	Manufacturer: METTLER TOLEDO	Exp. date: 3-Dec-2026
	Nominal value: pH (25.00 °C):	4.01	Lot No.: 1J338E
Standard 2:	Type: pH Buffer	Manufacturer: METTLER TOLEDO	Exp. date: 27-Nov-2026
	Nominal value: pH (25.00 °C):	7.00	Lot No.: 1J331B
Standard 3:	Type: pH Buffer	Manufacturer: METTLER TOLEDO	Exp. date: 11-Jan-2026
	Nominal value: pH (25.00 °C):	10.00	Lot No.: 1K011B
Standard 4:	Type: Redox Solution	Manufacturer: METTLER TOLEDO	Exp. date: -
	Nominal value: pH (25.00 °C):	-	Lot No.: -

Adjustment

Set Calibration Buffer	B1 (25 °C) 1.68, 4.01, 7.00, 10.01									
Select Calibration Mode Segment	3-Point calibration				2-Point calibration		2-Point calibration			
3-Point Calibration	°C		pH	°C		pH	°C		pH	
Cal 1	ATC	25.5	7.00	ATC			ATC			
Cal 2	ATC	25.5	4.00	ATC			ATC			
Offset (mV)	-27.2									
Slope % (or mV/pH)	95.9									
Cal 3	ATC	25.5	10.01							
Offset (mV)	-27.2									
Slope % (or mV/pH)	97.4									

Measurements

Resolution: 2 Decimal places

As Found				As Left			
Buffer Values	Measured	Difference	Buffer Values	Measured	Difference		
pH	°C	pH	pH	°C	pH	pH	
4.01	25.3	ATC	4.02	0.01	4.01	25.3	ATC
7.00	25.2	ATC	6.98	-0.02	7.00	25.2	ATC
9.99	25.3	ATC	10.11	0.12	9.99	25.2	ATC

Redox Measurement Result = - mV

Note: The difference result of calibrated electrode should be within +/- 0.05 pH

Remarks: N/A

Place: Laboratory Calibration Date: 29-Jan-2025

Service Specialist: Khomsan Pralaung Signature: 

STANDARD WEIGHT 50 g

Certificate No. : 24-062445
Sample Code : 24-25551-001

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., Nongkham,
Sriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited
(Calibration Laboratory)

Equipment : Standard Weight 50 g

Manufacturer : METTLER TOLEDO

Class : F1

Serial No. : N/A

ID No. : LABE 10/1

Date of Receipt : 23 May 2024

Date of Calibration : 03 June 2024

Calibrated by Mr. Somwang Sangdee
Scientist

Approved by (Mr. Somchai Neampunt)
Signed for Director

Issue date 04 June 2024

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

The calibration result is applied only to the above calibrated item and was found accurate as shown on data sheet.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

Certificate No. : 24-062445
Sample Code : 24-25551-001

REPORT OF CALIBRATION

Equipment : Standard Weight 50 g

Manufacturer : METTLER TOLEDO

Class : F1

Serial No. : N/A

ID No. : LABE 10/1

Result of Calibration :

☒ Without adjustment☐ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20°C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_0) of 1.2 kg.m⁻³

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	Maximum Permissible Error ± (mg)	ID No.
50 g	-0.343	49.999657 g	0.10	0.30	LABE 10/1

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.0$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3000.



Certificate No. : 24-062445
Sample Code : 24-25551-001

REPORT OF CALIBRATION

Condition of Calibration

1. Ambient Conditions : Temperature $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$, Relative humidity $50\% \pm 10\%$ and air density 1.19 kg/m^3
2. Calibration Method : Direct comparison weighing according to OIML R111-1 : 2004(E)
3. Reference standard instrument

Instrument	Class	ID No.	Certificate No.	Due Date
1) Standard Weight 1 mg to 1 kg	E2	LB-WE-83	24-001894	11 January 2025

4. This certification is traceable to the International System of Unit maintained at : -

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited

(Instrument number 1).

5. Condition of Calibration item: Normal

6. Description of Calibrated Item :

Type and Nominal Value :	Standard Weight 50 g
Shape :	Cylindrical weight with knob
Material :	Stainless steel
Case :	Wooden Box
Comments :	Recalibration

- End of Report -

STANDARD WEIGHT 100 g

Certificate No. : 24-079772
Sample Code : 24-31841-002

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., NongKham,
Sriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited
(Calibration Laboratory)

Equipment : Standard Weight 100 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/2

Date of Receipt : 25 June 2024

Date of Calibration : 30 June 2024

Calibrated by Mr. Nawa Sisuwan

Scientist

Approved by

Signed for Director

Issue date 03 July 2024

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

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

Certificate No. : 24-079772
Sample Code : 24-31841-002

REPORT OF CALIBRATION

Equipment : Standard Weight 100 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/2

Result of Calibration :

☒ Without adjustment☐ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20°C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_0) of 1.2 kg.m⁻³

Description	Deviation	Conventional Mass	Expanded Uncertainty	Maximum Permissible Error	ID No.
	(mg)		(mg)	± (mg)	
100 g	-0.173	99.999827 g	0.16	0.50	LABE 10/2

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.0$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M30

Certificate No. : 24-079772

Sample Code : 24-31841-002

REPORT OF CALIBRATION

Condition of Calibration

1. Ambient Conditions : Temperature $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$, Relative humidity $50\% \pm 10\%$ and air density 1.19 kg/m^3

2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Reference standard instrument

Instrument	Class	ID No.	Certificate No.	Due Date
1) Standard Weight 1 mg to 1 kg	E2	LB-WE-83	24-001894	11 January 2025

4. This certification is traceable to the International System of Unit maintained at : -

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited

(Instrument number 1).

5. Condition of Calibration item: Normal

6. Description of Calibrated Item :

Type and Nominal Value :	Standard Weight 100 g
Shape :	Cylindrical weight with knob
Material :	Stainless steel
Case :	Wooden Box
Comments :	Recalibration

- End of Report -

STANDARD WEIGHT 50 g

Certificate No. : 24-079773
Sample Code : 24-31841-003

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhapibarn 8 Rd., NongKham,
Sriracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited
(Calibration Laboratory)

Equipment : Standard Weight 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

Date of Receipt : 25 June 2024

Date of Calibration : 30 June 2024

Calibrated by Mr. Nawa Sisuwan

Scientist

Approved by

Signed for Director

Issue date 03 July 2024

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

The calibration result is applied only to the above calibrated item and was found accurate as shown on

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

Certificate No. : 24-079773
Sample Code : 24-31841-003

REPORT OF CALIBRATION

Equipment : Standard Weight 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

Result of Calibration :

☒ Without adjustment☐ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature (t_{ref}) of 20°C, the conventional mass is the mass of a reference weight of a density (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_0) of 1.2 kg.m⁻³

Description	Deviation	Conventional	Expanded	Maximum	ID No.
	(mg)	Mass	Uncertainty	Permissible Error	
			(mg)	± (mg)	
50 g	-0.176	49.999824 g	0.10	0.30	LABE 10/4

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.0$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M30



Certificate No. : 24-079773

Sample Code : 24-31841-003

REPORT OF CALIBRATION

Condition of Calibration

1. Ambient Conditions : Temperature $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$, Relative humidity $50\% \pm 10\%$ and air density 1.19 kg/m^3

2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Reference standard instrument

Instrument	Class	ID No.	Certificate No.	Due Date
1) Standard Weight 1 mg to 1 kg	E2	LB-WE-83	24-001894	11 January 2025

4. This certification is traceable to the International System of Unit maintained at : -

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited

(Instrument number 1).

5. Condition of Calibration item: Normal

6. Description of Calibrated Item :

Type and Nominal Value :	Standard Weight 50 g
Shape :	Cylindrical weight with knob
Material :	Stainless steel
Case :	Wooden Box
Comments :	Recalibration

- End of Report -

SOUND LEVEL METER

MODEL : NL-52A

SERIAL No. : 01120947

Cert. No. : ACL25054
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-52A / Microphone UC-59 / Preamplifier NH-25
Serial No.: 01120947 / 196478 / 15487
ID No.: -

Condition As Found : GOOD

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

Location : -
Ambient Temperature : (23.0 $\pm$ 3) °C
Pressure : (101.3 $\pm$ 3) kPa
Relative Humidity : (50.0 $\pm$ 20) %

Received Date : 06 JANUARY 2025
Calibration Date : 15 - 16 JANUARY 2025
Date of Issue : 17 JANUARY 2025

Calibrated by : Nathakorn Pisulpaisan

Approved by :

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL25054
Job No. : VC68AC0048
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL.BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL.BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL.BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KA1	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Cert. No. : ACL25054
Job No. : VC68AC0048
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.3	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL25054
Job No. : VC68AC0048
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.8

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A - weight	12.6
C - weight	19.9
Flat	25.5

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.0
1000	0.1	0.1	0.1	± 0.7
8000	0.1	0.1	0.1	+ 1.5, - 2.5

Cert. No. : ACL25054
Job No. : VC68AC0048
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	0.0	±1.0
125	0.0	0.0	0.0	±1.0
250	0.0	0.0	-0.1	±1.0
500	0.0	0.0	-0.1	±1.0
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	0.0	0.1	0.1	+ 1.5, - 2.5
16000	0.0	-1.2	-1.2	+ 2.5, -16.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.1

Cert. No. : ACL25054
Job No. : VC68AC0048
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±0.8
136.0	136.0	0.0	±0.8
135.0	135.0	0.0	±0.8
134.0	134.0	0.0	±0.8
133.0	132.9	-0.1	±0.8
132.0	131.9	-0.1	±0.8
131.0	130.9	-0.1	±0.8
129.0	129.0	0.0	±0.8
124.0	124.0	0.0	±0.8
119.0	119.0	0.0	±0.8
114.0	114.0	0.0	±0.8
109.0	109.0	0.0	±0.8
104.0	104.0	0.0	±0.8
99.0	99.0	0.0	±0.8
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
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	34.0	0.0	±0.8
30.0	30.0	0.0	±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	25.1	0.1	±0.8

Cert. No. : ACL25054
Job No. : VC68AC0048
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±0.8

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	28.9	-0.1	±0.8

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.0 ; -3.0
	2	8	117.0	117.0	0.0	1.0 ; -1.5
	200	800	134.0	134.0	0.0	±0.5
Slow	2	8	108.0	108.0	0.0	1.0 ; -3.0
	200	800	127.6	127.6	0.0	±0.5
SEL	0.25	1	99.0	98.9	-0.1	1.0 ; -3.0
	2	8	108.0	108.0	0.0	1.0 ; -1.5
	200	800	128.0	128.0	0.0	±0.5

Cert. No. : ACL25054
Job No. : VC68AC0048
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±2.0
One	133.4	133.4	0.0	±2.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±1.0
Positive half cycle	135.4	135.1	-0.3	±1.0
Negative half cycle	135.4	135.1	-0.3	±1.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.1

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95%.

End of Calibration Certificate

BAROMETER

Serial No. : N/A[S41020124]



CALIBRATION LABORATORY Co.,LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel: 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : BAROMETER
MANUFACTURER : BARIO
MODEL / TYPE : N/A
SERIAL NO. : N/A[S41020124]
CLID. NO. : 212500828
JOB CONTROL NO. : 250507051351
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : EASTERN THAI CONSULTING 1992 CO., LTD.
683 MOO 11, SUKHAPIBARN 8 RD,
NONGKHAM, SRIRACHA, CHONBURI 20230

DATE OF RECEIVED : 07 May 2025

DATE OF ISSUED : 09 May 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Sittipong Pimdee
Calibration Engineer

Approved By :

Authorized Signatory
09 May 2025



This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25051351

F3-011-05/12-23

page 1 of 3



clccalibration



CALIBRATION LABORATORY Co.,LTD.

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Tel: 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : BAROMETER
MANUFACTURER : BARIO
MODEL / TYPE : N/A
SERIAL NO. : N/A[S41020124]
DATE OF CALIBRATION : 08 May 2025

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$

Relative Humidity : $(55 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPPP-08 according to DKD-R 6-1 as calibration guidelines.

The calibration was performed by direct measurement with Reference Pressure Monitor which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Reference Pressure Monitor, Fluke Model RPM3 S/N. 829.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).

Certificate No. MP-0245-24, Due Date 11 November 2025.

UNCERTAINTY :

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of $k = 2$. It has been evaluated according to the "Calibration of Pressure Gauges (DKD-R 6-1)" which provides a level of confidence approximately 95%.

Certificate No. Q25051351

F3-011-05/12-23

page 2 of 3



clccalibration



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CALIBRATION LABORATORY Co., LTD.

2/10-11,14 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel: 02-578 0353-4 Fax: 02-578-2672 www.ccllaboratory.com E-mail: sale@ccllaboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The DUC was exercised by applying a known pressure from its zero to full scale 1 times. Then 2 series of known gauge pressure were applied. The STD reading were recorded and the means value were reported in the table below.

CALIBRATION DATA

CORRECTION OF PRESSURE

DUC Test point (hPa)	STD Reading (hPa)		Correction (hPa)	
	Up	Down	Up	Down
990	990.7	990.7	+0.7	+0.7
1000	1000.7	1000.8	+0.7	+0.8
1010	1010.8	1010.8	+0.8	+0.8
1020	1020.8	1020.9	+0.8	+0.9
1030	1030.9	1030.9	+0.9	+0.9

Uncertainty of measurement ± 0.7 hPa

Transmitting fluid : Air.

Note: The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 44 of 68

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q25051351

F3-011-05/12-23



©cclcalibration

GAS CHROMATOGRAPH

MODEL : GC-2010 Plus AF

S/N : C12095200986

SHIMADZU GAS CHROMATOGRAPH SYSTEM
GC-2010Plus Series

Operational Qualification

Operational Qualification Report

System Name _____

System ID No. Gas Chromatograph LABE 04/3

Installation Site Instrument Room GL/IC

The undersigned performer reports that the Operational Qualification Protocol has been successfully completed for the system stated above.

• Performer

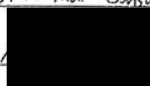
Signature		Date
Print	<u>Nutdanai Absantua</u>	<u>14 / 08 / 2025</u>
Title	<u>Service Engineer</u>	
Company	<u>Bora Scientific Co., Ltd</u>	

The undersigned reviewer and manager report that the performer has completed the Operational Qualification Protocol successfully.

• Reviewer

Signature	<u>ร.ร. ฐ. ฐ.</u>	Date
Print	<u>Pannapong Bunnayras</u>	<u>14 / 08 / 2025</u>
Title	<u>Scientist</u>	
Company	<u>Eastern Thai Consulting 1992 Co., Ltd.</u>	

• Manager

Signature		Date
Print	<u>Nunnaphat Bannakod</u>	<u>14 / 08 / 2025</u>
Title	<u>HS</u>	
Company	<u>Eastern Thai Consulting 1992 Co., Ltd.</u>	

3. Operational Qualification Record

If the unit is included in the system to be inspected, place a checkmark in the "Applicable" box. If the unit is not included in the system, place a checkmark in the "Not Applicable" box. Enter a diagonal line in the Pass/Fail checkbox for "Not applicable" items.

Here, inspection results are recorded along the procedure of Chapter 4 in Operational Qualification Protocol.

3-1 Gas Chromatograph GC-2010Plus ☒ Applicable ☐ Not Applicable

Component ID		Model Name		GC-2010Plus AF				
Serial Number (S/N)		LAB 04/3		C 1 2 0 9 5 2 0 0 9 8 6				
No.	Item	Criteria		Results	Pass	Fail		
1	Display, LED test	Verify the display and LED operation.	All LEDs light. Screen contrast adjustment is possible.	LED Display	☒	☐		
2	Standard self-diagnostic test	Verify the status and operation of all parts.	"Good" displayed as the result of the self-diagnostic test.	Good	☒	☐		
3	Firmware version check	Verify the program version.	Version number and build number are displayed. The version No. and build No. matches the controlled version number.	Ver. Controlled Ver. No.	Version: 2.1040 Build No.: 268 Version: 2.1040 Build No.: 268	☒	☐	
4	Temperature test	Verify that temperature control is normal.	TEMP LED lights green. Displayed actual values agree to the set values within $\pm 1.0^{\circ}\text{C}$.	Temperature controller (Name) Set value Measured value	☒	☐		
			☒ COL ☒ INJ1 ☐ INJ2 ☒ DET1 ☐ DET2 ☐ AUX3 ☐ AUX4 ☐ AUX5	Column SPL 1 c FTD 1 	50.0°C 50.0°C c °C 50.0°C °C °C °C °C °C	50.0°C 50.0°C °C 50.0°C °C °C °C °C °C	☒	☐
5	Column inlet pressure test	Verify the accuracy of the column inlet pressure.	Inspection pressure gauge reading ☒ 10.0 ± 3.0 kPa Inspection pressure gauge reading ☒ 20.0 ± 20.0 kPa Inspection pressure gauge reading ☒ 50.0 ± 35.0 kPa	Pressure gauge correction value Pressure gauge reading Post-correction reading Pressure gauge correction value Pressure gauge reading Post-correction reading Pressure gauge correction value Pressure gauge reading Post-correction reading	0.0 kPa 9.6 kPa 9.6 kPa 0.3 kPa 199.7 kPa 199.9 kPa 0.6 kPa 499.2 kPa 499.4 kPa	☒	☐	

Performer (signature): _____ Date: 14 / 08 / 2025

Reviewer (signature): _____ Date: 14 / 8 / 2025

Operational Qualification

Operational Qualification Record

No.	Item	Criteria	Results	Pass	Fail
6	Pressure program test	Verify that the pressure program operates normally.	Monitored pressure 6 minutes after start 250.0 ± 5.0 kPa Inspection pressure gauge reading 8 minutes after start 250.0 ± 20.0 kPa	2 4 3.4 kPa 2 4 7.5 kPa	☒ ☐
7	Flowrate test	Verify the accuracy of the full-flow and septum purging	Septum purge vent measured flow rate 3.0 ± 1.0 mL/min Total of septum purge and split vent flow rate values 10.0 ± 3.0 mL/min Total of septum purge and split vent flow rate values 200 ± 20 mL/min Total of septum purge and split vent flow rate values 300 ± 28 mL/min (Carrier gas: N ₂) Total of septum purge and split vent flow rate values 500 ± 35 mL/min (Carrier gas: He)	Septum purge 3.0 mL/min Split vent 2.2 mL/min Total 10.2 mL/min Split vent 19.8 mL/min Total 201 mL/min Split vent 49.5 mL/min Total 49.8 mL/min	☒ ☐
8	Column oven test	Verify the accuracy of the column oven temperature.	Inspection temperature sensor displayed value 150.0 ± 3.2 °C Inspection temperature sensor displayed value 150.0 ± 4.2 °C Inspection temperature sensor displayed value 280.0 ± 5.5 °C 280 ± 4 °C	Temp. correction value - 0.1 °C Temp. sensor reading 4 9.1 °C Corrected temp. value 4 9.2 °C Temp. correction value - 0.2 °C Temp. sensor reading 1 5 0.9 °C Corrected temp. value 1 5 0.9 °C Temp. correction value 0.9 °C Temp. sensor reading 2 8 1.3 °C Corrected temp. value 2 8 2.2 °C	☒ ☐
9	Temperature program test	Verify that the column temperature program operates normally.	Monitored temperature 6 minutes after start 200 ± 1 °C Inspection temperature reading 8 minutes after start 200.0 ± 4.7 °C Using a temperature sensor with 1 °C minimum display increment 200 ± 3 °C	2 0 0 °C 2 0 1.4 °C °C	☒ ☐
10	Sensitivity test	Verify the detector sensitivity.	FID (☒ Applicable ☐ Not Applicable) Calculated S value Inj. unit () Make-up gas: N ₂ 10.0 × 10 ⁻³ C/g min. Make-up gas: He 7.00 × 10 ⁻³ C/g min. TCD (☐ Applicable ☒ Not Applicable) Calculated S value Inj. unit () 4.00 × 10 ⁻³ mV·mL/mg min.	C ₁₀ AREA value 45,781 Calculated S value × 10 ⁻³ C/g C ₁₀ AREA value μV·s Flowrate at vent mL/min Calculated S value × 10 ⁻³ mV·mL/mg	☒ ☐

Performer (signature):

Date: 14 / 08 / 2025

Reviewer (signature):

Date: 14 / 08 / 2025

Operational Qualification

Operational Qualification Record

3-2 AOC-20i Auto Injector

☒ Applicable ☐ Not Applicable☒ Single ☐ Dual system, main injector

Component ID		Model Name		AOC-20i	
Serial No. (S/N)		LABE 0413		2 1 2 1 2 5 4 1 0 8 0 9	
No.	Item	Criteria	Results	Pass	Fail
1	Display, LED test	Verify the display and LED operation.	All LEDs light, except decimal point.	☒	☐
2	ROM, RAM self diagnosis	Verify that ROM and RAM memory operates normally.	Display shows "000"	Display: 000	☒
3	Firmware version check	Verify the program version.	Version number is displayed. The version number matches the controlled version number.	Version No. 3.4 Controlled Ver. No. 3.4	☒
4	Basic operation test	Verify that the auto injector basic operation is correct.	Sample injected into the GC and GC operation starts.		☒

☒ Not Applicable ☐ Dual system, sub injector

Component ID		Model Name		AOC-20i	
Serial No. (S/N)					
No.	Item	Criteria	Results	Pass	Fail
1	Display, LED test	Verify the display and LED operation.	All LEDs light, except decimal point.	☐	☐
2	ROM, RAM self diagnosis	Verify that ROM and RAM memory operates normally.	Display shows "000"	Display:	☐
3	Firmware version check	Verify the program version.	Version number is displayed. The version number matches the controlled version number.	Version No. Controlled Ver. No.	☐
4	Basic operation test	Verify that the auto injector basic operation is correct.	Sample No.1 transferred to the main injector; sample No. 2 transferred to the sub-injector. Sub-injector injects into the GC simultaneously with the main AOC.		☐

Performer (signature):

Date: 14 / 08 / 2025

Reviewer (signature):

Date: 14 / 08 / 2025

3-3 AOC-20s Auto Sampler

☒ Applicable ☐ Not Applicable

Model Name		AOC-20s			
Component ID		LABE 04/3			
Serial No. (S/N)		2 1 2 1 2 5 4 1 0 8 0 9			
No.	Item	Criteria	Results	Pass	Fail
1	Initial operation test	Verify that the auto sampler basic operation is correct.	LED lights green, not red.	☒	☐
2	Firmware version check	Verify the program version.	Version number is displayed.	Version No. 3.5	☒
		The version number matches the controlled version number.	Controlled Ver. No. 3.5	☒	☐

Performer (signature): _____ Date: 14 / 08 / 2025
Reviewer (signature): _____ Date: 14 / 8 / 2025

3-4 SPL-2010Plus Split/Splitless Injection Unit

☐ Applicable ☒ Not Applicable

Model Name		SPL-2010Plus			
Component ID					
Serial No. (S/N)					
No.	Item	Criteria	Results	Pass	Fail
1	Column inlet pressure test	Verify the accuracy of the column inlet pressure. Inspection pressure gauge reading $\square 10.0 \pm 3.0 \text{ kPa}$ Pressure gauge correction value Pressure gauge reading Post-correction reading Inspection pressure gauge reading $\square 200.0 \pm 20.0 \text{ kPa}$ Pressure gauge correction value Pressure gauge reading Post-correction reading Inspection pressure gauge reading $\square 500.0 \pm 35.0 \text{ kPa}$ Pressure gauge correction value Pressure gauge reading Post-correction reading	kPa kPa kPa kPa kPa kPa kPa kPa	☐	☐
2	Pressure program test	Verify that the pressure program operates normally. Monitored pressure 6 minutes after start $250.0 \pm 5.0 \text{ kPa}$ Inspection pressure gauge reading 8 minutes after start $250.0 \pm 20.0 \text{ kPa}$	kPa kPa	☐	☐
3	Flowrate test	Verify the accuracy of the full-flow and septum purging. Septum purge vent measured flow rate $3.0 \pm 1.0 \text{ mL/min}$ $\square$ Total of septum purge and split vent flow rate values $10.0 \pm 3.0 \text{ mL/min}$ $\square$ Total of septum purge and split vent flow rate values $200 \pm 20 \text{ mL/min}$ $\square$ Total of septum purge and split vent flow rate values $300 \pm 28 \text{ mL/min}$ (Carrier gas: N_2) $\square$ Total of septum purge and split vent flow rate values $500 \pm 35 \text{ mL/min}$ (Carrier gas: He)	Septum purge mL/min Split vent mL/min Total mL/min Split vent mL/min Total mL/min Split vent mL/min Total mL/min	☐	☐

Performer (signature): _____ Date: 14 / 08 / 2025
Reviewer (signature): _____ Date: 14 / 8 / 2025

Primary Flow Calibrator

Serial No. : 110619 , 207510



CALIBRATION LABORATORY CO., LTD.

2/10-11 14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel: 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : FLOW METER
MANUFACTURER : BIOS INTERNATIONAL
MODEL / TYPE : DEFENDER 510-L
SERIAL NO. : 110619
CLID. NO. : 212500238
JOB CONTROL NO. : 250128010260
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

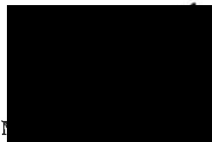
CUSTOMER : EASTERN THAI CONSULTING 1992 CO., LTD.
683 MOO 11, SUKHAPIBARN 8 RD,
NONGKHAM, SRIRACHA, CHONBURI 20230

DATE OF RECEIVED : 28 January 2025

DATE OF ISSUED : 31 January 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Supphakit Sakuntaharn
Calibration Engineer



Approved By :
Authorized Signatory
31 January 2025

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25010260

F3-011-05/12-23

page 1 of 3



quick calibration



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Tel: 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : FLOW METER
MANUFACTURER : BIOS INTERNATIONAL
MODEL / TYPE : DEFENDER 510-L
SERIAL NO. : 110619
DATE OF CALIBRATION : 29 January 2025

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$

Relative Humidity : $(55 \pm 10) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPPF-03. The calibration was performed by comparison with Gas Flow Meter which refers to the standard condition of 101.325 kPa and 0 $^\circ\text{C}$.

REFERENCE STANDARD USED :

Gas Flow Meter, Alicat Scientific Model M-500SCCM-D-DB15 S/N. 261329.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Chell Instrument Ltd.

Certificate No. N037063, Due Date 26 February 2025.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q25010260

F3-011-05/12-23



quick calibration



CALIBRATION LABORATORY CO., LTD.

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Tel: 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring flow meter.

CALIBRATION DATA

FLOW METER RESULT

Nominal Value (cc/min)	STD Applied (cc/min)	DUC Reading (cc/min)	Correction (cc/min)	Uncertainty $\pm$ (cc/min)
0	0.00	0.00	0.00	-
50	50.00	48.75	+1.25	2.10
100	100.00	97.66	+2.34	2.10
200	200.00	195.22	+4.78	2.10
300	300.00	292.56	+7.44	2.10
400	400.00	390.82	+9.18	2.10
500	500.00	490.04	+9.96	2.10

Technical Note. Media of Gas : Air

Setting Temperature 0 ° C ; Pressure 101.3 kPa

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 014 Page 49 of 68

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q25010260

F3-011-05/12-23



@clc.calibration



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Tel 02-578-0353-4 Fax 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : FLOW METER
MANUFACTURER : MESALABS
MODEL / TYPE : DEFENDER 510-M
SERIAL NO. : 207510
CLID. NO. : 212500237
JOB CONTROL NO. : 250128010259
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : EASTERN THAI CONSULTING 1992 CO., LTD.
683 MOO 11, SUKHAPIBARN 8 RD,
NONGKHAM, SRIRACHA, CHONBURI 20230

DATE OF RECEIVED : 28 January 2025

DATE OF ISSUED : 31 January 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Supphakit Sakuntaharn
Calibration Engineer



Approved By :
Authorized Signatory
31 January 2025

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25010259

F3-011-05/12-23

page 1 of 3



CALIBRATION LABORATORY Co.,LTD.

2/10-11 14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel 02-578-0353-4 Fax 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : FLOW METER
MANUFACTURER : MESALABS
MODEL / TYPE : DEFENDER 510-M
SERIAL NO. : 207510
DATE OF CALIBRATION : 29 January 2025

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$

Relative Humidity : $(55 \pm 10) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPFF-03. The calibration was performed by comparison with Gas Flow Meter which refers to the standard condition of 101.325 kPa and $0 ^\circ\text{C}$.

REFERENCE STANDARD USED :

Gas Flow Meter, Alicat Scientific Model M-500SCCM-D-DB15 S/N, 261329.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Ceil Instrument Ltd.

Certificate No. N037063, Due Date 26 February 2025.

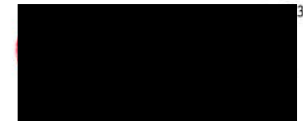
UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q25010259

F3-011-05/12-23





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Tel: 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring flow meter.

CALIBRATION DATA

FLOW METER RESULT

Nominal Value (cc/min)	STD Applied (cc/min)	DUC Reading (cc/min)	Correction (cc/min)	Uncertainty ± (cc/min)
0	0.00	0.00	0.00	-
50	50.00	45.81	+4.19	2.10
100	100.00	99.10	+0.90	2.10
200	200.00	198.03	+1.97	2.10
300	300.00	298.30	+1.70	2.10
400	400.00	396.50	+3.50	2.10
500	500.00	495.31	+4.69	2.10

Technical Note. Media of Gas : Air

Setting Temperature 0 ° C ; Pressure 101.3 kPa

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 014 Page 49 of 68

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q25010259

F3-011-05/12-23



SOUND LEVEL METER

MODEL : NL-42A

SERIAL No. : 00322744

Certificate of Calibration

Certificate No.: S2502-0998

Customer: EASTERN THAI CONSULTING 1992 CO.,LTD.
683 Moo 11, Sukhapibarn 8 Rd,
Nongkham, Sriracha, Chonburi 20230

Date of calibration: 2025-02-27
Date of issue: 2025-02-28
Instrument calibrated: Sound Level Meter
Manufacturer: Rion
Model: NL-42A (Meter), N11-24 (Preamplifier), UC-52 (Microphone)
Serial number: 00322744 (Meter), 15476 (Preamplifier), 196467 (Microphone)

Calibration and verification performed:

Acoustical levels are stated relative to 20 μ Pa. Other dB levels are relative values.

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which with the reported effective degree of freedom corresponds to coverage probability of approximately 95%.

The sound level meter instrument submitted for periodic testing following the periodic tests of IEC 61672-3 : 2013.

Preconditioning:

The equipment was preconditioned for more than 16 hours at the specified calibration temperature and humidity.

Instruments and Program:

A complete list of instruments, hardware, and software, that has been used for this calibration is separately available from the calibration laboratory.

Equipment standards used:

- Sound measuring equipment calibration unit 483B S/N31083
- Digital multimeter Keysight S/N HP34401A
- Ultra-low distortion function generator Stanford SRS DS360 S/N123625
- Acoustic sound calibrator class 1 Nor1256 S/N125626542
- Combined Pressure, Humidity and Temperature Transmitter PTU300 S/NM2520568

Traceability

The measured values are traceable to following the ISO/IEC 17025 laboratories:

Sound Pressure Level: EEI, Thailand

Reference Pressure, Humidity and Temperature: TPA, Thailand

Voltage: TPA, Thailand

Frequency: TPA, Thailand

This certificate of calibration is issued by Acoustic Laboratory Thailand (ALT). It also states that the laboratory has a satisfactory quality assurance system and traceability to accredited or national calibration laboratories. This certificate may not be reproduced other than in full.

Certificate No.: S2502-0998

Environmental conditions: Pressure: Temperature: Relative humidity:
Reference conditions: 101.325 kPa 23.0 °C 50 %RH
Measurement conditions: 101.28 $\pm$ 0.10 kPa 22.6 $\pm$ 1.0 °C 51.3 $\pm$ 2.0 %RH

1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)		Deviated value (dB)	Acceptance limit (dB)
	Before adjust	After adjust		
94.0	94.3	94.0	0.0	$\pm$ 1.0

Note: Indication at the checked calibration frequency was adjusted to 94.0 dB by the sound calibrator

2. Self-generated noise

Frequency weightings	Measured value (dB)
A-Weighting	12.1
C-Weighting	18.3
Z-Weighting	24.0

3. Electrical signal test of frequency weighting at 91 dB

Nominal Frequency (Hz)	Deviation from various frequency weighting response curve			
	A-Weighting (dB)	C-Weighting (dB)	Z-Weighting (dB)	Acceptance limit (dB)
63	0.0	-0.1	0.0	$\pm$ 2.0
125	0.0	0.0	0.0	$\pm$ 1.5
250	0.0	0.0	0.0	$\pm$ 1.5
500	0.0	0.0	0.0	$\pm$ 1.5
1000	0.0	0.0	0.0	$\pm$ 1.0
2000	-0.1	-0.2	-0.2	$\pm$ 2.0
4000	-0.3	-0.4	-0.4	$\pm$ 3.0
8000	0.1	0.0	-0.1	$\pm$ 5.0

Date of calibration : 2025-02-27
Date of issue : 2025-02-28

4. Frequency and time weighting at 1 kHz

4.1 Frequency weighting at 1 kHz

Frequency weightings	Measured value (dB)	Deviated value (dB)	Acceptance limit (dB)
A	94.0	0.0	±0.3
C	94.0	0.0	±0.3
Z	94.0	0.0	±0.3

4.2 Time weighting at 1 kHz

Time weightings	Measured value (dB)	Deviated value (dB)	Acceptance limit (dB)
Fast	94.0	0.0	±0.3
Slow	94.0	0.0	±0.3
Leq	94.0	0.0	±0.3

5. Long term stability

Time interval (mm:ss)	Start level (dB)	Stop level (dB)	Deviated value (dB)	Acceptance limit (dB)
28:13	94.0	94.0	0.0	±0.3

Date of calibration : 2025-02-27
Date of issue : 2025-02-28

6. Level linearity on the reference level range

6.1 Measured at 31.5 Hz

Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit (dB)
84.0	84.0	0.0	±1.1
89.0	89.0	0.0	±1.1
92.6	92.5	-0.1	±1.1
93.6	93.6	0.0	±1.1
94.6	94.5	-0.1	±1.1
95.6	95.6	0.0	±1.1
96.6	96.6	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.1	0.1	±1.1
44.0	43.9	-0.1	±1.1
40.0	39.9	-0.1	±1.1
39.0	38.9	-0.1	±1.1
38.0	37.9	-0.1	±1.1
37.0	36.9	-0.1	±1.1
36.0	35.9	-0.1	±1.1

Date of calibration : 2025-02-27
Date of issue : 2025-02-28

6.2 Measured at 1 kHz

Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit (dB)
94.0	94.0	0.0	±1.1
99.0	99.0	0.0	±1.1
104.0	104.0	0.0	±1.1
109.0	109.0	0.0	±1.1
114.0	114.0	0.0	±1.1
119.0	119.0	0.0	±1.1
124.0	124.0	0.0	±1.1
129.0	129.0	0.0	±1.1
132.0	132.0	0.0	±1.1
133.0	133.0	0.0	±1.1
134.0	134.0	0.0	±1.1
135.0	135.0	0.0	±1.1
136.0	136.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
40.0	40.0	0.0	±1.1
39.0	39.0	0.0	±1.1
38.0	38.0	0.0	±1.1
37.0	37.0	0.0	±1.1
36.0	36.1	0.1	±1.1

Date of calibration : 2025-02-27
Date of issue : 2025-02-28

6.3 Measured at 8 kHz

Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit (dB)
94.0	94.0	0.0	±1.1
99.0	99.0	0.0	±1.1
104.0	104.0	0.0	±1.1
109.0	109.0	0.0	±1.1
114.0	114.0	0.0	±1.1
119.0	119.0	0.0	±1.1
124.0	124.0	0.0	±1.1
129.0	129.0	0.0	±1.1
130.9	130.9	0.0	±1.1
131.9	131.9	0.0	±1.1
132.9	132.9	0.0	±1.1
133.9	133.9	0.0	±1.1
134.9	134.9	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	78.9	-0.1	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
40.0	40.0	0.0	±1.1
39.0	39.0	0.0	±1.1
38.0	38.0	0.0	±1.1
37.0	37.0	0.0	±1.1
36.0	36.0	0.0	±1.1

Date of calibration : 2025-02-27
Date of issue : 2025-02-28

7. Tone burst response

Time weightings	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit (dB)
Fast	200	132.9	-0.1	±1.0
	2	115.9	-0.1	+1.0,-2.5
	0.25	106.9	-0.1	+1.5,-5.0
Slow	200	126.5	-0.1	±1.0
	2	106.9	-0.1	+1.0,-5.0
SEL	200	126.9	-0.1	±1.0
	2	106.9	-0.1	+1.0,-2.5
	0.25	97.9	-0.1	+1.5,-5.0

8. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit (dB)
Complete cycle	128.4	127.4	-1.0	±3.0
Positive half cycle	130.4	130.2	-0.2	±2.0
Negative half cycle	130.4	130.2	-0.2	±2.0

9. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limit (dB)
Positive one half cycle	Negative one half cycle		
139.1	139.1	0.0	±1.5

10. High level stability

Initial level (dB)	Final level (dB)	Deviated value (dB)	Acceptance limit (dB)
135.0	135.0	0.0	±0.3

Date of calibration : 2025-02-27
Date of issue : 2025-02-28

Uncertainty of measurement

Parameters	Uncertainty
1. Indication at the calibration check frequency	0.12 dB
2. Self-generated noise	
- Frequency Weighting A	0.060 dB
- Frequency Weighting C	0.060 dB
- Frequency Weighting Z	0.060 dB
3. Electrical signal test of frequency weighting	0.13 dB
4. Frequency and time weightings at 1 kHz	0.13 dB
5. Long term stability test	0.10 dB
6. Level linearity on the reference level range	0.14 dB
7. Tone burst response	0.14 dB
8. Peak C sound level	0.13 dB
9. Overload indication	0.13 dB
10. High level stability test	0.10 dB

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%

Remark : The acoustical signal test of frequency weighting at 125Hz, 1kHz, and 8kHz is not included, along with correction values for environmental conditions in a free-field or diffuse field, and the effect of reflection and diffraction on the measurement microphone and the sound level meter.

Calibrated By
(Name)

Approved By :

Date of calibration : 2025-02-27

Date of issue : 2025-02-28

----- End of Calibration Certificate -----

SOUND LEVEL METER

MODEL : NL-42A

SERIAL No. : 00322745



Cert. No. : ACL25043

Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00322745 / 196468 / 15477
ID No.: -

Condition As Found : GOOD

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 06 JANUARY 2025
Calibration Date : 15 - 16 JANUARY 2025
Date of Issue : 17 JANUARY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by :



This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard,
other than in full, except with the prior written approval of the head of Calibration Laboratory.



Cert. No. : ACL25043

Job No. : VC68AC0048

Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference
Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

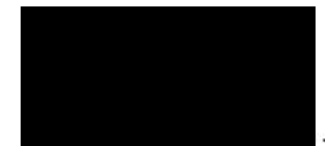
<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL.BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL.BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL.BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).



Cert. No. : ACL25043
Job No. : VC68AC0048
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL25043
Job No. : VC68AC0048
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Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.4

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A - weight	12.6
C - weight	19.2
Flat	24.7

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	0.9	0.9	0.9	± 5.0

Cert. No. : ACL25043
Job No. : VC68AC0048
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

Cert. No. : ACL25043
Job No. : VC68AC0048
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	78.9	-0.1	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	53.9	-0.1	± 1.1
49.0	48.9	-0.1	± 1.1
44.0	43.9	-0.1	± 1.1
39.0	38.9	-0.1	± 1.1
34.0	33.9	-0.1	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

Cert. No. : ACL25043
Job No. : VC68AC0048
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	28.9	-0.1	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

Cert. No. : ACL25043
Job No. : VC68AC0048
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{opeak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

SOUND LEVEL METER

MODEL : NL-42A

SERIAL No. : 00322750

Cert. No. : ACL25046
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00322750 / 196473 / 15482
ID No.: -

Condition As Found : GOOD

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 06 JANUARY 2025
Calibration Date : 15 - 16 JANUARY 2025
Date of Issue : 17 JANUARY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by :

Calibration Procedure : CP-AC-01
Cert. No. : ACL25046
Job No. : VC68AC0048
Pages : 2 of 8

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL.BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL.BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL.BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may
other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL25043

Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00322745 / 196468 / 15477
ID No.: -

Condition As Found : GOOD

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 06 JANUARY 2025
Calibration Date : 15 - 16 JANUARY 2025
Date of Issue : 17 JANUARY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by :

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, not
other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL25043

Job No. : VC68AC0048

Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference
Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL.BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL.BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL.BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Cert. No. : ACL25043
Job No. : VC68AC0048
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL25043
Job No. : VC68AC0048
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.4

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A - weight	12.6
C - weight	19.2
Flat	24.7

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.3	0.3	0.3	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	0.9	0.9	0.9	± 5.0

Cert. No. : ACL25043
Job No. : VC68AC0048
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

Cert. No. : ACL25043
Job No. : VC68AC0048
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	78.9	-0.1	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	53.9	-0.1	± 1.1
49.0	48.9	-0.1	± 1.1
44.0	43.9	-0.1	± 1.1
39.0	38.9	-0.1	± 1.1
34.0	33.9	-0.1	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

Cert. No. : ACL25043
Job No. : VC68AC0048
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	28.9	-0.1	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

Cert. No. : ACL25043
Job No. : VC68AC0048
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{opeak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

Cert. No. : ACL25046
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00322750 / 196473 / 15482
ID No.: -

Condition As Found : GOOD

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 06 JANUARY 2025
Calibration Date : 15 - 16 JANUARY 2025
Date of Issue : 17 JANUARY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by :

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may
other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL25046
Job No. : VC68AC0048
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference
Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
Waveform Generator	33210A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL.BP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL.BP 20/0267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL.BP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Cert. No. : ACL25046
Job No. : VC68AC0048
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL25046
Job No. : VC68AC0048
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.8

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A - weight	12.6
C - weight	17.4
Flat	23.4

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	± 1.5
1000	0.2	0.2	0.2	± 1.0
8000	0.6	0.6	0.6	± 5.0

Cert. No. : ACL25046
Job No. : VC68AC0048
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	-0.1	±2.0
125	0.0	0.0	-0.1	±1.5
250	-0.1	-0.1	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.0	0.0	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

Cert. No. : ACL25046
Job No. : VC68AC0048
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.1	0.1	± 1.1
134.0	134.1	0.1	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.1	0.1	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.1	0.1	± 1.1
114.0	114.1	0.1	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.1	0.1	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	30.0	0.0	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.0	0.0	± 1.1
27.0	27.1	0.1	± 1.1
26.0	26.1	0.1	± 1.1
25.0	25.1	0.1	± 1.1

Cert. No. : ACL25046
Job No. : VC68AC0048
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	108.0	0.0	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.1	0.1	1.5 ; -5.0
	200	800	127.6	127.7	0.1	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

Cert. No. : ACL25046
Job No. : VC68AC0048
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95%.

End of Calibration Certificate

SOUND LEVEL METER

MODEL : NL-42A

SERIAL No. : 00322752

Cert. No. : ACL25266

Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00322752 / 196475 / 15484
ID No.: -

Condition As Found : GOOD

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
SAHA GROUP INDUSTRIAL PARK, 683 MOO 11,
NONGKHAM, SIRACHA, CHONBURI 20230 THAILAND.

Location : -
Ambient Temperature : (23.0 $\pm$ 3) °C
Pressure : (101.3 $\pm$ 3) kPa
Relative Humidity : (50.0 $\pm$ 20) %

Received Date : 26 JUNE 2025
Calibration Date : 08 JULY 2025
Date of Issue : 09 JULY 2025

Calibrated by : Nathakorn Pisutpaisan

Approved by :

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard
other than in full, except with the prior written approval of the head of Calibration Labo

Cert. No. : ACL25266

Job No. : VC68AC0096

Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference
Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0011-25	11-FEB-26
Waveform Generator	33511B	MY52302742	EF-0012-25	11-FEB-26
Digital Multimeter	33461A	MY53220104	EEL.BP 24/0268	22-APR-26
Digital Multimeter	33461A	MY53220076	EEL.BP 23/0268	22-APR-26
Digital Multimeter	34461A	MY60024273	CA2025120EA	18-MAR-26
Programmable Attenuator	MAT-1070	62100114	EF-0006-25	11-FEB-26
Condenser Microphone	4180	2977900	AA-1002-25	19-FEB-26
Measuring Amplifier	NA-42KAI	34560495	AA-3002-25	19-FEB-26

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

3.3 Electrical And Electronics Institute (EEI).

Cert. No. : ACL25266
Job No. : VC68AC009
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL25266
Job No. : VC68AC0096
Page : 4 of 8

Result of calibration :**1. Absolute sensitivity**

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	93.9	0.0	±0.3

2. Self-generated noise**2.1 Normal test**

Measured Value (dB)
17.50000003

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A - weight	13.6
C - weight	20.1
Flat	25.8

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	-0.3	-0.3	-0.3	± 1.5
1000	-0.3	-0.3	-0.3	± 1.0
8000	0.8	0.9	0.9	±5.0

Cert. No. : ACL25266
Job No. : VC68AC009
Pages : 5 of 8

Cert. No. : ACL25266
Job No. : VC68AC009
Pages : 6 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	-0.1	±2.0
125	0.0	0.0	-0.1	±1.5
250	0.0	0.0	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	132.9	-0.1	± 1.1
132.0	131.9	-0.1	± 1.1
131.0	130.9	-0.1	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.1	0.1	± 1.1
30.0	30.1	0.1	± 1.1
29.0	29.2	0.2	± 1.1
28.0	28.2	0.2	± 1.1
27.0	27.3	0.3	± 1.1
26.0	26.3	0.3	± 1.1
25.0	25.4	0.4	± 1.1

Cert. No. : ACL25266
Job No. : VC68AC009
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.1	0.1	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.0 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

Cert. No. : ACL25266
Job No. : VC68AC009
Pages : 8 of 8

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

NOISE DOSI METER

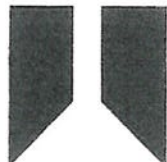
MODEL : CR:110A

SERIAL No. : CA8886

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 31 January 2025 CERTIFICATE NUMBER 231821



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
N.Smith
Electronically signed:

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc Notes: Eastern Thai Consulting 1992 Co., Ltd
Model: CR:110A 683 Moo 11,
Serial number: CA8886 Sukaphibai 8 Rd.,
Firmware version: 5.4 Nongkham,
Sriracha,

Test summary

Date of calibration: 30 January 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001613
Attenuator	Cirrus Research	ZE:952	64370
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	100498

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number:

231821

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 100.92 kPa Temperature: 20.8 °C Humidity: 34.1 %
After Pressure: 100.96 kPa Temperature: 20.9 °C Humidity: 34.3 %

Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CA8887

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 31 January 2025 CERTIFICATE NUMBER 231823



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
N.Smith
Electronically signed:

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CA8887
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co., Ltd
683 Moo 11,
Sukaphibai 8 Rd.,
Nongkham,
Sriracha,

Test summary

Date of calibration: 29 January 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDC7R0237
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	79620

Notes

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CERTIFICATE OF CALIBRATION

Certificate Number:

231823

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 99.41 kPa Temperature: 22.0 °C Humidity: 38.6 %
After Pressure: 99.41 kPa Temperature: 22.3 °C Humidity: 38.8 %

Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CA8888

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 31 January 2025 CERTIFICATE NUMBER 231838



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
N.Smith
Electronically signed:

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc Notes: Eastern Thai Consulting 1992 Co., Ltd
Model: CR:110A 683 Moo 11,
Serial number: CA8888 Sukaphibai 8 Rd.,
Firmware version: 5.4 Nongkham,
Sriracha,

Test summary

Date of calibration: 29 January 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.
The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDC7R0237
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	79620

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number:
231838

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 99.43 kPa Temperature: 22.3 °C Humidity: 39.0 %
After Pressure: 99.45 kPa Temperature: 22.3 °C Humidity: 39.5 %

Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CB0640

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 31 January 2025 CERTIFICATE NUMBER 231837



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory

N.Smith

Electronically signed:

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc

Model: CR:110A

Serial number: CB0640

Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co., Ltd
683 Moo 11,
Sukaphibai 8 Rd.,
Nongkham,
Sriracha,

Test summary

Date of calibration: 30 January 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDC7R0237
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	79620

Notes

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CERTIFICATE OF CALIBRATION

Certificate Number:

231837

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 101.17 kPa Temperature: 22.5 °C Humidity: 36.3 %

After Pressure: 101.18 kPa Temperature: 22.5 °C Humidity: 36.6 %

Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CB0644

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 31 January 2025 CERTIFICATE NUMBER 231828



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
N. Smith
Electronically signed:

Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CB0644
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co., Ltd
683 Moo 11,
Sukaphibai 8 Rd.,
Nongkham,
Sriracha,

Test summary

Date of calibration: 30 January 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001613
Attenuator	Cirrus Research	ZE:952	64370
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	100498

Notes

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CERTIFICATE OF CALIBRATION

Certificate Number:

231828

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 100.98 kPa Temperature: 21.0 °C Humidity: 35.4 %
After Pressure: 101.03 kPa Temperature: 21.4 °C Humidity: 35.5 %

Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CB0954

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 31 January 2025 CERTIFICATE NUMBER 231831

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
N.Smith

Electronically signed:

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc Notes: Eastern Thai Consulting 1992 Co., Ltd
Model: CR:110A 683 Moo 11,
Serial number: CB0954 Sukaphibai 8 Rd.,
Firmware version: 5.4 Nongkham,
Sriracha,

Test summary

Date of calibration: 29 January 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDC7R0237
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	79620

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number:

231831

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 99.46 kPa Temperature: 22.3 °C Humidity: 39.6 %
After Pressure: 99.51 kPa Temperature: 22.4 °C Humidity: 40.2 %

Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

NOISE DOSI METER

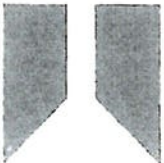
MODEL : CR:110A

SERIAL No. : CB0955

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 31 January 2025 CERTIFICATE NUMBER 231830



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
N.Smith
Electronically signed:



Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CB0955
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co., Ltd
683 Moo 11,
Sukaphibai 8 Rd.,
Nongkham,
Sriracha,

Test summary

Date of calibration: 29 January 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDC7R0237
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	79620

Notes

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CERTIFICATE OF CALIBRATION

Certificate Number:

231830

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test.

Before Pressure: 99.58 kPa Temperature: 22.3 °C Humidity: 40.4 %
After Pressure: 99.62 kPa Temperature: 22.3 °C Humidity: 40.9 %

Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

NOISE DOSI METER

MODEL : CR:110A

SERIAL No. : CB0958

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 31 January 2025 CERTIFICATE NUMBER 231829

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
N.Smith
Electronically signed:

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CB0958
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co., Ltd
683 Moo 11,
Sukaphibai 8 Rd.,
Nongkham,
Sriracha,

Test summary

Date of calibration: 30 January 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDC7R0237
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	79620

Notes

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CERTIFICATE OF CALIBRATION

Certificate Number:

231829

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test

Before Pressure: 101,16 kPa Temperature: 22,2 °C Humidity: 36,6 %
After Pressure: 101,17 kPa Temperature: 22,3 °C Humidity: 36,7 %

Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

NOISE DOSI METER

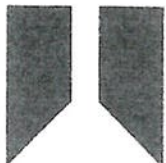
MODEL : CR:110A

SERIAL No. : CB1365

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 31 January 2025 CERTIFICATE NUMBER 231836



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
N.Smith
Electronically signed:

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc Notes: Eastern Thai Consulting 1992 Co., Ltd
Model: CR:110A 683 Moo 11,
Serial number: CB1365 Sukaphibai 8 Rd.,
Firmware version: 5.4 Nongkham,
Sriracha,

Test summary

Date of calibration: 29 January 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	KEYSIGHT	33511B	MY58001613
Attenuator	Cirrus Research	ZE:952	64370
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	100498

Notes

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CERTIFICATE OF CALIBRATION

Certificate Number:

231836

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 99.57 kPa Temperature: 22.4 °C Humidity: 40.6 %
After Pressure: 99.63 kPa Temperature: 22.3 °C Humidity: 41.0 %

Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

NOISE DOSI METER

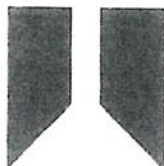
MODEL : CR:110A

SERIAL No. : CB1497

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 31 January 2025 CERTIFICATE NUMBER 231832



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
N.Smith
Electronically signed:

Dosimeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc
Model: CR:110A
Serial number: CB1497
Firmware version: 5.4

Notes: Eastern Thai Consulting 1992 Co., Ltd
683 Moo 11,
Sukaphibai 8 Rd.,
Nongkham,
Sriracha,

Test summary

Date of calibration: 29 January 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDC7R0237
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	79620

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realized by the Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number:

231832

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 99.33 kPa Temperature: 22.0 °C Humidity: 39.0 %
After Pressure: 99.38 kPa Temperature: 22.0 °C Humidity: 39.0 %

Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

NOISE DOSI METER

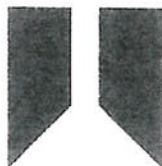
MODEL : CR:110A

SERIAL No. : CB1498

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 31 January 2025 CERTIFICATE NUMBER 231833



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
N.Smith
Electronically signed:

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc Notes: Eastern Thai Consulting 1992 Co., Ltd
Model: CR:110A 683 Moo 11,
Serial number: CB1498 Sukaphibai 8 Rd.,
Firmware version: 5.4 Nongkham,
Sriracha,

Test summary

Date of calibration: 30 January 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDC7R0237
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	79620

Notes

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CERTIFICATE OF CALIBRATION

Certificate Number:
231833

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 101.04 kPa Temperature: 21.6 °C Humidity: 35.6 %
After Pressure: 101.06 kPa Temperature: 21.7 °C Humidity: 36.4 %

Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

NOISE DOSI METER

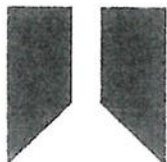
MODEL : CR:110A

SERIAL No. : CB1500

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc

DATE OF ISSUE 31 January 2025 CERTIFICATE NUMBER 231835



Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 2

Approved signatory
N.Smith
Electronically signed:

Dosemeter : IEC 61252-1993+A1:2000

Instrument information

Manufacturer: Cirrus Research plc Notes: Eastern Thai Consulting 1992 Co., Ltd
Model: CR:110A 683 Moo 11,
Serial number: CB1500 Sukaphibai 8 Rd.,
Firmware version: 5.4 Nongkham,
Sriracha,

Test summary

Date of calibration: 29 January 2025

The calibration was performed respecting the requirements of ISO/IEC 17025:2017.

The dosimeter submitted for testing successfully completed the periodic tests of IEC 61252-1993+A1:2000.

The dosimeter submitted for testing conforms to the specifications in IEC 61252-1993+A1:2000.

Test equipment

Equipment	Manufacturer	Model	Serial number
Signal Generator	SIGLENT	SDG1032X	SDG1XDDC7R0237
Attenuator	Cirrus Research	ZE:952	78713
Environmental Monitor	Comet	T7510	16966334
doseBadge Reader	Cirrus Research plc	RC:110A	79620

Notes

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CERTIFICATE OF CALIBRATION

Certificate Number:

231835

Page 2 of 2

Environmental conditions

The following conditions were recorded at the time of the test:

Before Pressure: 99.64 kPa Temperature: 22.2 °C Humidity: 41.1 %
After Pressure: 99.68 kPa Temperature: 22.4 °C Humidity: 42.4 %

Test results summary

Test	Result
Absolute Acoustic Sensitivity	Complies
Linearity	Complies
Short Duration	Complies
Overload Latching	Complies
Frequency weighting	Complies

Certificate of System Qualification

GC-OQ

System ID: CN15343147
Organization Name: Secot Co.,Ltd. (Head Office)
Organization Location: 239 Rimklongprapa Rd., Bangsue, Bangkok 10800

Date: April 28, 2025 12:57:27 PM
EQP Name: AgilentRecommended

EQP Revision: GC.02.55
Overall Qualification Status: Pass

CDS Logon Verification - GC
Logon: No logon credentials required for customer CDS

System Inspection and Basic Safety and Operation

Name: 7890
Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status
Pass

Inlet Pressure Decay

Name: 7890
Front SSL

Setpoint Status: Pass
Pressure: 25.0 psi
Pressure Change: -0.1 psi /5 minutes
Agilent Recommended: >= -2.0 and <= 0.5

Overall Inlet Pressure Decay Test Status
Pass

Inlet Pressure Accuracy

Name: 7890
Front SSL
Setpoint Status: Pass
Setpoint Actual
Inlet Pressure: 25.0 psi 24.9 psi
Accuracy: 0.1 psi
Agilent Recommended: <= 1.2

Overall Inlet Pressure Accuracy Test Status
Pass

Inlet Pressure Decay

Name: 7890
Back SSL
Setpoint Status: Pass
Pressure: 25.0 psi
Pressure Change: -0.2 psi /5 minutes
Agilent Recommended: >= -2.0 and <= 0.5

Overall Inlet Pressure Decay Test Status
Pass

Inlet Pressure Accuracy

Name: 7890
Back SSL
Setpoint Status: Pass
Setpoint Actual
Inlet Pressure: 25.0 psi 24.9 psi
Accuracy: 0.1 psi
Agilent Recommended: <= 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Back FID

Setpoint Status: Pass

Flow Type: Fuel

Setpoint: 30.0 mL/min Measured Flow: 29.8 mL/min

Accuracy: 0.2 mL/min

Agilent Recommended: <= 10.0 % setpoint (3.0 mL/min)

Limit is percentage of setpoint or 0.5 ml/minute, whichever is largest.

Setpoint Status: Pass

Flow Type: Oxidizer

Setpoint: 400.0 mL/min Measured Flow: 399.8 mL/min

Accuracy: 0.2 mL/min

Agilent Recommended: <= 10.0 % setpoint (40.0 mL/min)

Limit is percentage of setpoint or 0.5 ml/minute, whichever is largest.

Setpoint Status: Pass

Flow Type: Makeup

Setpoint: 25.0 mL/min Measured Flow: 24.9 mL/min

Accuracy: 0.1 mL/min

Agilent Recommended: <= 10.0 % setpoint (2.5 mL/min)

Limit is percentage of setpoint or 0.5 ml/minute, whichever is largest.

Overall Detector Flow Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Front UECD

Setpoint Status: Pass

Flow Type: Makeup

Setpoint: 25.0 mL/min Measured Flow: 24.9 mL/min

Accuracy: 0.1 mL/min

Agilent Recommended: <= 10.0 % setpoint (2.5 mL/min)

Limit is percentage of setpoint or 0.5 ml/minute, whichever is largest.

Overall Detector Flow Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 230.0 °C

Accuracy: 0.0 °C

Agilent Recommended: >= -1.0 % setpoint in K (-5.0 °C)

<= 1.0 % setpoint in K (5.0 °C)

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 100.0 100.0 °C

Accuracy: 0.0 °C

Agilent Recommended: >= -1.0 % setpoint in K (-3.7 °C)

<= 1.0 % setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 100.0667 °C

Stability: 0.1 °C

Agilent Recommended: <= 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Scouting Run

Tested Combination1 Front SSL / Back FID

Injection Tower

Name: 7693A

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination1 Front SSL / Back FID

Name: 7890

Setpoint Status: Pass

Base Signal: 10.48 pA

ASTM Noise Drift

pA pA/h

0.06 0.07

Agilent Recommended: <= 0.10 <= 2.50

Status: Pass Pass

Date: April 28, 2025 12:57:27 PM

System ID: CN15343147

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1 Front SSL / Back FID

Name: 7693A

Setpoint Status: Pass

Injection Volume on Column: 1.0 uL

Area RSD: 0.21 % Retention Time RSD: 0.20 %

Agilent Recommended: <= 3.00 <= 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination1 Front SSL / Back FID

Injection Tower

Name: 7890

Setpoint Status: Pass

Signal to Noise: 1141834

Agilent Recommended: >= 300000

Overall Signal to Noise Test Status

Pass

Scouting Run

Tested Combination2 Back SSL / Front UECD

Manual Injection

Name: Not applicable

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Date: April 28, 2025 12:57:27 PM

System ID: CN15343147

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination2 Back SSL / Front UECD

Name: 7890

Setpoint Status: Pass

Base Signal: 437 Hz

ASTM Noise Drift

Hz Hz/h

1.44 4.73

Agilent Recommended: <= 3.00 <= 15.00

Status: Pass Pass

Overall Noise and Drift Test Status

Pass

Signal to Noise

Tested Combination2 Back SSL / Front UECD

Manual Injection

Name: 7890

Setpoint Status: Pass

Signal to Noise: 15296

Agilent Recommended: >= 1500

Overall Signal to Noise Test Status

Pass

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID CN15343147
Manufacturer Agilent Technologies
Name 7890
Flow Data Input Manual Data
Temperature Data Input Manual Data or Other Data Logging

Tested Combination1

Injection Technique Injection Tower
Inlet Front
Detector Back
LTM Included? No

Tested Combination2

Injection Technique Manual Injection
Inlet Back
Detector Front
LTM Included? No

Sampler 1

Manufacturer Agilent Technologies
Type Injection Tower
Name 7693A
Model Number G4513A
Serial Number CN11350133
Firmware Revision A.10.09
Usage Sample Injection
Location Front
Syringe Volume (µL) 10

Sampler 2	
Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN13080006
Firmware Revision	A.10.16
Vial Heater	Not installed
Sampler 3	
Manufacturer	Agilent Technologies
Type	Manual Injection
Usage	Sample Injection
Syringe Volume (µL)	10
Mainframe 1	
Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440B
Serial Number	CN15343147
Firmware Revision	B.02.03.2
Oven Type	Standard
Inlet 1	
Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Inlet 2	
Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes
Detector 1	
Manufacturer	Agilent Technologies
Name	7890
Type	UECD
Serial Number	U27289
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen
Detector 2	
Manufacturer	Agilent Technologies
Name	7890
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Back
Makeup Gas	Nitrogen

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and logon to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer: Nattapat Hengcharoen
Logged On User Name: nattapat.hengcharoen@agilent.com
Signature Creation Date: April 28, 2025
Reason for Signature: Executed protocol and published this original version of document

ACE Self Qualification Status

The installed version of ACE used to deliver this service passed qualification; the results conform with expected values. The self qualification summary report is available in the session folder location SDS\ClearStore\AceSelfQualification.

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This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

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Agilent Technologies

System ID: CN15343147

Secot_CN15343147 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 28, 2025 12:14:09 PM	Audit	SessionCreated	Session	Host Name: AG-5CG2350YN0, Drive Serial Number: 2A984E77
April 28, 2025 12:14:09 PM	start	Configuration	Session	None
April 28, 2025 12:14:09 PM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
April 28, 2025 12:14:35 PM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks\Gc\Configurat ions\02.55\Gc.02.55.eqp], EQP File Name: [Gc.02.55.eqp], EQP Name: [AgilentRecommended],Proto col Revision :[Gc.02.55]
April 28, 2025 12:14:37 PM	End	Configuration	Session	None
April 28, 2025 12:14:42 PM	start	Qualification	Session	OQ
April 28, 2025 12:14:43 PM	start	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	None
April 28, 2025 12:15:21 PM	End	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	Run Count : 1
April 28, 2025 12:16:09 PM	start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
April 28, 2025 12:16:17 PM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1

Page 1 / 9

System ID: CN15343147

Secot_CN15343147 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 28, 2025 12:16:18 PM	start	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
April 28, 2025 12:16:28 PM	End	Execution	Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	Run Count : 1
April 28, 2025 12:16:29 PM	start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
April 28, 2025 12:16:33 PM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
April 28, 2025 12:16:35 PM	start	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	None
April 28, 2025 12:16:42 PM	End	Execution	Inlet Pressure Decay - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi	Run Count : 1
April 28, 2025 12:16:43 PM	start	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
April 28, 2025 12:16:50 PM	End	Execution	Inlet Pressure Accuracy - Back SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
April 28, 2025 12:17:51 PM	start	Execution	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None

System ID: CN15343147

Secot_CN15343147 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 28, 2025 12:18:14 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
April 28, 2025 12:18:17 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
April 28, 2025 12:18:18 PM	start	Execution	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
April 28, 2025 12:18:37 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
April 28, 2025 12:18:44 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
April 28, 2025 12:18:46 PM	start	Execution	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
April 28, 2025 12:19:17 PM	Audit	Data	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
April 28, 2025 12:19:26 PM	End	Execution	Detector Flow Accuracy - Back FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
April 28, 2025 12:19:35 PM	start	Execution	Detector Flow Accuracy - Front UECD: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
April 28, 2025 12:19:55 PM	Audit	Data	Detector Flow Accuracy - Front UECD: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry

Secot_CN15343147 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 28, 2025 12:20:02 PM	End	Execution	Detector Flow Accuracy - Front UECD: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
April 28, 2025 12:20:03 PM	start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
April 28, 2025 12:20:43 PM	start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
April 28, 2025 12:21:02 PM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
April 28, 2025 12:21:03 PM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
April 28, 2025 12:21:11 PM	start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
April 28, 2025 12:21:27 PM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
April 28, 2025 12:21:31 PM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1

Secot_CN15343147 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 28, 2025 12:21:33 PM	start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
April 28, 2025 12:22:25 PM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
April 28, 2025 12:22:27 PM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
April 28, 2025 12:25:36 PM	start	Execution	GC Scouting Run - Injection Tower, Front SSL, Back FID: - Part of System Preparation - No limits associated	None
April 28, 2025 12:27:08 PM	start	Execution	GC Scouting Run - Injection Tower, Front SSL, Back FID: - Part of System Preparation - No limits associated	None
April 28, 2025 12:28:18 PM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over
April 28, 2025 12:28:18 PM	Audit	TestUnlocked	GC Scouting Run - Injection Tower, Front SSL, Back FID: - Part of System Preparation - No limits associated	Deviation filed for Run Count : 0
April 28, 2025 12:28:18 PM	start	Execution	GC Scouting Run - Injection Tower, Front SSL, Back FID: - Part of System Preparation - No limits associated	None
April 28, 2025 12:29:02 PM	start	Execution	GC Scouting Run - Injection Tower, Front SSL, Back FID: - Part of System Preparation - No limits associated	None

Transaction ID: CN15343147

Secot_CN15343147 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 28, 2025 12:30:17 PM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over
April 28, 2025 12:30:17 PM	Audit	TestUnlocked	GC Scouting Run - Injection Tower, Front SSL, Back FID: -	Deviation filed for Run Count : 0 Part of System Preparation - No limits associated
April 28, 2025 12:30:17 PM	start	Execution	GC Scouting Run - Injection Tower, Front SSL, Back FID: -	None Part of System Preparation - No limits associated
April 28, 2025 12:30:29 PM	start	Execution	GC Scouting Run - Injection Tower, Front SSL, Back FID: -	None Part of System Preparation - No limits associated
April 28, 2025 12:31:35 PM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Back FID: -	Data files Path : D:\Secot_ECD\IOQ 2025-04-24 15-01-00\ISC_FID1.D\FID2B.ch
April 28, 2025 12:32:18 PM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Back FID: -	Run Count : 1 Part of System Preparation - No limits associated
April 28, 2025 12:32:22 PM	start	Execution	Noise and Drift - Back FID: -	None Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour
April 28, 2025 12:33:53 PM	Audit	Data	Noise and Drift - Back FID: -	Data files Path : D:\Secot_ECD\ND_B_01.D\FID2B.ch

Transaction ID: CN15343147

Secot_CN15343147 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 28, 2025 12:34:07 PM	End	Execution	Noise and Drift - Back FID: -	Run Count : 1 Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour
April 28, 2025 12:34:15 PM	start	Execution	Injection Precision - Injection Tower, Front SSL, Back FID: -	None GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%
April 28, 2025 12:35:02 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID: -	Data files Path : D:\Secot_ECD\IOQ 2025-04-24 15-01-00\IP_FID_2.D\FID2B.ch
April 28, 2025 12:35:02 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID: -	Data files Path : D:\Secot_ECD\IOQ 2025-04-24 15-01-00\IP_FID_3.D\FID2B.ch
April 28, 2025 12:35:02 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID: -	Data files Path : D:\Secot_ECD\IOQ 2025-04-24 15-01-00\IP_FID_4.D\FID2B.ch
April 28, 2025 12:35:02 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID: -	Data files Path : D:\Secot_ECD\IOQ 2025-04-24 15-01-00\IP_FID_5.D\FID2B.ch
April 28, 2025 12:35:02 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID: -	Data files Path : D:\Secot_ECD\IOQ 2025-04-24 15-01-00\IP_FID_6.D\FID2B.ch

Secot_CN15343147 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 28, 2025 12:35:02 PM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data files Path : D:\Secot_ECD\IOQ 2025-04-24 15-01-00\IP_FID_7.D\FID2B.ch
April 28, 2025 12:35:07 PM	End	Execution	Injection Precision - Injection Tower, Front SSL, Back FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Run Count : 1
April 28, 2025 12:35:22 PM	start	Execution	Signal to Noise - Injection Tower, Front SSL, Back FID: - Detector FID - L: >= 300000	None
April 28, 2025 12:35:43 PM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Back FID: - Detector FID - L: >= 300000	Data files Path : D:\Secot_ECD\IOQ 2025-04-24 15-01-00\SN_FID_1.D\FID2B.ch
April 28, 2025 12:35:49 PM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Back FID: - Detector FID - L: >= 300000	Run Count : 1
April 28, 2025 12:35:52 PM	start	Execution	GC Scouting Run - Manual Injection, Back SSL, Front UECD: - Part of System Preparation - No limits associated	None
April 28, 2025 12:37:27 PM	Audit	Data	GC Scouting Run - Manual Injection, Back SSL, Front UECD: - Part of System Preparation - No limits associated	Data files Path : D:\Secot_ECD\SC_ECD_01.D\ECD1A.ch
April 28, 2025 12:40:25 PM	End	Execution	GC Scouting Run - Manual Injection, Back SSL, Front UECD: - Part of System Preparation - No limits associated	Run Count : 1

Secot_CN15343147 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 28, 2025 12:40:29 PM	start	Execution	Noise and Drift - Front UECD: - Detector UECD - L (Noise): <= 3.00 Hz - L (Drift): <= 15.00 Hz/hour	None
April 28, 2025 12:40:55 PM	Audit	Data	Noise and Drift - Front UECD: - Detector UECD - L (Noise): <= 3.00 Hz - L (Drift): <= 15.00 Hz/hour	Data files Path : D:\Secot_ECD\IND_ECD_01.D\ECD1A.ch
April 28, 2025 12:41:05 PM	End	Execution	Noise and Drift - Front UECD: - Detector UECD - L (Noise): <= 3.00 Hz - L (Drift): <= 15.00 Hz/hour	Run Count : 1
April 28, 2025 12:41:09 PM	start	Execution	Signal to Noise - Manual Injection, Back SSL, Front UECD: - Detector UECD - L: >= 1500	None
April 28, 2025 12:41:25 PM	Audit	Data	Signal to Noise - Manual Injection, Back SSL, Front UECD: - Detector UECD - L: >= 1500	Data files Path : D:\Secot_ECD\SC_ECD_01.D\ECD1A.ch
April 28, 2025 12:42:31 PM	End	Execution	Signal to Noise - Manual Injection, Back SSL, Front UECD: - Detector UECD - L: >= 1500	Run Count : 1
April 28, 2025 12:42:34 PM	End	Qualification	Session	OQ
April 28, 2025 12:42:34 PM	start	Reporting	Session	None
April 28, 2025 12:56:16 PM	Audit	Reporting	Session	Report Generated : Certificate
April 28, 2025 12:56:43 PM	Audit	Reporting	Session	Report Generated : Report

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: US2509MA07
Organization Name: Secot CO.,Ltd. (Head Office)
Organization Location: 239 Rimklongprapa Rd., Bangsue, Bangkok 10800

Date: April 10, 2025 3:59:29 PM
EQP Name: AgilentRecommended , AgilentRecommended

EQP Revision: GC.02.55, GCMS.02.56
Overall Qualification Status: Pass

CDS Logon Verification - GC

Logon: No logon credentials required for customer CDS

System Inspection and Basic Safety and Operation

Name: 8890
Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Accuracy

Name: 8890
Front SSL

Setpoint Status: Pass

	Setpoint		Actual	
Inlet Pressure:	25.0	psi	24.9	psi
Accuracy:			0.1	psi
Agilent Recommended:			<= 1.2	

Overall Inlet Pressure Accuracy Test Status

Pass

Date: April 10, 2025 3:59:29 PM
System ID: US2509MA07

GC Oven Temperature Accuracy

Name: 8890
Setpoint Status: Pass
Zone: Oven
Setpoint/Actual
Temperature: 230.0 230.0 °C
Accuracy: 0.0 °C
Agilent Recommended: >= -1.0 % setpoint in K (-5.0 °C)
<= 1.0 % setpoint in K (5.0 °C)

Setpoint Status: Pass
Zone: Oven
Setpoint/Actual
Temperature: 100.0 100.0 °C
Accuracy: 0.0 °C
Agilent Recommended: >= -1.0 % setpoint in K (-3.7 °C)
<= 1.0 % setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 8890
Setpoint Status: Pass
Setpoint/Average
Temperature: 100.0 100.05 °C
Stability: 0.1 °C
Agilent Recommended: <= 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Log Amp

Date: April 10, 2025 3:59:29 PM
System ID: US2509MA07

Tested Combination1 Front SSL / External SQ
Name: 5977C

Setpoint Status: Pass

Overall Log Amp Test Status

Pass

RFPA

Tested Combination1 Front SSL / External SQ
Name: 5977C

Setpoint Status: Pass

Amu: 1050 m/z Drift After Five Minutes: RFPA Voltage: 510 mV
31 mV
>= -100 and <= 100 <= 1100

Agilent Recommended:

Overall RFPA Test Status

Pass

Tune EI

Tested Combination1 Front SSL / External SQ
Name: 5977C

Setpoint Status: Pass

Filament: 1

Setpoint Status: Pass

Filament: 2

Overall Tune EI Test Status

Pass

Scouting Run

Tested Combination1 Front SSL / External SQ
Manual Injection

Date: April 10, 2025 3:59:29 PM
System ID: US2509MA07

Name: Not applicable
Source: EI - Extractor

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Overall Scouting Run Status

Completed

NOTE: This test's 1 comment(s) and 1 deviation(s) are available in the Attachments section.

Signal to Noise EI

Tested Combination1 Front SSL / External SQ
Name: 5977C

Source: EI - Extractor Filament: 1

Setpoint Status: Pass

Signal to Noise: 14338

Agilent Recommended: >= 4000

Source: EI - Extractor Filament: 2

Setpoint Status: Pass

Signal to Noise: 8988

Agilent Recommended: >= 4000

Overall Signal to Noise EI Test Status

Pass

Date: April 10, 2025 3:59:29 PM
System ID: US2509MA07

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	US2509MA07
Manufacturer	Agilent Technologies
Name	8890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

Injection Technique	Manual Injection
Inlet	Front
Detector	External
LTM Included?	No

Sampler 1

Manufacturer	Agilent Technologies
Type	Manual Injection
Usage	Sample Injection
Syringe Volume (µL)	10

Mainframe 1

Manufacturer	Agilent Technologies
Name	8890
Model Number	G3540A
Serial Number	CN2508A105
Firmware Revision	3.0.0.181
Oven Type	Standard

Inlet 1

Manufacturer	Agilent Technologies
Name	8890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5977C
Model Number	G7077C
Serial Number	US2509MA07
Firmware Revision	Not applicable
High Vacuum System	Turbo Pump
Liquid Injection Scouting Run Standard	OFN Std

MS EI Source 1

Manufacturer	Agilent Technologies
Source Type	EI - Extractor
Number of filaments	2

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and logon to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer: Nattapat Hengcharoen
Logged On User Name: nattapat.hengcharoen@agilent.com
Signature Creation Date: April 10, 2025
Reason for Signature: Executed protocol and published this original version of document

ACE Self Qualification Status

The installed version of ACE used to deliver this service passed qualification; the results conform with expected values. The self qualification summary report is available in the session folder location SDS\ClearStore\AceSelfQualification.

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Date: April 10, 2025 3:59:29 PM
System ID: US2509MA07

Report Generated by Host Name: DESKTOP-ST5F4N3
Print Date: April 10, 2025 3:59:29 PM

Secot_GCMSD Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 10, 2025 9:48:38 AM	Audit	SessionCreated	Session	Host Name: DESKTOP-ST5F4N3, Drive Serial Number: E842594E
April 10, 2025 9:49:38 AM	start	Configuration	Session	None
April 10, 2025 9:49:38 AM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
April 10, 2025 9:54:33 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.55/Gc.02.55.eqp], EQP File Name: [Gc.02.55.eqp], EQP Name: [AgilentRecommended], Protocol Revision: [Gc.02.55] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.56/GcMs.02.56.eqp], EQP File Name: [GcMs.02.56.eqp], EQP Name: [AgilentRecommended]
April 10, 2025 9:54:45 AM	End	Configuration	Session	None
April 10, 2025 9:54:49 AM	start	Qualification	Session	IQ
April 10, 2025 9:54:49 AM	start	Qualification	Session	OQ
April 10, 2025 9:54:49 AM	start	Execution	Purchase Order Details - 8890: - None Purchase Order	
April 10, 2025 9:54:56 AM	End	Qualification	Session	IQ
April 10, 2025 9:54:56 AM	start	Qualification	Session	OQ

Date: April 10, 2025 3:59:29 PM
System ID: US2509MA07

Report Generated by the name: DESKTOP\STEFAN3

Print Date: April 10, 2025 3:59:36 PM

Secot_GCMSD Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 10, 2025 9:54:56 AM	start	Execution	CDS Logon Verification - GC - 8890: - Qualitative test	None
April 10, 2025 9:56:08 AM	End	Execution	CDS Logon Verification - GC - 8890: - Qualitative test	Run Count : 1
April 10, 2025 9:56:10 AM	start	Execution	System Inspection and Basic Safety and Operation - 8890: - Qualitative Test - No setpoints associated	None
April 10, 2025 9:56:25 AM	End	Execution	System Inspection and Basic Safety and Operation - 8890: - Qualitative Test - No setpoints associated	Run Count : 1
April 10, 2025 9:56:27 AM	start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
April 10, 2025 9:57:28 AM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
April 10, 2025 9:57:29 AM	start	Execution	GC Oven Temperature Accuracy - 8890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
April 10, 2025 9:58:03 AM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 4000	None
April 10, 2025 10:00:25 AM	start	Execution	GC Oven Temperature Accuracy - 8890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None

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Report Generated by the name: DESKTOP\STEFAN3

Print Date: April 10, 2025 3:59:36 PM

Secot_GCMSD Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 10, 2025 10:00:38 AM	Audit	Data	GC Oven Temperature Accuracy - 8890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
April 10, 2025 10:00:42 AM	End	Execution	GC Oven Temperature Accuracy - 8890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
April 10, 2025 10:00:44 AM	start	Execution	GC Oven Temperature Accuracy - 8890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
April 10, 2025 10:18:14 AM	Audit	Data	GC Oven Temperature Accuracy - 8890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
April 10, 2025 10:18:19 AM	End	Execution	GC Oven Temperature Accuracy - 8890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
April 10, 2025 10:19:26 AM	start	Execution	GC Oven Temperature Stability - 8890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
April 10, 2025 10:48:10 AM	Audit	Data	GC Oven Temperature Stability - 8890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
April 10, 2025 10:48:12 AM	End	Execution	GC Oven Temperature Stability - 8890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
April 10, 2025 10:48:14 AM	start	Execution	Log Amp - 5977C SQ: - Source: EI - Extractor	None
April 10, 2025 10:55:30 AM	End	Execution	Log Amp - 5977C SQ: - Source: EI - Extractor	Run Count : 1

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Report Generated by Hostname: DESKTOP-ST5F4N3
Print Date: April 10, 2025 3:59 PM

Secot_GCMSD Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 10, 2025 10:55:32 AM	start	Execution	RFPA - 5977C SQ: - Source: EI - None - Extractor	
April 10, 2025 10:57:39 AM	start	Execution	Scouting Run - Manual Injection, Front SSL, SQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None
April 10, 2025 11:07:38 AM	start	Execution	RFPA - 5977C SQ: - Source: EI - None - Extractor	
April 10, 2025 11:17:53 AM	End	Execution	RFPA - 5977C SQ: - Source: EI - Run Count : 1 - Extractor	
April 10, 2025 11:17:55 AM	start	Execution	Tune EI - 5977C SQ: - Source: - None EI - Extractor Filament 1 (Qualitative - No setpoints associated)	
April 10, 2025 11:19:09 AM	End	Execution	Tune EI - 5977C SQ: - Source: - Run Count : 1 EI - Extractor Filament 1 (Qualitative - No setpoints associated)	
April 10, 2025 11:19:11 AM	start	Execution	Tune EI - 5977C SQ: - Source: - None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
April 10, 2025 11:19:24 AM	End	Execution	Tune EI - 5977C SQ: - Source: - Run Count : 1 EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
April 10, 2025 11:19:25 AM	start	Execution	Scouting Run - Manual Injection, Front SSL, SQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None

Report Generated by Hostname: DESKTOP-ST5F4N3
Print Date: April 10, 2025 3:59 PM

Secot_GCMSD Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 10, 2025 12:10:38 PM	start	Execution	Scouting Run - Manual Injection, Front SSL, SQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None
April 10, 2025 12:10:59 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 4000	None
April 10, 2025 12:11:04 PM	start	Execution	Scouting Run - Manual Injection, Front SSL, SQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None
April 10, 2025 12:11:06 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 4000	None
April 10, 2025 12:14:35 PM	Audit	AceClosed	Session	None
April 10, 2025 12:15:07 PM	Audit	AceRestarted	Session	Host Name: DESKTOP-ST5F4N3, Drive Serial Number: E842594E
April 10, 2025 2:31:58 PM	Audit	SessionReloaded	Session	None
April 10, 2025 2:31:59 PM	start	Qualification	Session	IQ
April 10, 2025 2:31:59 PM	start	Qualification	Session	OQ
April 10, 2025 2:31:59 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 4000	None
April 10, 2025 2:32:02 PM	start	Execution	Scouting Run - Manual Injection, Front SSL, SQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None

User Name: admin@crosslab.com

Report Generated by Host Name: DESKTOP-ST5F4N3

Print Date: April 10, 2025 3:59:10 PM

Secot_GCMSD Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 10, 2025 2:32:42 PM	Audit	Data	Scouting Run - Manual Injection, Front SSL, SQ: - Source: - EI - Extractor- Part of GCMS System Preparation	Data files Path : D:\Projects\VOQO2025\Data\OQ2025\Sc1.d
April 10, 2025 2:33:06 PM	End	Execution	Scouting Run - Manual Injection, Front SSL, SQ: - Source: - EI - Extractor- Part of GCMS System Preparation	Run Count : 1
April 10, 2025 2:33:09 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 4000	None
April 10, 2025 2:46:56 PM	Audit	AcceClosed	Session	None
April 10, 2025 3:05:56 PM	Audit	AcceRestarted	Session	Host Name: DESKTOP-ST5F4N3, Drive Serial Number: E842594E
April 10, 2025 3:05:57 PM	Audit	SessionReloaded	Session	None
April 10, 2025 3:05:59 PM	start	Qualification	Session	IQ
April 10, 2025 3:05:59 PM	start	Qualification	Session	OQ
April 10, 2025 3:05:59 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 4000	None
April 10, 2025 3:06:27 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 4000	None
April 10, 2025 3:15:40 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 4000	Manual Data Entry

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User Name: admin@crosslab.com

Report Generated by Host Name: DESKTOP-ST5F4N3

Print Date: April 10, 2025 3:59:10 PM

Secot_GCMSD Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 10, 2025 3:15:42 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 4000	Run Count : 1
April 10, 2025 3:15:44 PM	start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 4000	None
April 10, 2025 3:18:58 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 4000	Manual Data Entry
April 10, 2025 3:19:37 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 4000	Run Count : 1
April 10, 2025 3:19:39 PM	End	Qualification	Session	OQ
April 10, 2025 3:19:39 PM	start	Reporting	Session	None
April 10, 2025 3:41:22 PM	End	Reporting	Session	None
April 10, 2025 3:41:22 PM	start	Qualification	Session	IQ
April 10, 2025 3:41:22 PM	start	Execution	Purchase Order Details - 8890: - None Purchase Order	
April 10, 2025 3:44:42 PM	start	Execution	Preparation and Installation Details - 8890: - Preparation	None
April 10, 2025 3:44:43 PM	End	Execution	Purchase Order Details - 8890: - Run Count : 1 Purchase Order	
April 10, 2025 3:44:53 PM	start	Execution	Documentation - 8890: - Documentation	None
April 10, 2025 3:44:53 PM	End	Execution	Preparation and Installation Details - 8890: - Preparation	Run Count : 1

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User Name: nattapat.hengcharoen				
Report Generated by HostName: DESKTOP-ST5F4N3				
Print Date: April 10, 2025 3:54:30 PM				
Secot_GCMSD Transaction log :				
Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 10, 2025 3:45:06 PM	start	Execution	Product Quality Assurance Details - 8890: - Quality Assurance	None
April 10, 2025 3:45:06 PM	End	Execution	Documentation - 8890: - Documentation	Run Count : 1
April 10, 2025 3:45:12 PM	start	Execution	Startup - 8890: - Startup	None
April 10, 2025 3:45:12 PM	End	Execution	Product Quality Assurance Details - 8890: - Quality Assurance	Run Count : 1
April 10, 2025 3:45:15 PM	End	Execution	Startup - 8890: - Startup	Run Count : 1
April 10, 2025 3:45:16 PM	start	Execution	Instrument Check - External Mass Spectrometer: - Instrument Check	None
April 10, 2025 3:45:32 PM	End	Execution	Instrument Check - External Mass Spectrometer: - Instrument Check	Run Count : 1
April 10, 2025 3:45:33 PM	End	Qualification	Session	IQ
April 10, 2025 3:45:33 PM	start	Qualification	Session	OQ
April 10, 2025 3:45:36 PM	End	Qualification	Session	OQ
April 10, 2025 3:45:36 PM	start	Reporting	Session	None
April 10, 2025 3:46:12 PM	Audit	Reporting	Session	Report Generated : Certificate
April 10, 2025 3:46:29 PM	Audit	Reporting	Session	Report Generated : Report

User Name: nattapat.hengcharoen				
Report Generated by HostName: DESKTOP-ST5F4N3				
Print Date: April 10, 2025 3:57:09 PM				
Secot_GCMSD Transaction log :				
Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 10, 2025 3:47:30 PM	Audit	Reporting	Session	Report Signed : Certificate PDF Name: Secot_GCMSD_20250410_Certificate_1.pdf User Name: nattapat.hengcharoen@agilent.com Full Name of Signer: Nattapat Hengcharoen Reason for signature: Executed protocol and published this original version of document
April 10, 2025 3:47:58 PM	Audit	Reporting	Session	Report Signed : Report PDF Name: Secot_GCMSD_20250410_IQ Report_1.pdf User Name: nattapat.hengcharoen@agilent.com Full Name of Signer: Nattapat Hengcharoen Reason for signature: Executed protocol and published this original version of document
April 10, 2025 3:49:28 PM	Audit	AceClosed	Session	None
April 10, 2025 3:50:07 PM	Audit	AceRestarted	Session	Host Name: DESKTOP-ST5F4N3, Drive Serial Number: E842694E
April 10, 2025 3:50:08 PM	Audit	SessionReloaded	Session	None
April 10, 2025 3:50:09 PM	start	Qualification	Session	IQ
April 10, 2025 3:50:09 PM	start	Qualification	Session	OQ
April 10, 2025 3:58:09 PM	Audit	Reporting	Session	Report Generated : Certificate

Host Name: mafford-hs00h3000

Report Generated by Hostname: DESKTOP-ST5F4N3

Print Date: April 10, 2025 3:59:30 PM

Scof_GCMSD Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 10, 2025 3:58:31 PM	Audit	Reporting	Session	Report Generated : Report