

ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือ



List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Ambient									
1	Orifice Transfer Standard Calibrator	Particulate Matter < 10 µm (PM ₁₀)	Andersen Instruments, Inc.	G25A 1901	Jiranatee Associates Co., Ltd.	COF-026-68	21 Jul 25	20 Jul 26	-
2	U-Tube Manometer	Particulate Matter < 10 µm (PM ₁₀)	Dwyer	1221-36-W/M -	Technology Promotion Association (Thailand-Japan)	25P3505	9 Sep 25	8 Sep 26	-
3	Aneroid Barometer	Particulate Matter < 10 µm (PM ₁₀)	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	26P1516	22 Apr 26	21 Apr 27	-
4	Dial Thermo-Hygrometer	Particulate Matter < 10 µm (PM ₁₀)	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	26H708	17 Apr 26	16 Apr 27	-
5	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i CM08130002	UAE Consultant Co.,Ltd.	17022026	17 Feb 26	16 Feb 27	-
6	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i CM19050148	UAE Consultant Co.,Ltd.	20022026	20 Feb 26	19 Feb 27	-
7	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i CM19050149	UAE Consultant Co.,Ltd.	24022026	24 Feb 26	23 Feb 27	-
8	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i CM19050150	UAE Consultant Co.,Ltd.	24022026	24 Feb 26	23 Feb 27	-
9	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i CM22177051	UAE Consultant Co.,Ltd.	12122025	12 Dec 25	11 Dec 26	-
10	Standard Gases (Mixture)	Nitrogen Dioxide	Airgas	EB0162121 2016PSIG	Airgas an Air Liquide company	E05N91E15A0014	6 Jul 23	6 Jul 31	-
11	Carbon Monoxide Analyzer	Carbon Monoxide	Thermo	48i CM08140003	UAE Consultant Co.,Ltd.	04072025	4 Jul 25	3 Jul 26	-
12	Carbon Monoxide Analyzer	Carbon Monoxide	Thermo	48i CM08140004	UAE Consultant Co.,Ltd.	04072025	4 Jul 25	3 Jul 26	-

List of Instruments Certification for Air & Noise Quality Analysis

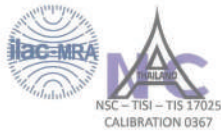
No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Ambient									
13	Carbon Monoxide Analyzer	Carbon Monoxide	Thermo	48i 1180540068	UAE Consultant Co.,Ltd.	11072025	11 Jul 25	10 Jul 26	-
14	Carbon Monoxide Analyzer	Carbon Monoxide	Thermo	48i 1180540069	UAE Consultant Co.,Ltd.	17072025	17 Jul 25	16 Jul 26	-
15	Carbon Monoxide Analyzer	Carbon Monoxide	Thermo	48i 1180540074	UAE Consultant Co.,Ltd.	09072025	9 Jul 25	8 Jul 26	-
16	Standard Gases (Mixture)	Carbon Monoxide	Airgas	EB0162121 2016PSIG	Airgas an Air Liquide company	E05N91E15A0014	6 Jul 23	6 Jul 31	-
17	Wind Speed/Wind Direction	WS/WD	LSI Lastem	E-LOG 305 / DNA 821 20020305 / 20040161	Thai Meteorological Department	226/26	17 Apr 26	16 Apr 27	-
18	Wind Speed/Wind Direction	WS/WD	LSI Lastem	E-LOG 305 / DNA 821 20040002 / 20040162	Thai Meteorological Department	232/26	22 Apr 26	21 Apr 27	-
19	Wind Speed/Wind Direction	WS/WD	LSI Lastem	E-LOG 305 / DNA 821 20040007 / 20040167	Thai Meteorological Department	233/26	22 Apr 26	21 Apr 27	-
20	Wind Speed/Wind Direction	WS/WD	LSI Lastem	E-LOG 305 / DNA 821 20040026 / 20040177	Thai Meteorological Department	228/26	17 Apr 26	16 Apr 27	-
21	Wind Speed/Wind Direction	WS/WD	LSI Lastem	E-LOG 305 / DNA 821 20040027 / 20040178	Thai Meteorological Department	234/26	22 Apr 26	21 Apr 27	-
22	Sound Level Calibrator (Acoustic Calibrator)	Calibrate Sound Level Meter	Larson Davis	CAL150 6171	Innovative Instrument Co.,Ltd.	26-ACT-062	6 Apr 26	5 Apr 27	-
23	Sound Level Meter	$L_{Aeq\ 24\ hours}$ $L_{Aeq\ 1\ hr}$ L_{Amax} L_{A90} L_{A50} L_{A10}	Larson Davis	LxT2 0005286	Innovative Instrument Co.,Ltd.	25-SLM-272	11 Aug 25	10 Aug 27	-
24	Sound Level Meter	$L_{Aeq\ 24\ hours}$ $L_{Aeq\ 1\ hr}$ L_{Amax} L_{A90} L_{A50} L_{A10}	Larson Davis	LxT2 0005287	Innovative Instrument Co.,Ltd.	25-SLM-241	29 Jul 25	28 Jul 27	-

List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Ambient									
25	Sound Level Meter	$L_{Aeq} 24\text{ hours}$ $L_{Aeq} 1\text{ hr}$ L_{Amax} L_{A10} L_{A5}	Larson Davis	LxT2 0005288	Innovative Instrument Co.,Ltd.	25-SLM-242	29 Jul 25	28 Jul 27	-
26	Sound Level Meter	$L_{Aeq} 24\text{ hours}$ $L_{Aeq} 1\text{ hr}$ L_{Amax} L_{A10} L_{A5}	Larson Davis	LxT2 0005298	Electrical And Electronics Institute Foundation For Industrial Development	CP20240341EA	23 Sep 24	22 Sep 26	-
27	Sound Level Meter	$L_{Aeq} 24\text{ hours}$ $L_{Aeq} 1\text{ hr}$ L_{Amax} L_{A10} L_{A5}	Larson Davis	LxT2 0005299	Innovative Instrument Co.,Ltd.	25-SLM-273	11 Aug 25	10 Aug 27	-
28	Sound Level Meter	$L_{Aeq} 24\text{ hours}$ $L_{Aeq} 1\text{ hr}$ L_{Amax} L_{A10} L_{A5}	Larson Davis	LxT2 0005341	Innovative Instrument Co.,Ltd.	25-SLM-339	9 Oct 25	8 Oct 26	-

J NAC
JIRANATEE ASSOCIATES CO.,LTD.
Jirananate Associates Co.,Ltd.
62/74-15, 62/75-16
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Email: jirac-calibration@jirananate.com
Web site: www.jirananate.com

Accredited calibration laboratory
ISO/IEC 17025:2017
NSC-TIS-765.17025
CALIBRATION 0367
Flow measurement laboratory
Calibration services department.



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JIRANATEE ASSOCIATES CO.,LTD.

Continuation of Certificate of Calibration Number CDF-026-68

Page 2 of 2 Pages

CERTIFICATE OF CALIBRATION

Certificate No. : CDF-026-68

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYP
SERIAL NUMBER
ID NUMBER
CONDITION AS-RECEIVED
CUSTOMER

: Top Load Office
: Andersen Instruments
: 625A
: 1301
: UAE.ANV.051/2547
: Used Item
: United Analyst and Engineering Consultant Co., Ltd.
: 81 Soi Udomsak 41, Sukhumvit Road, Bangkok, Phrakhanong,
: Bangkok 10260

Calibration procedure:
The Orifice gas flow device was calibrated against Standard Rotary Displacement Meter (Boots Meter) Model: 685/NAC/NE-01. The 10-CL-004 was used as a calibration guideline.

Traceability:
This certificate provides a traceability of the measurement to recognized the national standard through the realization of the international system of units (SI) through the NMAT (National Metrology Institute of Thailand) via Certificate number: NMAT/016-25.

Uncertainty of Measurement:
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM "Evaluation of measurement data - Guide to the expression of uncertainty in measurement".

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 0.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1030 ± 10 hPa

CALIBRATION CONDITION:

Preconditioning : 24 hours at ambient conditions.
Measurement Condition : The average values during measurement are 23.1 °C and 51.8 %RH.

NOTED: The certificate is valid only to the item calibrated on date and placed calibration.

TABULATION OF RESULTS:

The table on next page give the measured values.

MEASUREMENT RESULTS:

The Orifice gas flow device was calibrated by direct comparison method with the Standard Rotary Displacement Meter (Boots Meter). The Humid air was used as a medium in the system. The standard conditions are 25°C (298.15 K) and 760 mmHg for standard temperature and standard pressure respectively.

Table 1: The results of Q Standard calibration data

Plate	Flow rate m^3/min	Pressure [Pa] mmHg	Temperature [T _a] °C	Temperature [T _m] °C	A_{p_meter} mmHg	$A_{p_Orifice}$ mmHg	F	Standard Flow [Q_s] m^3/min
1	0.701	752.648	23.05	23.18	55.802	1.641	1.379	0.649
2	0.999	752.569	23.74	23.05	62.020	3.289	1.809	0.913
3	1.116	752.607	23.89	23.32	41.689	4.337	2.076	1.098
4	1.366	752.474	24.12	23.54	30.780	4.893	2.204	1.113
5	1.410	752.389	24.24	23.84	29.526	7.186	2.671	1.346

Slope (a): 1.89437
Intercept (b): -0.01544
Correlation coefficient (r): 0.99989
Uncertainty (a=2): 0.015 m^3/min

Table 2: The results of Q actual calibration data

Plate	Flow rate m^3/min	Pressure [Pa] mmHg	Temperature [T _a] °C	Temperature [T _m] °C	A_{p_meter} mmHg	$A_{p_Orifice}$ mmHg	F	Standard Flow [Q_s] m^3/min
1	0.701	752.648	23.05	23.18	55.802	1.641	0.804	0.651
2	0.999	752.569	23.74	23.05	62.020	3.289	1.139	0.918
3	1.116	752.607	23.89	23.32	41.689	4.337	1.308	1.058
4	1.366	752.474	24.12	23.54	30.780	4.899	1.590	1.121
5	1.410	752.389	24.24	23.84	29.526	7.186	1.685	1.367

Slope (a): 1.24908
Intercept (b): -0.00965
Correlation coefficient (r): 0.99989
Uncertainty (a=2): 0.015 m^3/min

End of Certificate of Calibration

Calibrated by:
☐ Mr. Sorawit Thachalad
☒ Mr. Jirananate Lersangphol



Approved signatory: Mr. Pannipa Booncharoen
Calibration Department Manager



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Certificate of Calibration

Certificate No.: 25P3505
Page: 1 of 2

Equipment: U-Tube Manometer
Manufacturer: Dwyer
Model: 1221-35-WIM
Serial No.: -
ID No.: UAE.EFM.020/2560

Condition As-Received: Used Item

Received Date: 03 September 2025

Calibration Date: 09 September 2025

Reference: 2508-0144WSC

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 15) %

Atmospheric Pressure: 1010 mbar

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except with the prior written approval of the head of
Corporate Services 3: Equipment Calibration and Testing Services.

Submitted by: United Analyst and Engineering Consultant Co., Ltd.

81 Soi Udomsuk 41, Sukhumvit Road, Bangkok, Phrakhanong,
Bangkok 10260

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard
according to calibration procedure CP-P04, using " DKD-R 6-1 : Calibration of Pressure Gauges " as a guidelines.

Condition of this result of calibration

1. Reference standards Instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Pressure Calibrator	PC10SP	1189	MP-0218-24	24 Sep 2025

2. This result of calibration was made on requested at the point specified by customer.

3. Scale and conversion factor is 1 kPa = 4.0146293 inHgO

4. This instrument was used clean air as pressure media.

5. This instrument was calibrated by applied pressure to high-port (+) side and low-port (-) side open to atmospheric pressure.

6. This instrument was installed in vertical orientation and top of the pressure port was used as the reference level.

7. The certificate is valid only to the item calibrated on date and place of calibration.

8. This measurement result is traceable to the International System of Unit maintained through:-

-National Institute of Metrology (Thailand), NSG-ONSG Accredited No. Calibration 0144

Calibrated by: Suksan Khankaew
Issue Date: 10 September 2025

Approved Signatory:

Ahapel P

[] Phalinee Pratsapal

[] Sura Suwanmasri

[✓] Attepul Panurath

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Result of calibration: Without adjustment
Function: Pressure Measurement
Increasing Pressure

Range: 0 inHg to 36 inHg
Scale Interval: 0.1 inHg (The Second Estimate)

Applied Pressure	High-port side	UUC Indication		ΔP	Error
		Low-port side			
0.00	0.00	0.00	0.00	0.00	0.00
2.00	0.96	-1.05	2.00	0.00	0.00
4.00	1.96	-2.05	4.00	0.00	0.00
6.00	2.96	-3.05	6.00	0.00	0.00
8.00	3.96	-4.05	8.00	0.00	0.00
10.00	4.96	-5.05	10.00	0.00	0.00
12.00	5.96	-6.05	12.00	0.00	0.00
14.00	6.96	-7.05	14.00	0.05	0.05
16.00	7.96	-8.05	16.00	0.05	0.05
18.00	8.96	-9.10	18.10	0.10	0.10
20.00	10.00	-10.10	20.10	0.10	0.10
22.00	11.05	-11.10	22.15	0.15	0.15
24.00	12.05	-12.10	24.15	0.15	0.15
26.00	13.05	-13.10	26.15	0.15	0.15
28.00	14.05	-14.10	28.15	0.15	0.15
30.00	15.05	-15.05	30.10	0.10	0.10
32.00	16.10	-16.05	32.15	0.15	0.15
34.00	17.10	-17.05	34.15	0.15	0.15
35.70	18.00	-17.90	35.90	0.20	0.20

The uncertainty of measurement was ± 0.11 inHgO

* ΔP = High-port side - Low-port side

* UUC = Unit Under Calibration

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

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Certificate of Calibration

Certificate No.: 26P1518
Page: 1 of 2

Equipment: Aneroid Barometer
Manufacturer: Barigo
Model: -
Serial No.: -
ID No.: UAE.ANV.120/2550

Condition As-Received: Used Item

Received Date: 19 April 2026

Calibration Date: 22 April 2026

Reference: 2604-0316WSC

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 15) %

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Submitted by: United Analyst and Engineering Consultant Co., Ltd.

81 Soi Udomsuk 41, Sukhumvit Road, Bangkok, Phrakhanong,
Bangkok 10260

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard
according to calibration procedure CP-P10, using " DKD-R 6-1 : Calibration of Pressure Gauges " as a guidelines.

Condition of this result of calibration

1. Reference standards Instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Pressure Indicator	DPI142	1422505046	MP-0150-25	20 May 2026

2. This result of calibration was made on requested at the point specified by customer.

3. The certificate is valid only to the item calibrated on date and place of calibration.

4. This measurement result is traceable to the International System of Unit maintained through:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by: Sontchai Chaidan
Issue Date: 24 April 2026

Approved Signatory:

S Sont

[] Phalinee Pratsapal

[✓] Sura Suwanmasri

[] Attepul Panurath

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Technical information and UUC* settings during calibration:

Result of calibration: Without adjustment

Pressure type: Absolute Pressure

Installation: Vertical Orientation

Atmospheric pressure: (1004 ± 10) mbar

Range: 960 hPa to 1030 hPa

Scale Interval: 1 hPa (The Fifth Estimate)

Pressure medium: Clean air

Reference level: at the center of the dial

Increasing Pressure

Applied Pressure (hPa)	960.73	971.51	982.09	991.61	1000.93	1009.79	1019.03	1028.51
UUC* Indication (hPa)	960.0	970.0	980.0	990.0	1000.0	1010.0	1020.0	1030.0
Error (hPa)	-0.73	-1.51	-2.00	-1.61	-0.93	0.25	0.97	1.49

Decreasing Pressure

Applied Pressure (hPa)	1028.45	1018.52	1008.58	999.64	990.31	981.35	970.50	960.47
UUC* Indication (hPa)	1030.0	1020.0	1010.0	1000.0	990.0	980.0	970.0	960.0
Error (hPa)	1.55	1.48	1.42	0.36	-0.31	-1.35	-0.50	-0.47

The uncertainty of measurement was ± 0.25 hPa

* UUC = Unit Under Calibration

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

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUKHUMVIT, SUKHUMVIT, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9434



Certificate of Calibration

Certificate No.: 26H708
Page: 1 of 2

Equipment: Dial Thermo-Hygrometer
Manufacturer: Barigo
Model: -
Serial No.: -
ID No.: UAE.ANV.016/2547

Condition As-Received: Used Item
Received Date: 10 April 2026
Calibration Date: 17 April 2026
Reference: 2604-0315WSC
Ambient Temperature: (25 ± 3) °C
Relative Humidity: (50 ± 20) %

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Corporate Services 3: Equipment Calibration and Testing Services.

Submitted by: United Analyst and Engineering Consultant Co., Ltd.

81 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong,
Bangkok 10260

Procedure used: Calibration were conducted using in-house calibration procedure CP402 according to comparison
with standard chilled mirror sensor for humidity measurement function and comparison with standard
temperature probe for temperature measurement function into humidity / temperature chamber.

Condition of this result of calibration

1. Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Chilled-Mirror Hygrometer	Dew Master	41292	23277	08 May 2026
2) Handheld Thermometer With Sensor	1523	5717086	251200	21 Nov 2026

2. The certificate is valid only to the item calibrated on date and place of calibration.

3. This measurement result is traceable to the International System of Unit maintained through:-

- Thunder Scientific Corporation, NVLAP Accreditation No. Calibration 200592-0
- Technology Promotion Association (Thailand-Japan), NSC-ONSAC Accredited No. Calibration 0008

Cert. No.: 26H708
Page: 2 of 2

Result of Calibration:-

Before Adjustment					
Function: Humidity Measurement					
Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	UUC* Correction (%R.H.)	Uncertainty of Measurement (±%R.H.)	
25.0	40.1	39	1.1	1.6	
25.0	60.0	58	2.0	1.7	
25.0	80.0	75	5.0	1.9	

Result of Calibration:-

After Adjustment					
Function: Humidity Measurement					
Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	UUC* Correction (%R.H.)	Uncertainty of Measurement (±%R.H.)	
25.0	40.1	40	0.1	1.6	
25.0	60.0	60	0.0	1.7	
25.0	80.0	77	3.0	1.9	

Result of Calibration:-

Without Adjustment			
Function: Temperature Measurement			
Standard	UUC*	UUC*	Uncertainty
<u>Temperature</u>	<u>Reading</u>	<u>Correction</u>	<u>of Measurement</u>
(°C)	(°C)	(°C)	(±°C)
20.012	20.0	0.012	0.65
25.028	25.0	0.028	0.65
30.005	30.0	0.005	0.65
35.019	35.0	0.019	0.65
40.040	39.5	0.540	0.65

UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied
by coverage factor k = 2.00, providing confidence level approximately 95%.

Calibrated by: Kraisop Onrat
Issue Date: 23 April 2026

Approved Signatory:

[] Chakrit Waeewanjus
[] Pornthipha Taneyakul
[✓] Vipom Tanlayawuti

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MULTI-POINT GAS TEST REPORT

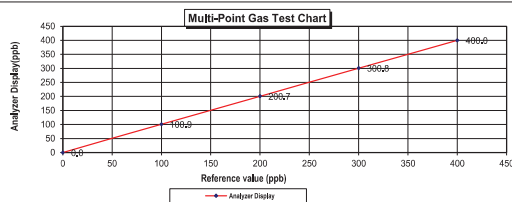
Test Date : Feb 17, 2026

Equipment : Gas Analyzer (NO₂) Model : 42i
Manufacturer : Thermo Scientific Serial Number : CM08130002

Standard Gas Concentration			Dilutor Detail	
Sulphur Dioxide (SO ₂)	42.89	PPM	Manufacturer :	Thermo Scientific
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH ₄)	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB0159156			
Expiration Date :	Nov 6, 2026			

Multi-point gas test data

Reference Value (ppb)		Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	0.90	0.89	0.89
Level 3	40.00%	200.0	0.70	0.35	0.35
Level 4	60.00%	300.0	0.80	0.27	0.27
Level 5	80.00%	400.0	0.00	0.00	0.00
Remark : Measuring Range 500.0 ppb		Average Difference (%)		0.30	



Calculate by

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Approve by

.....17.../...Feb.../...2026.



United Analyst and Engineering Consultant Co., Ltd.

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MULTI-POINT GAS TEST REPORT

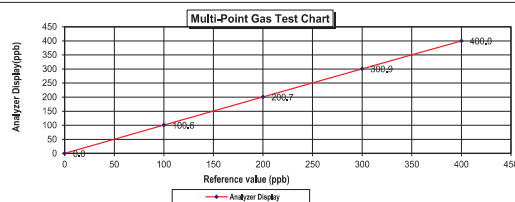
Test Date : Feb 20, 2026

Equipment : Gas Analyzer (NO₂) Model : 42i
Manufacturer : Thermo Scientific Serial Number : CM19050148

Standard Gas Concentration			Dilutor Detail	
Sulphur Dioxide (SO ₂)	42.89	PPM	Manufacturer :	Thermo Scientific
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH ₄)	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB0159156			
Expiration Date :	Nov 6, 2026			

Multi-point gas test data

	Reference Value (ppb)	Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	0.60	0.60	0.60
Level 3	40.00%	200.0	0.70	0.35	0.35
Level 4	60.00%	300.0	0.90	0.30	0.30
Level 5	80.00%	400.0	0.00	0.00	0.00
Remark : Measuring Range	500.0 ppb		Average Difference (%)		0.25



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Approve by

.....20.../...Feb.../...2026

MULTI-POINT GAS TEST REPORT

Test Date : Feb 24, 2026

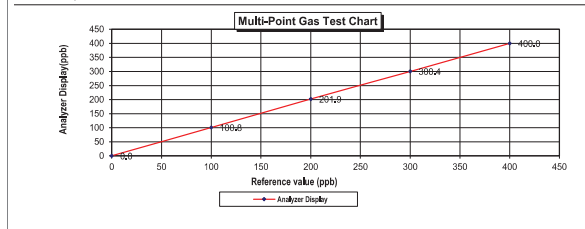
Equipment : Gas Analyzer (NO₂) Model : 42i
Manufacturer : Thermo Scientific Serial Number : CM19050149

Standard Gas Concentration

Sulphur Dioxide (SO ₂)	42.89	PPM	Manufacturer :	Thermo Scientific
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH ₄)	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB0159156			
Expiration Date :	Nov 06, 2026			

Multi-point gas test data

Level	Reference Value (ppb)	Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	0.80	0.79	0.79
Level 3	40.00%	201.9	1.90	0.94	0.94
Level 4	60.00%	300.4	0.40	0.13	0.13
Level 5	80.00%	400.0	0.00	0.00	0.00
Remark : Measuring Range			500.0 ppb	Average Difference (%)	0.37
:Acceptable Limit ± 5%					



Calculate by : 24 / 02 / 2569

Approve by : 24 / Feb / 2026

MULTI-POINT GAS TEST REPORT

Test Date : Feb 24, 2026

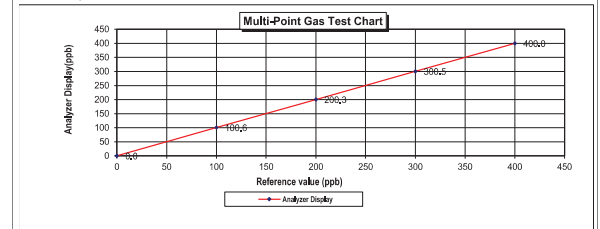
Equipment : Gas Analyzer (NO₂) Model : 42i
Manufacturer : Thermo Scientific Serial Number : CM19050150

Standard Gas Concentration

Sulphur Dioxide (SO ₂)	42.89	PPM	Manufacturer :	Thermo Scientific
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH ₄)	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB0159156			
Expiration Date :	Nov 06, 2026			

Multi-point gas test data

Level	Reference Value (ppb)	Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	0.60	0.60	0.60
Level 3	40.00%	200.3	0.30	0.15	0.15
Level 4	60.00%	300.5	0.50	0.17	0.17
Level 5	80.00%	400.0	0.00	0.00	0.00
Remark : Measuring Range			500.0 ppb	Average Difference (%)	0.18
:Acceptable Limit ± 5%					



Calculate by : 24 / 02 / 2569

Approve by : 24 / Feb / 2026

MULTI-POINT GAS TEST REPORT

Test Date : Dec 12, 2025

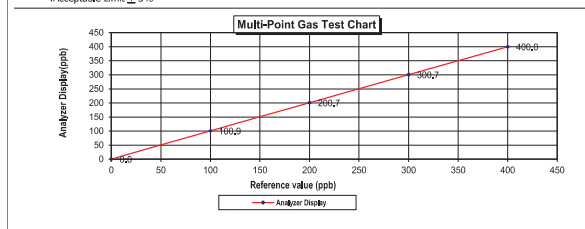
Equipment : Gas Analyzer (NO₂) Model : 42i
Manufacturer : Thermo Scientific Serial Number : CM22177051

Standard Gas Concentration

Sulphur Dioxide (SO ₂)	42.89	PPM	Manufacturer :	Thermo Scientific
Nitric Oxide (NO)	46.77	PPM	Model :	146i
Methane (CH ₄)	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	965.9			
Cylinder No. :	EB0159156			
Expiration Date :	Nov 6, 2026			

Multi-point gas test data

Level	Reference Value (ppb)	Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	0.90	0.89	0.89
Level 3	40.00%	200.7	0.70	0.35	0.35
Level 4	60.00%	300.7	0.70	0.23	0.23
Level 5	80.00%	400.0	0.00	0.00	0.00
Remark : Measuring Range			500.0 ppb	Average Difference (%)	0.29
:Acceptable Limit ± 5%					



Calculate by : 12 / 12 / 2568

Approve by : 12 / Dec / 2025

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: AIR LIQUIDE (THAILAND) LTD.
Part Number: E05N191E15A0014
Cylinder Number: EB0162121
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12023
Gas Code: CO, CO₂, NO, NO₂, SO₂, BALN

Reference Number: 160-402772205-1
Cylinder Volume: 144.0 CF
Cylinder Pressure: 2016 PSIG
Valve Outlet: 660
Certification Date: Jul 06, 2023
Expiration Date: Jul 06, 2031

Certification performed in accordance with EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012) document EPA 820-R-12-001, using the assay procedures listed. Analytical methodology does not require correction for analytical interference. This cylinder has a full analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole fraction basis unless otherwise noted. The results relate only to the items tested. The report shall not be reproduced except in full without approval of the laboratory. Do not use this cylinder below 100 psig, i.e. 6.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NO ₂	100.0 PPM	100.4 PPM	G1	+/- 0.9% NIST Traceable	06/27/2023, 07/06/2023
NITRIC OXIDE	100.0 PPM	100.2 PPM	G1	+/- 0.9% NIST Traceable	06/27/2023, 07/06/2023
SULFUR DIOXIDE	100.0 PPM	100.0 PPM	G1	+/- 1.4% NIST Traceable	06/27/2023, 07/06/2023
CARBON MONOXIDE	2000.0 PPM	199.2 PPM	G1	+/- 0.3% NIST Traceable	06/26/2023
CARBON DIOXIDE	8.000 %	7.982 %	G1	+/- 1.2% NIST Traceable	06/27/2023
NITROGEN	Balance				

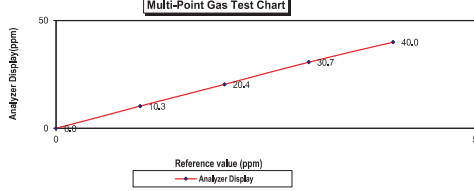
CALIBRATION STANDARDS

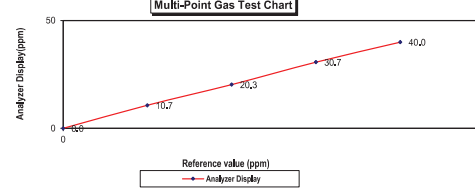
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
DMIS	104282208	CC754384	98.36 PPM NITRIC OXIDE/NITROGEN	+/- 0.4%	Jan 04, 2031
PRM	C2219101	APE1514048	100.19 PPM NITRIC OXIDE/NITROGEN	+/- 0.3%	Feb 28, 2025
DMIS	2023042526	CC754381	98.52 PPM NITRIC OXIDE/NITROGEN	+/- 0.4%	Apr 25, 2031
PRM	12409	DB13880	15.01 PPM NITROGEN DIOXIDE/AIR	+/- 1.5%	Feb 17, 2023
DMIS	13340203022	EB0130037	9.993 PPM NITROGEN DIOXIDE/NITROGEN	+/- 1.9%	Sep 29, 2023
NTRM	150103-02	KAL003820	87.69 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Nov 01, 2027
CO	230601	CC745602	249.47 PPM CARBON MONOXIDE/NITROGEN	+/- 0.3%	Dec 09, 2028
NTRM	130605-02	CC411730	13.399 % CARBON DIOXIDE/NITROGEN	+/- 0.6%	May 14, 2025

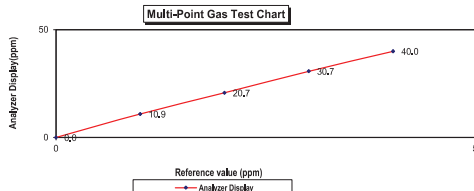
ANALYTICAL EQUIPMENT

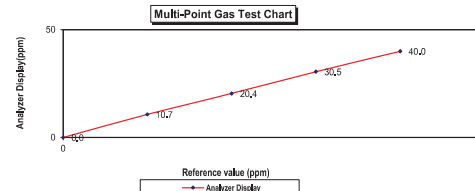
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iS50 FTIR AUP2010245 CO ₂	FTIR	Jun 15, 2023
SIEMENS ULTRAMATRE N1-CB-180	NDIR	Jun 14, 2023
Nicolet iS50 FTIR AUP2010245 NO ₂	FTIR	Jun 29, 2023
Nicolet iS50 FTIR AUP2010245 NO ₂	FTIR	Jun 15, 2023
Nicolet iS50 FTIR AUP2010245 SO ₂	FTIR	Jun 08, 2023

Approved for Release

MULTI-POINT GAS TEST REPORT					
Test Date : July 4, 2025					
Equipment : Gas Analyzer (CO)		Model : 48i			
Manufacturer : Thermo Scientific		Serial Number : CM08140003			
Standard Gas Concentration			Dilutor Detail		
Sulphur Dioxide (SO ₂)	42.89	PPM	Manufacturer :	Thermo Scientific	
Nitric Oxide (NO)	46.77	PPM	Model :	146i	
Methane (CH ₄)	-	PPM	Serial Number :	1180540071	
Carbon Monoxide (CO)	965.9	PPM			
Cylinder No. :	EB01159156				
Expiration Date :	Nov 06, 2026				
Multi-point gas test data					
Level	Reference Value (ppm)	Analyzer Display (ppm)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.0	0.0	0.0
Level 2	20.00%	10.0	0.3	2.9	2.9
Level 3	40.00%	20.0	0.4	2.0	2.0
Level 4	60.00%	30.0	0.7	2.3	2.3
Level 5	80.00%	40.0	0.0	0.0	0.0
Remark : Measuring Range 50.0 ppm			Average Difference (%) 1.43		
:Acceptable Limit $\pm$ 5%					
					
Calculate by			Approve by		
4 / 07 / 2568			4 / July / 2025		

MULTI-POINT GAS TEST REPORT					
Test Date : July 4, 2025					
Equipment : Gas Analyzer (CO)		Model : 48i			
Manufacturer : Thermo Scientific		Serial Number : CM08140004			
Standard Gas Concentration			Dilutor Detail		
Sulphur Dioxide (SO ₂)	42.89	PPM	Manufacturer :	Thermo Scientific	
Nitric Oxide (NO)	46.77	PPM	Model :	146i	
Methane (CH ₄)	-	PPM	Serial Number :	1180540071	
Carbon Monoxide (CO)	965.9	PPM			
Cylinder No. :	EB01159156				
Expiration Date :	Nov 06, 2026				
Multi-point gas test data					
Level	Reference Value (ppm)	Analyzer Display (ppm)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.0	0.0	0.0
Level 2	20.00%	10.0	0.7	6.5	6.5
Level 3	40.00%	20.0	0.3	1.5	1.5
Level 4	60.00%	30.0	0.7	2.3	2.3
Level 5	80.00%	40.0	0.0	0.0	0.0
Remark : Measuring Range 50.0 ppm			Average Difference (%) 2.06		
:Acceptable Limit $\pm$ 5%					
					
Calculate by			Approve by		
4 / 07 / 2568			4 / July / 2025		

MULTI-POINT GAS TEST REPORT					
Test Date : July 11, 2025					
Equipment : Gas Analyzer (CO)		Model : 48i			
Manufacturer : Thermo Scientific		Serial Number : 1180540068			
Standard Gas Concentration			Dilutor Detail		
Sulphur Dioxide (SO ₂)	42.89	PPM	Manufacturer :	Thermo Scientific	
Nitric Oxide (NO)	46.77	PPM	Model :	146i	
Methane (CH ₄)	-	PPM	Serial Number :	1180540071	
Carbon Monoxide (CO)	965.9	PPM			
Cylinder No. :	EB01159156				
Expiration Date :	Nov 06, 2026				
Multi-point gas test data					
Level	Reference Value (ppm)	Analyzer Display (ppm)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.0	0.0	0.0
Level 2	20.00%	10.0	0.9	8.3	8.3
Level 3	40.00%	20.0	0.7	3.4	3.4
Level 4	60.00%	30.0	0.7	2.3	2.3
Level 5	80.00%	40.0	0.0	0.0	0.0
Remark : Measuring Range 50.0 ppm			Average Difference (%) 2.78		
:Acceptable Limit $\pm$ 5%					
					
Calculate by			Approve by		
11 / 07 / 2568			11 / July / 2025		

MULTI-POINT GAS TEST REPORT					
Test Date : July 17, 2025					
Equipment : Gas Analyzer (CO)		Model : 48i			
Manufacturer : Thermo Scientific		Serial Number : 1180540069			
Standard Gas Concentration			Dilutor Detail		
Sulphur Dioxide (SO ₂)	42.89	PPM	Manufacturer :	Thermo Scientific	
Nitric Oxide (NO)	46.77	PPM	Model :	146i	
Methane (CH ₄)	-	PPM	Serial Number :	1180540071	
Carbon Monoxide (CO)	965.9	PPM			
Cylinder No. :	EB01159156				
Expiration Date :	Nov 06, 2026				
Multi-point gas test data					
Level	Reference Value (ppm)	Analyzer Display (ppm)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.0	0.0	0.0
Level 2	20.00%	10.0	0.7	6.5	6.5
Level 3	40.00%	20.0	0.4	2.0	2.0
Level 4	60.00%	30.0	0.5	1.6	1.6
Level 5	80.00%	40.0	0.0	0.0	0.0
Remark : Measuring Range 50.0 ppm			Average Difference (%) 2.03		
:Acceptable Limit $\pm$ 5%					
					
Calculate by			Approve by		
17 / 07 / 2568			17 / July / 2025		

MULTI-POINT GAS TEST REPORT

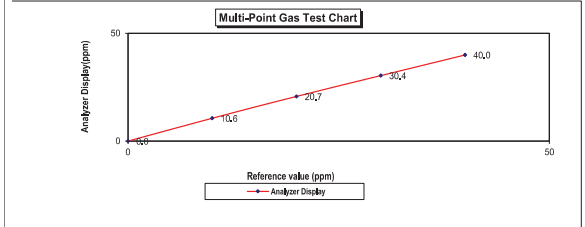
Test Date : July 9, 2025

Equipment : Gas Analyzer (CO) Model : 481
Manufacturer : Thermo Scientific Serial Number : 1180540074

Standard Gas Concentration		Dilutor Detail	
Sulphur Dioxide (SO ₂)	42.89	PPM	Manufacturer : Thermo Scientific
Nitric Oxide (NO)	46.77	PPM	Model : 1461
Methane (CH ₄)	-	PPM	Serial Number : 1180540071
Carbon Monoxide (CO)	965.9	PPM	
Cylinder No. :	EB01159156		
Expiration Date :	Nov 06, 2026		

Multi-point gas test data

Reference Value (ppm)			Analyzer Display (ppm)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.0	0.0	0.0	0.0
Level 2	20.00%	10.0	10.6	0.6	5.7	5.7
Level 3	40.00%	20.0	20.7	0.7	3.4	3.4
Level 4	60.00%	30.0	30.4	0.4	1.3	1.3
Level 5	80.00%	40.0	40.0	0.0	0.0	0.0
Remark : Measuring Range			50.0 ppm	Average Difference (%) 2.07		



Calculate by
.....9.....07.....2568..

Approve by
.....9.....07.....2025..



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 17 April, 2026

Certification No. 226/26

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : LSI Lastem ID No. : UAE.EFM.119/2563

Type : Data Logger E-LOG 305 wind speed and wind direction DNA 821

Serial No. : Data Logger 20020305 wind speed and wind direction 20040161

Customer : United Analyst and Engineering Consultant Co., Ltd.

81 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Prakanong, Bangkok 10260.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1006.8 hPa

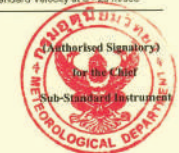
NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119
: HOOK GAGE NO 1425 Pilot Tube Theodor Friedrichs Type 0800.0000 serial 9023
N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec
: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by : Hatharapol Subwat
Mr. Watcharapol Subwat
Mechanical Engineer

Signed :
Mr. Pigeod Promsit



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Certification No. 226/26

17 April, 2026

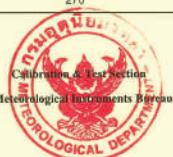
Page : 2 of 2

Standard		HOOK GAGE NO. 1425		TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacuum	Velocity	Velocity	Correction
m/sec	inches H ₂ O	inches H ₂ O	m/sec	m/sec	m/sec
1.00	-	-	-	1.0	0.00
3.02	-	-	-	2.9	0.12
5.00	-	-	-	5.0	0.00
7.04	-	-	-	6.9	0.14
9.02	-	-	-	9.0	0.02
11.01	-	-	-	11.0	0.01
13.01	-	-	-	13.0	0.01
15.01	-	-	-	15.0	0.01
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.0	0.02

Vane Angel Bench Stand Model 18112	
Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : Hatharapol Subwat
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 22 April, 2026

Certification No. 232/26

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : LSI Lastem ID No. : UAE.EFM.120/2563

Type : Data Logger E-LOG 305 wind speed and wind direction DNA 821

Serial No. : Data Logger 20040002 wind speed and wind direction 20040162

Customer : United Analyst and Engineering Consultant Co., Ltd.

81 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Prakanong, Bangkok 10260.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1010.1 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119
: HOOK GAGE NO 1425 Pilot Tube Theodor Friedrichs Type 0800.0000 serial 9023
N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec
: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by : Hatharapol Subwat
Mr. Watcharapol Subwat
Mechanical Engineer

Signed :
Mr. Pigeod Promsit





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Certification No. 232/26

22 April, 2026

Page : 2 of 2

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
Ultrasonic Anemometer	m/sec	inches H ₂ O	inches H ₂ O	m/sec	m/sec
1.00	-	-	-	1.0	0.00
3.02	-	-	-	3.0	0.02
5.00	-	-	-	5.0	0.00
7.04	-	-	-	7.0	0.04
9.02	-	-	-	9.0	0.02
11.01	-	-	-	11.0	0.01
13.01	-	-	-	13.0	0.01
15.01	-	-	-	15.0	0.01
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.0	0.02

Vane Angel Bench Stand Model 18112	
Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer



เอกสารไม่ควบคุม



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 22 April, 2026

Certification No. 233/26

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : LSI Lastem ID No. : UAE.EFM.124/2563

Type : Data Logger E-LOG 305 wind speed and wind direction DNA 821

Serial No. : Data Logger 20040007 wind speed and wind direction 20040167

Customer : United Analyst and Engineering Consultant Co., Ltd.
81 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Prakanong, Bangkok 10260.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1010.5 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0900.0000 serial 9023

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Signed :

Mr. Pirood Promsat



เอกสารไม่ควบคุม



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Certification No. 233/26

22 April, 2026

Page : 2 of 2

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
Ultrasonic Anemometer	m/sec	inches H ₂ O	inches H ₂ O	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.9	0.12
5.00	-	-	-	4.9	0.10
7.04	-	-	-	7.0	0.04
9.02	-	-	-	9.0	0.02
11.01	-	-	-	11.0	0.01
13.01	-	-	-	13.0	0.01
15.01	-	-	-	15.0	0.01
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.0	0.02

Vane Angel Bench Stand Model 18112	
Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer



เอกสารไม่ควบคุม



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 17 April, 2026

Certification No. 228/26

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : LSI Lastem ID No. : UAE.EFM.125/2563

Type : Data Logger E-LOG 305 wind speed and wind direction DNA 821

Serial No. : Data Logger 20040026 wind speed and wind direction 20040177

Customer : United Analyst and Engineering Consultant Co., Ltd.
81 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Prakanong, Bangkok 10260.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1007.5 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0900.0000 serial 9023

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Signed :

Mr. Pirood Promsat



เอกสารไม่ควบคุม



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Certification No. 228/26

17 April, 2026

Page : 2 of 2

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
Ultrasonic Anemometer	m/sec	inches H ₂ O	inches H ₂ O	m/sec	m/sec
1.00	-	-	-	1.0	0.00
3.02	-	-	-	3.0	0.02
5.00	-	-	-	5.0	0.00
7.04	-	-	-	7.0	0.04
9.02	-	-	-	9.0	0.02
11.01	-	-	-	11.0	0.01
13.01	-	-	-	13.0	0.01
15.01	-	-	-	15.0	0.01
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.0	0.02

Vane Angel Bench Stand Model 18112	
Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

เอกสารไม่ควบคุม



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 22 April, 2026

Certification No. 234/26

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : LSI Lastem ID No. : UAE.EFM.126/2563

Type : Data Logger E-LOG 305 wind speed and wind direction DNA 821

Serial No. : Data Logger 20040027 wind speed and wind direction 20040178

Customer : United Analyst and Engineering Consultant Co., Ltd.
81 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Prakanong, Bangkok 10260.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1010.9 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0009 serial 9023

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 ~ 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 20 ~ 30 m/sec

Calibrated by :

Mr. Watcharapol Subwat
Mechanical Engineer

Signed :

Mr. Pisood Premrut

Calibration & Test Section
Meteorological Instruments Bureau

เอกสารไม่ควบคุม



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Certification No. 234/26

22 April, 2026

Page : 2 of 2

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
Ultrasonic Anemometer	m/sec	inches H ₂ O	inches H ₂ O	m/sec	m/sec
1.00	-	-	-	1.0	0.00
3.02	-	-	-	3.0	0.02
5.00	-	-	-	5.0	0.00
7.04	-	-	-	7.0	0.04
9.02	-	-	-	9.0	0.02
11.01	-	-	-	11.0	0.01
13.01	-	-	-	13.0	0.01
15.01	-	-	-	15.0	0.01
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.1	-0.08

Vane Angel Bench Stand Model 18112	
Young Meteorological Instruments	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

เอกสารไม่ควบคุม

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
719 MOO 11, SOI 11, TAMBON BANG KHAO,
AMPHOE BANG PHU SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL : 0800-2116-9800-1 FAX: 0800-2116-7140



Page 1 of 2

Certificate of Calibration

Customer

Name : UNITED ANALYST AND ENGINEERING
CONSULTANT CO., LTD.
Address : 81 Soi Udomsuk 41, Sukhumvit Road, Bangchak,
Prakanong, Bangkok 10260

Certificate No : 26-ACT-062

Request No : Req-2026-0826

Unit Under Calibration Details

Measurement item : Acoustic Calibrator
Manufacturer : LARSON DAVIS
Model : CAL150
Serial Number : 6171
ID : UAE.EFM.117/2562

Class : 2

Range : 94, 114 dB / 1000 Hz

Instrument Status : Used

Calibration Environment and Details

Temperature : (23 ± 2 °C)
Humidity : (50 ± 20 %RH)
Barometric Pressure : (1013 ± 10.0 hPa)
Received Date : 25 March 2026
Calibration Date : 6 April 2026

Location of Calibration : LAB 1 Acoustic

Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEL	20 June 2026
THD Multimeter	2015	1047765	NIMT	22 January 2027

Traceability : This certificate provides traceability of measurement to recognized national standard, and to the realization of the international System of Units (SI).

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k=2$, providing a level of confidence approximately 95 %.

Calibrated By :

Mr. Noppadon Luangart
Service Calibration Engineer

Approved By :

Mr. Pacil Mathavorn
Calibration Engineer Supervisor

Issue Date : 6 April 2026

เอกสารไม่ควบคุม

Certificate No : 26-ACT-062

Request No : Req-2026-0826

Sound pressure level

Calibration Results : Without Adjustment

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty (± dB)
	Measured	Deviated value	Measured	Deviated value	
94 dB / 1000 Hz	94.00	0.00	-	-	0.12
114 dB / 1000 Hz	113.99	-0.01	-	-	0.13

Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)
	Measured (Hz)	Deviated value (%)	Measured (Hz)	Deviated value (%)	
94 dB / 1000 Hz	1000.00	0.00	-	-	0.010
114 dB / 1000 Hz	1000.00	0.00	-	-	0.010

Total Harmonic Distortion plus Noise of Sound pressure level (THD+N %)

Calibration Range (Hz)	Without Adjustment	Adjustment	Uncertainty (± %)
	Measured (%)	Measured (%)	
94 dB / 1000 Hz	1.86	-	0.17
114 dB / 1000 Hz	0.51	-	0.17

Note :

- The calibration results exclude the calibrator pressure correction
- The calibration results exclude the microphone volume correction

End of Calibration

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-708-ACT-01 Rev.04 Issue date 17/2/25

เอกสารไม่ควบคุม

Certificate of Calibration

Customer

Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address : 81 Soi Udommik 41, Sukhumvit Road, Bangchak, Prakanong, Bangkok 10260

Certificate No : 25-SLM-272
Request No : Req-2025-1706

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : LARSON DAVIS
Model : Lx72
Serial Number : 005286
ID : UAEJFM102/2562
Resolution : 0.1 dB
Microphone Class : 2
Microphone Model : 375B02
Microphone S/N : 011740
Preamplifier Model : PRMLs12B
Preamplifier S/N : 056087
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 22 July 2025
Calibrated Date : 11 August 2025
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3:2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Multifunction Acoustic Calibrator	Briel&Kjaer	4226	3412381	8 May 2026	NIMT
Audio Generator	Svanick	Svan401	131	15 October 2025	WK Electric

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k = 2, providing a level of confidence approximately 95 %.

Calibrated By : Mr. Nopphon Luangat
Service Calibration Engineer

Approved By : Mr. Puck Mathaveon
Calibration Engineer Supervisor
Issue Date : 11 August 2025

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-708-SLM-01 Rev.06 Issue date 17/2/25

เอกสารไม่ควบคุม

Certificate No : 25-SLM-272

Request No : Req-2025-1706

1. Indication at the calibration check frequency

UUC Setting	Nominal Level	Before Adjust		After Adjust		UNCERTAINTY (± dB)
		UUC	ERR	UUC	ERR	
FAST / A / 37-139	(dB)	(dB)	(dB)	(dB)	(dB)	0.20
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	
1000 Hz 114 dB	114.13	114.9	0.77	114.1	-0.03	0.20

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 36, SN. 107224

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139	(dB)	(± dB)
UUC Weighting	(dB)	(± dB)
A	31.5	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139	(dB)	(± dB)
UUC Weighting	(dB)	(± dB)
A	31.2	0.10
C	30.7	0.10
Z	35.1	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)
	A	C	Z	
FAST / 37-139	(dB)	(dB)	(dB)	0.60
STD Setting	(dB)	(dB)	(dB)	
125 Hz	0.2	0.2	0.2	
1000 Hz	0.0	0.0	0.0	
4000 Hz	1.6	1.7	1.7	
8000 Hz	2.3	2.3	2.3	0.70

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-708-SLM-01 Rev.06 Issue date 17/2/25

เอกสารไม่ควบคุม

Certificate No : 25-SLM-272

Request No : Req-2025-1706

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY (± dB)
	A	C	Z	
FAST / 37-139	(dB)	(dB)	(dB)	0.20
STD Setting	(dB)	(dB)	(dB)	
63 Hz	-0.2	0.0	0.0	
125 Hz	-0.1	0.0	0.0	
250 Hz	-0.1	0.0	0.0	
500 Hz	-0.1	0.0	0.0	
1000 Hz	0.0	0.0	0.0	
2000 Hz	0.0	0.0	0.0	
4000 Hz	0.0	0.0	0.0	
8000 Hz	0.0	0.0	0.0	
16000 Hz	-0.1	-0.1	-0.1	

6. Frequency and time weightings at 1kHz

UUC Setting	STD REF	Measured		UNCERTAINTY (± dB)
		UUC	ERR	
FAST / 37-139	(dB)	(dB)	(dB)	0.20
UUC Weighting	(dB)	(dB)	(dB)	
A	114.00	114.0	0.0	
C	114.00	114.0	0.0	0.20
Z	114.00	114.0	0.0	

UUC Setting	STD REF	Measured		UNCERTAINTY (± dB)
		UUC	ERR	
37-139 / A	(dB)	(dB)	(dB)	0.20
UUC Time Response	(dB)	(dB)	(dB)	
Fast	114.00	114.0	0.0	
Slow	114.00	114.0	0.0	
Log	114.00	114.0	0.0	0.20

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-708-SLM-01 Rev.06 Issue date 17/2/25

เอกสารไม่ควบคุม

Certificate No : 25-SLM-272
Request No : Req-2025-1706

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	
STD Setting	(dB)	(± dB)
Initial	114.0	
Final	114.0	
Deviated	0.0	0.10

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY
FAST / A / 37-139	REF	UUC	ERR
STD dB	(dB)	(dB)	(dB)
			(± dB)
139.00	139	139.0	0.0
134.00	134	134.0	0.0
129.00	129	129.0	0.0
124.00	124	124.0	0.0
119.00	119	119.0	0.0
114.00	114	114.0	0.0
109.00	109	109.0	0.0
104.00	104	104.0	0.0
99.00	99	99.0	0.0
94.00	94	94.0	0.0
89.00	89	89.0	0.0
84.00	84	84.0	0.0
79.00	79	79.0	0.0
74.00	74	74.0	0.0
69.00	69	69.0	0.0
64.00	64	64.0	0.0
59.00	59	59.0	0.0
54.00	54	54.0	0.0
49.00	49	49.1	0.1
44.00	44	44.2	0.2
41.00	43	43.1	0.3
42.00	42	42.4	0.4
41.00	41	41.5	0.5

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FIM-708-SLM-01 Rev.00 Issue date 17/12/21

เอกสารไม่ควบคุม

Certificate No : 25-SLM-272
Request No : Req-2025-1706

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY
FAST / A	REF	UUC	ERR
UUC Range	(dB)	(dB)	(dB)
			(± dB)
37-139	46.60	48.7	0.1
	114	114.0	0.0

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY
A / 37-139	Toneburst	Ref	UUC	ERR
UUC Time Response	(ms)	(dB)	(dB)	(dB)
				(± dB)
Fast	200	135.0	134.8	-0.1
	2	118.0	117.8	-0.2
	0.25	109.0	108.5	-0.5
Slow	200	128.6	128.4	-0.2
	2	109.0	108.8	-0.2
	200	129.0	129.0	0.0
SEL	2	109.0	108.9	-0.1
	0.25	100.0	99.8	-0.2

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY
FAST / C / 95-142	REF	UUC	ERR
STD Setting	(dB)	(dB)	(dB)
			(± dB)
Complete cycle	137.4	136.8	-0.60
Positive half cycle	136.4	136.2	-0.20
Negative half cycle	136.4	136.2	-0.20

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FIM-708-SLM-01 Rev.00 Issue date 17/12/21

เอกสารไม่ควบคุม

Certificate No : 25-SLM-272
Request No : Req-2025-1706

12. Overload indication

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	
STD Setting	(dB)	(± dB)
Positive one-half cycle	145.3	
Negative one-half cycle	145.6	
Deviated	-0.1	0.20

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	
STD Setting	(dB)	(± dB)
Initial	138.0	
Final	138.0	
Deviated	0.0	0.10

End of Certificate

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FIM-708-SLM-01 Rev.00 Issue date 17/12/21

เอกสารไม่ควบคุม

Certificate of Calibration

Customer

Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address : RT Sai Udomsak 41, Sukhumvit Road, Bangchak, Prakarong, Bangkok 10260
Certificate No : 25-SLM-241
Request No : Req-2025-1240

Unit Under Calibration Details

Measurement Item : Sound Level Meter
Microphone Class : 2
Manufacturer : LARSON DAVIS
Microphone Model : 375A04
Model : LxT2
Microphone S/N : 339427
Serial Number : 0005287
Preamplifier Model : PRMLxT2B
ID : UAE-FPM.1032562
Preamplifier S/N : 056074
Resolution : 0.1 dB
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 16 July 2025
Calibrated Date : 29 July 2025
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	S/N	Due calibration	Traceability
Multi-function Acoustic Calibrator	Bruel&Kjaer	4226	3412381	8 May 2026	NIMT
Audio Generator	Svanick	Scan401	131	15 October 2025	WK Electric

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %

Calibrated By :
Mr. Nopphon Luangrat
Service Calibration Engineer

Approved By :
Mr. Paet Mahasorn
Calibration Engineer Supervisor
Issue Date : 29 July 2025

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FIM-708-SLM-01 Rev.00 Issue date 17/12/21

เอกสารไม่ควบคุม

Certificate No : 25-SLM-241
Request No : Req-2025-1240

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust	After Adjust	UNCERTAINTY
FAST / A / 37-139	Level	UUC	UUC	ERR
Calibrator Setting	(dB)	(dB)	(dB)	(dB)
1000 Hz 114.0dB	114.68	115.2	0.52	114.7
			0.02	0.20

Note: Absolute sensitivity was established by the use of Sound Calibrator Brand 3M, Model AC-300; SN: AC-300001087

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139		
UUC Weighting	(dB)	(± dB)
A	27.4	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139		
UUC Weighting	(dB)	(± dB)
A	27.2	0.10
C	27.9	0.10
Z	34.6	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY
FAST / 37-139	A C Z	(± dB)
STD Setting	(dB) (dB) (dB)	
125 Hz	0.4 0.3 0.3	0.60
1000 Hz	0.0 0.0 0.0	0.60
4000 Hz	0.1 0.1 0.1	0.60
8000 Hz	-0.3 -0.3 -0.2	0.70

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
P06-708-01.34-01 Rev.06 Issue date 17/2/21

เอกสารไม่ควบคุม

Certificate No : 25-SLM-241
Request No : Req-2025-1240

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY
FAST / 37-139	A (dB) C (dB) Z (dB)	(± dB)
STD Setting		
63 Hz	0.2 0.2 0.2	
125 Hz	0.1 0.2 0.2	
250 Hz	0.0 0.1 0.1	
500 Hz	0.0 0.1 0.0	
1000 Hz	0.0 0.0 0.0	0.20
2000 Hz	0.0 0.0 0.0	
4000 Hz	-0.1 -0.1 -0.1	
8000 Hz	-0.2 -0.2 -0.1	
16000 Hz	-0.2 -0.2 -0.3	

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured	UNCERTAINTY
FAST / 37-139	REF	UUC ERR	(± dB)
UUC Weighting	(dB)	(dB) (dB)	
A	114.00	114.0 0.0	
C	114.00	114.0 0.0	0.20
Z	114.00	114.0 0.0	

UUC Setting	STD	Measured	UNCERTAINTY
37-139 / A	REF	UUC ERR	(± dB)
UUC Time Response	(dB)	(dB) (dB)	
Fast	114.00	114.0 0.0	
Slow	114.00	114.0 0.0	0.20
Imp	114.00	114.0 0.0	

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
P06-708-01.34-01 Rev.06 Issue date 17/2/21

เอกสารไม่ควบคุม

Certificate No : 25-SLM-241
Request No : Req-2025-1240

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	
STD Setting	(dB)	(± dB)
Initial	114.0	
Final	114.0	
Deviated	0.0	0.10

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY
FAST / A / 37-139	REF	UUC ERR	(± dB)
STD dB	(dB)	(dB) (dB)	
110.00	139	139.0 0.0	
134.00	134	134.0 0.0	
129.00	129	129.0 0.0	
124.00	124	124.0 0.0	
119.00	119	119.0 0.0	
114.00	114	114.0 0.0	
109.00	109	109.0 0.0	
104.00	104	104.0 0.0	
99.00	99	99.0 0.0	
94.00	94	93.9 -0.1	
89.00	89	88.9 -0.1	
84.00	84	83.9 -0.1	
79.00	79	78.9 -0.1	
74.00	74	73.9 -0.1	
69.00	69	68.9 -0.1	
64.00	64	63.9 -0.1	
59.00	59	58.9 -0.1	
54.00	54	54.0 0.0	
49.00	49	49.0 0.0	
44.00	44	44.0 0.0	
39.00	39	39.3 0.3	
34.00	34	34.3 0.3	
29.00	29	29.4 0.4	
24.00	24	24.5 0.5	

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
P06-708-01.34-01 Rev.06 Issue date 17/2/21

เอกสารไม่ควบคุม

Certificate No : 25-SLM-241
Request No : Req-2025-1240

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY
FAST / A	REF	UUC ERR	(± dB)
UUC Range	(dB)	(dB) (dB)	
37-139	42.00	42.1 0.1	
	114	114.0 0.0	0.30

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY
A / 37-139	Toneburst	Ref	UUC ERR	(± dB)
UUC Time Response	(ms)	(dB)	(dB) (dB)	
Fast	200	135.0	134.9 -0.1	
	2	118.0	117.9 -0.1	
	0.25	109.0	108.7 -0.3	
Slow	200	128.6	128.4 -0.2	
	2	109.0	108.8 -0.2	
	200	129.0	129.0 0.0	0.20
SEL	2	109.0	109.1 -0.1	
	0.25	100.0	99.9 -0.1	

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY
FAST / C / 95-142	REF	UUC ERR	(± dB)
STD Setting	(dB)	(dB) (dB)	
Complete cycle	137.4	136.8 -0.60	
Positive half cycle	136.4	136.2 -0.20	
Negative half cycle	136.4	136.2 -0.20	0.20

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
P06-708-01.34-01 Rev.06 Issue date 17/2/21

เอกสารไม่ควบคุม

Certificate No : 25-SLM-241
Request No : Req-2025-1240

12. Overload indication

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	(± dB)
STD Setting	(dB)	
Positive one-half cycle	140.8	
Negative one-half cycle	140.6	
Deviated	0.2	

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	(± dB)
STD Setting	(dB)	
Initial	138.0	
Final	138.0	
Deviated	0.0	

End of Certificate

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
PHE-709-03.34-01 Rev.06 Issue date 17/2/21

เอกสารไม่ควบคุม

Certificate of Calibration

Customer
Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address : 81 Soi Udomsak 41, Sukhumvit Road, Bangkok, Peckong, Bangkok 10260
Certificate No : 25-SLM-242
Request No : Req-2025-1241

Unit Under Calibration Details
Measurement Item : Sound Level Meter
Manufacturer : LARSON DAVIS
Model : Lx32
Serial Number : 0005288
ID : UAE-EFM-104/2562
Resolution : 0.1 dB
Microphone Class : 2
Microphone Model : 375B02
Microphone S/N : 011731
Preamplifier Model : PKMLs12B
Preamplifier S/N : 056075
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 16 July 2025
Calibrated Date : 29 July 2025
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN	Due calibration	Traceability
Multifunction Acoustic Calibrator	Brüel&Kjaer	4226	3412381	6 May 2026	NDMT
Audio Generator	Svanick	Svan401	131	15 October 2025	WK Electric

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %

Calibrated By :
Mr. Noppadol Luangrat
Service Calibration Engineer

Approved By :
Mr. Paet Mathavorn
Calibration Engineer Supervisor
Issue Date : 29 July 2025

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
PHE-709-03.34-01 Rev.06 Issue date 17/2/21

เอกสารไม่ควบคุม

Certificate No : 25-SLM-242
Request No : Req-2025-1241

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust	After Adjust	UNCERTAINTY
FAST / A / 37-139	Level	UUC	UUC	(± dB)
Calibrator Setting	(dB)	(dB)	(dB)	
1000 Hz 114 dB	114.68	115.2	114.7	
		ERR	ERR	
		(dB)	(dB)	

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand 3M, Model AC-500, SN: AC-300001087

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139	UUC	(± dB)
UUC Weighting	(dB)	
A	30.8	

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139	UUC	(± dB)
UUC Weighting	(dB)	
A	30.6	
C	30.2	
Z	34.3	

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY
FAST / 37-139	A C Z	(± dB)
STD Setting	(dB) (dB) (dB)	
125 Hz	0.1 0.1 0.1	
1000 Hz	0.0 0.0 0.0	
4000 Hz	1.6 1.6 1.6	
8000 Hz	2.2 2.2 2.3	

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
PHE-709-03.34-01 Rev.06 Issue date 17/2/21

เอกสารไม่ควบคุม

Certificate No : 25-SLM-242
Request No : Req-2025-1241

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY
FAST / 37-139	A (dB) C (dB) Z (dB)	(± dB)
STD Setting	(dB) (dB) (dB)	
63 Hz	-0.1 0.0 0.0	
125 Hz	-0.1 0.1 0.0	
250 Hz	-0.1 0.0 0.0	
500 Hz	0.0 0.1 0.0	
1000 Hz	0.0 0.0 0.0	
2000 Hz	0.1 0.1 0.0	
4000 Hz	0.0 0.1 0.1	
8000 Hz	0.0 0.0 0.1	
16000 Hz	0.0 0.0 -0.1	

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured	UNCERTAINTY
FAST / 37-139	REF	UUC ERR	(± dB)
UUC Weighting	(dB)	(dB) (dB)	
A	114.00	114.0 0.0	

UUC Setting	STD	Measured	UNCERTAINTY
37-139 / A	REF	UUC ERR	(± dB)
UUC Time Response	(dB)	(dB) (dB)	
Fast	114.00	114.0 0.0	
Slow	114.00	114.0 0.0	

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
PHE-709-03.34-01 Rev.06 Issue date 17/2/21

เอกสารไม่ควบคุม

Certificate No : 25-SLM-242
Request No : Req-2025-1241

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	
STD Setting	(dB)	(± dB)
Initial	114.0	
Final	114.0	
Deviated	0.0	0.10

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY
FAST / A / 37-139	REF	UUC	ERR
STD dB	(dB)	(dB)	(dB)
			(± dB)
139.00	139	139.0	0.0
134.00	134	134.0	0.0
129.00	129	129.0	0.0
124.00	124	124.0	0.0
119.00	119	119.0	0.0
114.00	114	114.0	0.0
109.00	109	109.0	0.0
104.00	104	104.0	0.0
99.00	99	99.0	0.0
94.00	94	94.0	0.0
89.00	89	89.0	0.0
84.00	84	84.0	0.0
79.00	79	79.0	0.0
74.00	74	74.0	0.0
69.00	69	69.0	0.0
64.00	64	64.0	0.0
59.00	59	59.0	0.0
54.00	54	54.1	0.1
49.00	49	49.1	0.1
44.00	44	44.2	0.2
40.00	40	40.3	0.3

The results related only to the items calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

File: 708-00.00-01 Rev.06 Issue date: 17/2/25

เอกสารไม่ควบคุม

Certificate No : 25-SLM-242
Request No : Req-2025-1241

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY
FAST / A	REF	UUC	ERR
UUC Range	(dB)	(dB)	(dB)
			(± dB)
37-139	45.20	45.4	0.2
	114	114.0	0.0

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY
A / 37-139	Toneburst	Ref	UUC	ERR
UUC Time Response	(ms)	(dB)	(dB)	(dB)
				(± dB)
Fast	200	135.0	134.9	-0.1
	2	118.0	117.8	-0.2
	0.25	109.0	108.7	-0.3
Slow	200	128.6	128.4	-0.2
	2	109.0	108.8	-0.2
	200	129.0	129.0	0.0
SPL	2	109.0	108.9	-0.1
	0.25	100.0	99.8	-0.2

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY
FAST / C / 95-142	REF	UUC	ERR
STD Setting	(dB)	(dB)	(dB)
			(± dB)
Complete cycle	137.4	136.7	-0.70
Positive half cycle	136.4	136.1	-0.30
Negative half cycle	136.4	136.1	-0.30

The results related only to the items calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

File: 708-00.00-01 Rev.06 Issue date: 17/2/25

เอกสารไม่ควบคุม

Certificate No : 25-SLM-242
Request No : Req-2025-1241

12. Overload indication

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	
STD Setting	(dB)	(± dB)
Positive one-half cycle	142.5	
Negative one-half cycle	142.4	
Deviated	0.1	0.20

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	
STD Setting	(dB)	(± dB)
Initial	138.0	
Final	138.0	
Deviated	0.0	0.10

End of Certificate

The results related only to the items calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

File: 708-00.00-01 Rev.06 Issue date: 17/2/25

เอกสารไม่ควบคุม

Certificate No.: CP20240341EA
Operation No.: CP2024090312

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: Larson Davis (Meter), PCB (Microphone), PCB (Preamplifier)
Model/Type: LX72 (Meter), 375802 (Microphone), PRLX72B (Preamplifier)
Serial No.: 0005298 (Meter), 011741 (Microphone), 056088 (Preamplifier)
ID No.: UAE.EFM.113/2562
Customer: United Analyst and Engineering Consultant Co.,Ltd.
Address: 81 Soi Udomsuk 41, Sukhumvit Road, Bangchak
Phrakhanong, Bangkok 10260
Received Date: 3 September 2024
Calibrated Date: 23 - 25 September 2024
Issued Date: 26 September 2024
Calibrated by: Ms. Juntaporn Kunhakom

Approved by: 
(Mr. Sittichai Swaksuriyawong)
Group Manager

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

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F-CAL-004 Ed.1

เอกสารไม่ควบคุม



Certificate No.: CP20240341EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: Larson Davis (Meter), PCB (Microphone), PCB (Preamplifier)
Model/Type: LX72 (Meter), 375B02 (Microphone), PRLxT28 (Preamplifier)
Serial No.: 0005298 (Meter), 011741 (Microphone), 056088 (Preamplifier)
ID No.: UAEFPM.113/2562
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration: IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument >

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2787490	AA-1012-23	12 November 2024
2) Arbitrary Function Generator	AFG2021	C010063	CK20240048EA	23 June 2025
3) Programmable Attenuator	PA5	2755	EF-0040-23	1 October 2024
4) 6.5 Digit precision multimeter	8846A	9610014	CB20230200EA	15 November 2024
5) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P240022 CD20240180EA	20 March 2025 7 August 2025
6) Performance Audio Analyzer	U8903B	MY56510003	CB20240035EB CK20240069EA	13 February 2025 19 September 2025

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

3. This certification is traceable to the international system of unit maintained at >

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Reference standards instrument for Electrical function

- National Institute of Metrology (Thailand)

- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:

Function : 1. Indication at the calibration check frequency

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



Certificate No.: CP20240341EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Measured value (dB)
31.1

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting (dB)	Measured value (dB)
A-weighting	31.1
C-weighting	31.0
Z-weighting	36.5

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

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

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
125	0.2	0.1	0.1	±1.5
1000	0.3	0.3	0.3	±1.0
8000	1.3	1.2	1.3	±5.0

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

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

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

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



Certificate No.: CP20240341EA

Calibration Report

5.2 Time weighting at 1 kHz

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

Function : 6. Long-Term Stability

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

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

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±1.1
99.0	99.0	0.0	±1.1
104.0	104.0	0.0	±1.1
109.0	109.0	0.0	±1.1
114.0	114.0	0.0	±1.1
119.0	119.0	0.0	±1.1
124.0	124.0	0.0	±1.1
129.0	129.0	0.0	±1.1
134.0	134.1	0.1	±1.1
139.0	139.1	0.1	±1.1
140.0	140.1	0.1	±1.1
141.0	141.1	0.1	±1.1
142.0	142.1	0.1	±1.1
143.0	143.1	0.1	±1.1



Certificate No.: CP20240341EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.2	0.2	±1.1
43.0	43.3	0.3	±1.1
42.0	42.4	0.4	±1.1
41.0	41.5	0.5	±1.1
40.0	40.5	0.5	±1.1

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	136.0	0.0	±1.0
	2	118.9	-0.1	+1.0; -2.5
	0.25	109.8	-0.2	+1.5; -5.0
Slow	200	129.5	-0.1	±1.0
	2	109.9	-0.1	+1.0; -5.0
	200	130.0	0.0	±1.0
LAE	2	110.0	0.0	+1.0; -2.5
	0.25	101.0	0.0	+1.5; -5.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	135.4	134.8	-0.6	±3.0
Positive half cycle	134.4	134.1	-0.3	±2.0
Negative half cycle	134.4	134.2	-0.2	±2.0

Function : 10. Overload Indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle		
145.0	145.2	0.2	±1.5



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20240341EA

Calibration Report

Function : 11. High-Level Stability

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

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance Limits (dB)
5	139.0	139.0	0.0	±0.5

Uncertainty of measurement

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

Remarks: 1. The acceptance limit is for the deviated value.
2. Acceptance limits was IEC61672-3:2013 Class 2.
3. The coverage factor $k = 2.00$

-- End of Report --

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F-CAL-905 Ed.1

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INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
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TEL : 0609-2110-5900-1 FAX : 0609-2110-7140



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Certificate of Calibration

Customer

Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address : 81 Soi Udomnuak 41, Sukhumvit Road, Bangkok, Prakanong, Bangkok 10260

Certificate No : 25-SLM-373
Request No : Req-2025-1711

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : LARSON DAVIS
Model : Lx12
Serial Number : 0005299
ID : UAE-EPM.114/2502
Resolution : 0.1 dB
Microphone Class : 2
Microphone Model : 375A04
Microphone S/N : 323471
Preamplifier Model : PMMLx12C
Preamplifier S/N : 071493
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 22 July 2025
Calibrated Date : 11 August 2025
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electromechanics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN	Due calibration	Traceability
Multifunction Acoustic Calibrator	Briel&Kjaer	4226	3412081	8 May 2026	NIMT
Audio Generator	SvanteK	Svans801	131	15 October 2025	WK Electric

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95%.

Calibrated By :

Mr. Noppadon Luangtong
Service Calibration Engineer

Approved By :

Mr. Pasi Mathavorn
Calibration Engineer Supervisor
Issue Date : 11 August 2025

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

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F54-708-SLM-01 Rev.06 Issue date 17/12/23

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Certificate No : 25-SLM-373
Request No : Req-2025-1711

1. Indication at the calibration check frequency

UUC Setting	Nominal Level	Before Adjust	After Adjust	UNCERTAINTY
FAST / A / 37-139	UUC	UUC	UUC	ERR
Calibrator Setting	(dB)	(dB)	(dB)	(dB)
1000 Hz 114 dB	114.13	113.9	-0.23	114.1
			-0.03	0.20

Note : Absolute sensitivity was established by the use of Sound Calibrator brand SVANTER, Model SV 36, SN. 107224

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139	UUC	ERR
UUC Weighting	(dB)	(± dB)
A	26.6	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139	UUC	ERR
UUC Weighting	(dB)	(± dB)
A	26.3	0.10
C	25.8	0.10
Z	30.2	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY
FAST / 37-139	A C Z	(± dB)
STD Setting	(dB)	(dB)
125 Hz	0.2 0.2 0.2	0.60
1000 Hz	0.0 0.0 0.0	0.60
4000 Hz	-0.1 -0.1 -0.1	0.60
8000 Hz	-0.6 -0.6 -0.6	0.70

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INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
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Certificate No : 25-SLM-373
Request No : Req-2025-1711

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY
FAST / 37-139	A (dB) C (dB) Z (dB)	(± dB)
STD Setting		
63 Hz	-0.2 -0.1 -0.1	0.20
125 Hz	-0.1 0.0 -0.1	
250 Hz	-0.1 -0.1 -0.1	
500 Hz	-0.1 0.0 -0.1	
1000 Hz	0.0 0.0 -0.1	
2000 Hz	0.0 0.0 0.0	
4000 Hz	0.0 0.0 0.0	
8000 Hz	-0.1 -0.1 0.0	0.20
16000 Hz	-0.1 -0.1 -0.1	

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured	UNCERTAINTY
FAST / 37-139	REF	UUC ERR	(± dB)
UUC Weighting	(dB)	(dB)	(dB)
A	114.00	114.0	0.0
C	114.00	114.0	0.0
Z	114.00	114.0	0.0

UUC Setting	STD	Measured	UNCERTAINTY
37-139 / A	REF	UUC ERR	(± dB)
UUC Time Response	(dB)	(dB)	(dB)
Fast	114.00	114.0	0.0
Slow	114.00	114.0	0.0
Log	114.00	114.0	0.0

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

F54-708-SLM-01 Rev.06 Issue date 17/12/23

เอกสารไม่ควบคุม

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

F54-708-SLM-01 Rev.06 Issue date 17/12/23

เอกสารไม่ควบคุม

Certificate No : 25-SLM-273
Request No : Req-2025-1711

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	
STD Setting	(dB)	(± dB)
Initial	114.0	
Final	114.0	
Deviated	0.0	0.10

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY
FAST / A / 37-139	REF	UUC	ERR
STD dB	(dB)	(dB)	(dB)
139.00	139	139.0	0.0
134.00	134	134.0	0.0
129.00	129	129.0	0.0
124.00	124	124.0	0.0
119.00	119	119.0	0.0
114.00	114	114.0	0.0
109.00	109	109.0	0.0
104.00	104	104.0	0.0
99.00	99	99.0	0.0
94.00	94	94.0	0.0
89.00	89	89.0	0.0
84.00	84	84.0	0.0
79.00	79	79.0	0.0
74.00	74	74.0	0.0
69.00	69	69.0	0.0
64.00	64	64.0	0.0
59.00	59	59.0	0.0
54.00	54	54.0	0.0
49.00	49	49.3	0.1
44.00	44	44.3	0.1
39.00	39	39.3	0.1
34.00	34	34.4	0.1
29.00	29	29.4	0.1
24.00	24	24.5	0.1

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FSM-708-SLM-01 Rev.08 Issue date 17/12/23

เอกสารไม่ควบคุม

Certificate No : 25-SLM-273
Request No : Req-2025-1711

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY
FAST / A	REF	UUC	ERR
UUC Range	(dB)	(dB)	(dB)
37-139	41.70	41.8	0.1
	114	114.0	0.0

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY
A / 37-139	Toneburst	Ref	UUC	ERR
UUC Time Response	(ms)	(dB)	(dB)	(dB)
Fast	200	135.0	134.9	-0.1
	2	118.0	117.8	-0.2
	0.25	109.0	108.7	-0.3
Slow	200	128.6	128.4	-0.2
	2	109.0	108.8	-0.2
SEL	200	129.0	129.0	0.0
	2	109.0	108.9	-0.1
	0.25	100.0	99.8	-0.2

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY
FAST / C / 95-142	REF	UUC	ERR
STD Setting	(dB)	(dB)	(dB)
Complete cycle	137.4	136.6	-0.80
Positive half cycle	136.4	136.2	-0.20
Negative half cycle	136.4	136.2	-0.20

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FSM-708-SLM-01 Rev.08 Issue date 17/12/23

เอกสารไม่ควบคุม

Certificate No : 25-SLM-273
Request No : Req-2025-1711

12. Overload indication

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	
STD Setting	(dB)	(± dB)
Positive one-half cycle	140.5	
Negative one-half cycle	140.5	
Deviated	0.0	0.20

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	
STD Setting	(dB)	(± dB)
Initial	138.0	
Final	138.0	
Deviated	0.0	0.10

End of Certificate

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FSM-708-SLM-01 Rev.08 Issue date 17/12/23

เอกสารไม่ควบคุม

Certificate of Calibration

Customer

Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address : 81 Soi Udomsak 41, Sukhumvit Road, Bangchak, Prakanong, Bangkok
10260

Certificate No : 25-SLM-339
Request No : Req-2025-2019

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : LARSON DAVIS
Model : LxT2
Serial Number : 0005341
ID : UAE-BFM-038/2563
Resolution : 0.1 dB
Microphone Class : 2
Microphone Model : 375802
Microphone S/N : 11793
Preamplifier Model : PPM1AT28
Preamplifier S/N : 056133
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 5 September 2025
Calibrated Date : 9 October 2025
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-1 : 2013 Electroacoustics - Sound level meters - Part 1: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	S/N	Due calibration	Traceability
Standard Microphone	Briel&Kjaer	4228	3412381	7 May 2026	NIMT
Audio Generator	Svanick	Svan801	131	27 September 2026	WK Electric

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %.

Calibrated By :
Mr. Noppadon Laungart
Service Calibration Engineer

Approved By :
Mr. Puch Mathavorn
Calibration Engineer Supervisor
Issue Date : 9 October 2025

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FSM-708-SLM-01 Rev.08 Issue date 17/12/23

เอกสารไม่ควบคุม

Certificate No : 25-SLM-339
Request No : Req-2025-2019

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust	After Adjust	UNCERTAINTY
FAST / A / 37-139	Level	UUC	UUC	
Calibrator Setting	(dB)	(dB)	(dB)	(± dB)
1000 Hz 114 dB	113.75	113.9	113.7	0.20

Note: Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN. 58079

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139		
UUC Weighting	(dB)	(± dB)
A	29.3	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 37-139		
UUC Weighting	(dB)	(± dB)
A	28.9	0.10
C	28.6	0.10
Z	32.8	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY
FAST / 37-139	A C Z	(± dB)
STD Setting	(dB) (dB) (dB)	
125 Hz	0.2 0.2 0.2	0.60
1000 Hz	0.0 0.0 0.0	0.60
4000 Hz	1.1 1.2 1.1	0.60
8000 Hz	0.4 0.4 0.4	0.70

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Institute of Calibration Laboratory Co., Ltd.
PM/708-SLM-01 Rev.06 Issue date 17/2/23

เอกสารไม่ควบคุม

Certificate No : 25-SLM-339
Request No : Req-2025-2019

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY
FAST / 37-139	A (dB) C (dB) Z (dB)	(± dB)
STD Setting		
63 Hz	-0.2 -0.1 -0.1	
125 Hz	-0.1 0.0 -0.1	
250 Hz	-0.1 -0.1 -0.1	
500 Hz	-0.1 0.0 -0.1	
1000 Hz	0.0 0.0 0.0	0.20
2000 Hz	0.0 0.0 0.0	
4000 Hz	0.0 0.0 0.0	
8000 Hz	-0.1 -0.1 0.0	
16000 Hz	-0.1 -0.1 -0.1	

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured	UNCERTAINTY
FAST / 37-139	REF	UUC ERR	(± dB)
UUC Weighting	(dB) (dB) (dB)		
A	114.00	114.0 0.0	0.20
C	114.00	114.0 0.0	
Z	114.00	114.0 0.0	

UUC Setting	STD	Measured	UNCERTAINTY
37-139 / A	REF	UUC ERR	(± dB)
UUC Time Response	(dB) (dB) (dB)		
Fast	114.00	114.0 0.0	0.20
Slow	114.00	114.0 0.0	
Leq	114.00	114.0 0.0	

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Institute of Calibration Laboratory Co., Ltd.
PM/708-SLM-01 Rev.06 Issue date 17/2/23

เอกสารไม่ควบคุม

Certificate No : 25-SLM-339
Request No : Req-2025-2019

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	
STD Setting	(dB)	(± dB)
Initial	114.0	
Final	114.0	
Deviated	0.0	0.10

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY
FAST / A / 37-139	REF	UUC ERR	(± dB)
STD dB	(dB) (dB) (dB)		
130.00	139	130.0 0.0	
134.00	134	134.0 0.0	
129.00	129	129.0 0.0	
124.00	124	124.0 0.0	
119.00	119	119.0 0.0	
114.00	114	114.0 0.0	
109.00	109	109.0 0.0	
104.00	104	104.0 0.0	
99.00	99	99.0 0.0	
94.00	94	94.0 0.0	
89.00	89	89.0 0.0	
84.00	84	84.0 0.0	
79.00	79	79.0 0.0	
74.00	74	74.0 0.0	
69.00	69	69.0 0.0	
64.00	64	64.0 0.0	
59.00	59	59.0 0.0	
54.00	54	54.0 0.0	
49.00	49	49.1 0.1	
44.00	44	44.2 0.2	
39.00	39	39.5 0.5	
34.00	34	34.7 0.7	

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Institute of Calibration Laboratory Co., Ltd.
PM/708-SLM-01 Rev.06 Issue date 17/2/23

เอกสารไม่ควบคุม

Certificate No : 25-SLM-339
Request No : Req-2025-2019

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY
FAST / A	REF	UUC ERR	(± dB)
UUC Range	(dB) (dB) (dB)		
37-139	43.70	43.9 0.2	0.30
	114	114.0 0.0	

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY
A / 37-139	Toneburst	Ref	UUC ERR	(± dB)
UUC Time Response	(ms) (dB) (dB) (dB)			
Fast	200	135.0	134.9 -0.1	
	2	118.0	117.6 -0.4	
	0.25	109.0	108.6 -0.4	
Slow	200	128.6	128.4 -0.2	
	2	109.0	108.8 -0.2	
	200	129.0	129.0 0.0	
SEL	2	109.0	109.0 0.0	
	0.25	100.0	99.9 -0.1	

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY
FAST / C / 95-142	REF	UUC ERR	(± dB)
STD Setting	(dB) (dB) (dB)		
Complete cycle	137.4	136.8 -0.60	0.20
Positive half cycle	136.4	136.2 -0.20	
Negative half cycle	136.4	136.2 -0.20	

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Institute of Calibration Laboratory Co., Ltd.
PM/708-SLM-01 Rev.06 Issue date 17/2/23

เอกสารไม่ควบคุม

Certificate No : 25-SLM-339
 Request No : Req-2025-2019

12. Overload indication

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	(± 4dB)
STD Setting	(dB)	
Positive one-half cycle	142.7	
Negative one-half cycle	142.7	
Deviated	0.0	

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY
FAST / A / 37-139	UUC	(± 4dB)
STD Setting	(dB)	
Initial	138.0	
Final	138.0	
Deviated	0.0	

End of Certificate

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Metrology Department Co., Ltd.
 เอกสารไม่ควบคุม
 FM-709-SLM-01 Rev.06 Issue date 17/3/25

List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*
1	Analytical Balance	PARTICULATE MATTER (PM10)	Mettler Toledo	MS204TS/00 / C252436235	United Analyst and Engineering Consultant. Co., Ltd. (UAE)	2603111-3-BL-004-26	13/3/2026	12/3/2027

Due Date of Calibration* : Based on the annual calibration plan. At least 1 time per year.

Certificate of Calibration

Certificate No.: 260311-3-BL004-26

Code No.: BL004-26

Page: 1 of 3

Customer Name: United Analyst and Engineering Consultant Co., Ltd.
Address: 3 Soi Udomsuk 41, Sukhumvit Rd., Bang Chak, Phrakhanong, Bangkok 10260

Equipment: Electronic Balance
Manufacturer: Mettler Toledo
Model: MS204TS/00
Serial No.: C252436235
Asset No.: UAE.AIR.023/2566
Building: UAE number 3 Floor: 2 Room: 206

Received Date: March 11, 2026
Date of Calibration: March 13, 2026

Calibration Conditions: Temperature start 19.6 °C end 18.1 °C
Humidity start 59.8 % end 56.5 %
Pressure start 758.6 mmHg end 756.4 mmHg

Calibrated by: Thanachat Chatpahot

Approved by: Suwit Chotnok

Signature: 

Issued Date: March 17, 2026

- Note : 1) The Uncertainties are for a confidence probability of approximately 95%
2) This Certificate is valid only to the item calibrated on date and place of calibration.
3) 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 units 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 United Analyst and Engineering Consultant Co., Ltd. (UAE)

เอกสารไม่ควบคุม

Certificate No.: 260311-3-BL004-26
Code No.: BL004-26
Page: 2 of 3

Equipment: Electronic Balance
Model: MS204TS/00
Serial No.: C252436235
Max. Capacity: 220 (g)
Calibration Date: March 13, 2026
Condition As-Received: In Condition

Manufacturer: Mettler Toledo
Readability: 0.0001 (g)
ID No.: UAE.AIR.023/2566

Condition of This Result of Calibration

1. Calibration Method: This instrument was calibrated by method UAE CP CAL-008 In-House Method based on UAE Lab 24: 2020

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Traceability	Due Date
Standard Weight Class (2 10M,1)	1 mg to 1 kg	C310641405	NETTLER TOLEDO GmbH	C310641405	NETTLER TOLEDO GmbH	3-Apr-27
Standard Weight Class (2 10M,1)	1 mg to 1 kg	8749109122	AMARC	25-008339	AMARC	21-Jan-27

Instrument	Model	Serial No.	Calibrated By	Certificate No.	Traceability	Due Date
Thermo-Hydro-Sero Meter	NH-B 3825D	AK-84857	SUCCESS	50-H-00992/58	Success Gateway	26-Nov-26
Thermo-Hydro-Sero Meter	NH-B 3825D	AK-84857	TFA	25P4668	TFA	18-Dec-26

3. This certification is traceable to SI Unit

4. This certification was verified only for the instrument we calibrated

5. This result of calibration may found available as shown on date and place of calibration only.

6. Through the reference standard laboratory of Mettler-Toledo GmbH C310641405, 545 accreditation number SC5 0032.

7. Through the reference standard laboratory of AMARC 25-008339, TIS accreditation number 8152.

Calibration Results:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
200*	0.000089

2. Eccentric or off-center loading:

A mass of 100 g was placed and moved to various position on pan.

The balance reading obtained is given in the table:

					
☐	☒	☐			
1	2	3	4	5	Maximum Difference (g)
(g)	(g)	(g)	(g)	(g)	
99.9998	99.9998	99.9996	99.9995	99.9996	
					0.0003



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Certificate No.: 260311-3-BL004-26

Code No.: BL004-26

Page: 3 of 3

Equipment: Electronic Balance
Model: MS204TS/00
Serial No.: C252436235
Max. Capacity: 220 (g)
Calibration Date: March 13, 2026

Manufacturer: Mettler Toledo
Readability: 0.0001 (g)
ID No.: UAE.AIR.023/2566

Calibration Results:

(Continued)

Calibration Range: 0 to 220 (g)

Calibration Adjustment: Internal Calibration

3. Error of indication from nominal or conventional mass value:

Nominal Value (g)	Reference Value (g)	Indication (g)	Correction (g)	Uncertainty (± mg)	Coverage Factor k
Unloaded	0.0000000	0.0000	0.0000	0.15	2.28
0	0.1000083	0.0999	0.0001	0.15	2.28
1	1.0000119	0.9999	0.0001	0.15	2.28
3	3.0000244	2.9999	0.0001	0.16	2.28
5	5.0000146	4.9999	0.0001	0.16	2.28
10	10.0000330	10.0000	0.0000	0.15	2.25
20	20.0000280	19.9999	0.0001	0.16	2.25
40	40.0000540	39.9999	0.0002	0.16	2.18
60	60.0000700	59.9996	0.0005	0.17	2.14
80	80.0000980	79.9999	0.0002	0.18	2.09
100	100.0000420	99.9997	0.0005	0.19	2.07
120	120.0000680	119.9996	0.0005	0.21	2.05
160	160.0001120	159.9996	0.0005	0.25	2.00
200	200.0001460	199.9998	0.0004	0.28	2.00

4. Effect of Tare test:

Tare Load (g)	Test Load (g)	Indication (g)	Correction (g)
100	20.000028	19.9998	0.0002
	40.000054	39.9999	0.0002
	60.000070	59.9997	0.0004
	80.000098	79.9998	0.0003
	100.000109	100.0001	0.0000

Remark: Test weight by Filter pen at 1g = 1.0000 g, 3g = 2.9998 g, 5g = 4.9998 g.

The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k, providing a level of confidence of approximately 95%.

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List of Instruments Certification for Water Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Water									
1	pH Meter	pH	Horiba	LAQUA-PH210 HA0E0009	Technology Promotion Association (Thailand-Japan)	25CH1472	26 Dec 25	25 Dec 26	-

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484



Cert.No.: 25CH1472
Page.: 2 of 3

Certificate of Calibration

Cert.No.: 25CH1472
Page.: 1 of 3

Equipment : pH Meter
Manufacturer : Horiba
Model : LAQUA-PH210
Serial No. : HA0E0009
ID No. : UAE.EFM.071/2564(EFM,pH.04/64)
Condition As-Received: Used Item
Received Date : 24 December 2025
Calibration Date : 26 December 2025
Reference : 2512-0643WSC-1
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260
Ambient Temperature : (25 ± 2,5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with temperature standard
Calibrated by : Walak Sirithean
Approved by :
() Chakrit Waewwanjua
() Ponpan Paipim
(✓) Saithip Meangmai
Issue Date : 29 December 2025

Condition of this calibration result

- Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	25E2743	25 Aug 2026
2) Ref. Standard Thermometer	4982054	110RC044	25I708	03 July 2026

- This measurement result is traceable to SI through Technology Promotion Association (Thailand - Japan)
- Certified Reference Materials

:The measurement results are traceable to SI through Hach Lenge GmbH Ltd.,
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00
:The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.007	CPA chem	1114384	12 June 2027
pH 6.999	Hach Lenge GmbH	C03273	13 May 2027
pH 10.010	CPA chem	1114385	08 June 2026

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration Results

Function : mV Measurement

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

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement	Coverage factor
	pH	mV	mV	pH	(smV)	k
pH Meter S/N: HA0E0009	4,00	177.48	177.4	4,01	0,058	2,00
	7,00	0,00	0,0	7,00	0,058	2,00
	7,00	0,00	0,0	7,00	0,058	2,00
	10,00	-177.48	-177.3	10,01	0,058	2,00

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services

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Cert.No.: 25CH1472
Page.: 3 of 3

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7)(7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement ($\pm$)	Coverage factor k
pH Electrode S/N. -	4,007	4,01	167.2	0,0079	2,00
	6,999	7,00	-8,8	0,0092	2,00
	6,999	7,00	-7,7	0,0092	2,00
	10,010	10,01	-175,5	0,0092	2,00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : -

- Serial No. : -

Dimension of probe

- Length : 110 mm.

- Diameter : 16 mm.

- Immersion Depth : 100 mm.

Calibration Point ($^{\circ}\text{C}$)	Standard Temperature ($^{\circ}\text{C}$)	UUC* Reading ($^{\circ}\text{C}$)	Error ($^{\circ}\text{C}$)	Uncertainty of measurement ($\pm$ $^{\circ}\text{C}$)	Coverage factor k
15,0	15,001	15,0	-0,001	0,13	2,00
30,0	30,001	30,0	-0,001	0,13	2,00
45,0	45,001	45,0	-0,001	0,13	2,00

Remark : UUC* = Unit Under Calibration

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

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List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*
1	Analytical Balance	FAT OIL AND GREASE	Mettler Toledo	AB204-S/FACT / 1129361010	United Analyst and Engineering Consultant Co., Ltd.	260318-1-BL007-26	3/4/2026	2/4/2027
2	Analytical Balance	TOTAL DISSOLVED SOLIDS	Mettler Toledo	XSR205DU / C210685394	United Analyst and Engineering Consultant Co., Ltd (UAE)	260311-2-BL001-26	12/3/2026	11/3/2027
3	Analytical Balance	TOTAL SUSPENDED SOLIDS	Mettler Toledo	XSR205DU / C009071872	United Analyst and Engineering Consultant Co., Ltd. (UAE)	260311-2-BL002-26	12/3/2026	11/3/2027
4	Auto Clave	TOTAL COLIFORM BACTERIA	ALP Co.,Ltd. (Japan)	CL-40L / 808763	National Food Institute, Ministry of Industry, Thailand	2602303-007-01	11/3/2026	11/3/2027
5	BOD Incubator	BIOCHEMICAL OXYGEN DEMAND	ARCO	UC4-1320 / 1021	Technology Promotion Association (Thailand-Japan)	25TM1001	7/7/2025	6/7/2026
6	DO Meter	DO	Horiba	LAQUA-DO210 / HE9M0013	Technology Promotion Association (Thailand-Japan)	25TW236	20/11/2025	19/11/2026
7	DO Meter	BIOCHEMICAL OXYGEN DEMAND	YSI	5100 / 11B 101863	Technology Promotion Association (Thailand-Japan)	26TW50	2/3/2026	1/3/2027
8	Digestion Units	TOTAL KJELDAHL NITROGEN	FOSS Analytical Co., Ltd (China)	DT2508/2520 / 91905060	FOSS South East Asia	15257	12/2/2026	11/2/2027
9	Hot Air Oven	TOTAL DISSOLVED SOLIDS TOTAL SUSPENDED SOLIDS	Memmert	UF55 / B212.0411	National food institute ministry of Industry	2602300 001 01	11/3/2026	11/3/2027
10	Incubator	TOTAL COLIFORM BACTERIA	Binder	KB400 / 20220000022479	National food institute ministry of Industry	2503682 004 01	1/7/2025	30/6/2026
11	Kjeltec Distillation Unit	TOTAL KJELDAHL NITROGEN	FOSS	KT9 / 91905393	FOSS South East Asia	15256	12/2/2026	11/2/2027
12	pH Meter	pH	Horiba	LAQUA-PH210 / HA0A0005	technology promotion association (thailand-japan)	25CH1433	11/12/2025	10/12/2026

Due Date of Calibration* : Based on the annual calibration plan. At least 1 time per year.

Certificate of Calibration

Certificate No.: 260318-1-BL007-26
Code No.: BL007-26
Page: 1 of 3

Customer Name: United Analyst and Engineering Consultant Co., Ltd.
Address: 3 Soi Udom suk 41, Sukhumvit Rd., Bang Chak, Phra Khanong, Bangkok 10260

Equipment: Electronic Balance
Manufacturer: Mettler Toledo
Model: AB204-S/FACT
Serial No.: 1129361010
Asset No.: UAE.WAS.002/2552

Building: UAE No.3 **Floor:** 1 **Room:** 107

Received Date: April 2, 2026

Date of Calibration: April 3, 2026

Calibration Conditions:
Temperature: start 21.9 °C end 22.1 °C
Humidity: start 60.6 % end 60.1 %
Pressure: start 756.6 mmHg end 755.1 mmHg

Calibrated by: Thanachat Chatpahol

Approved by: Suwit Chotnok

Signature:

chit

Issued Date: April 7, 2026

- Note:** 1) The Uncertainties are for a confidence probability of approximately 95%
2) This Certificate is valid only to the item calibrated on date and place of calibration.
3) 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 units 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 United Analyst and Engineering Consultant Co., Ltd. (UAE)

เอกสารไม่ควบคุม

Certificate No.: 260318-1-BL007-26
Code No.: BL007-26
Page: 2 of 3

Equipment: Electronic Balance
Model: AB204-S/FACT
Serial No.: 1129361010
Max. Capacity: 220 g
Calibration Date: April 3, 2026
Condition As-Received: In Condition

Manufacturer: Mettler Toledo
Readability: 0.0001 g
ID No.: UAE.WAS.002/2552

Condition of Equipment:

Condition of This Result of Calibration:

1. Calibration Method: This instrument was calibrated by method UAE CP-CA-006 In-house Method based on GRS Lab 14-2022
2. Reference Standards
Reference Standard: Model: Serial No. Calibrated By Certificate No. Traceability Due Date
Standard Weight Class E2 (OIML) 1 mg to 1 kg C310641608 METTLER TOLEDO GmbH C310641608 Mettler-Toledo 3-Mar-27
Instrument: Model: Serial No. Calibrated By Certificate No. Traceability Due Date
Thermo-Hygro-Baro Meter MHB-38250 AA-88457 SUCCESS 50-H-00092-08 Success Gateway 26-Nov-28
Thermo-Hygro-Baro Meter MHB-38250 AA-88457 TPA 2544048 TPA 18-Dec-26
3. This certification is traceable to SI Unit
4. This certification was certified only for the instrument we calibrated
5. This result of calibration was found accurate as shown on date and place of calibration only.
6. Through the reference standard laboratory of Mettler-Toledo GmbH C310641605, S43 accreditation number SCS 0032

Calibration Results:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
200g	0.00018

2. Eccentric or off-center loading:

A mass of 100 g was placed and moved to various position on pan. The balance reading obtained is given in the table.

1	2	3	4	5	Maximum Difference (g)
(g)	(g)	(g)	(g)	(g)	
100.0025	100.0022	100.0022	100.0019	100.0030	0.0005

เอกสารไม่ควบคุม

Certificate No.: 260318-1-BL007-26
Code No.: BL007-26
Page: 3 of 3

Equipment: Electronic Balance
Model: AB204-S/FACT
Serial No.: 1129361010
Max. Capacity: 220 g
Calibration Date: April 3, 2026

Manufacturer: Mettler Toledo
Readability: 0.0001 g
ID No.: UAE.WAS.002/2552

Calibration Result: (Continued)
Calibration Range: 0 - 220 g
Calibration Adjustment: Internal Calibration

3. Error of indication from nominal or conventional mass value:

Nominal Value (g)	Reference Value (g)	Indication (g)	Correction (g)	Uncertainty ($\pm$ mg)	Coverage Factor k
Unload	0.0000000	0.0000	0.0000	0.17	2.32
0.01	0.0100005	0.0099	0.0001	0.17	2.32
0.05	0.0500003	0.0499	0.0001	0.17	2.32
0.1	0.1000003	0.0999	0.0001	0.17	2.32
0.5	0.5000121	0.5000	0.0000	0.17	2.32
1.0	1.0000119	1.0000	0.0000	0.17	2.32
10.0	10.000033	10.0003	-0.0003	0.17	2.32
40.0	40.000054	40.0010	-0.0010	0.18	2.23
50.0	50.000037	50.0013	-0.0013	0.18	2.23
80.0	80.000098	80.0020	-0.0019	0.19	2.11
100.0	100.000042	100.0025	-0.0024	0.20	2.10
120.0	120.000068	120.0028	-0.0027	0.22	2.06
150.0	150.000079	150.0035	-0.0035	0.24	2.04
160.0	160.000112	160.0036	-0.0035	0.25	2.03
200.0	200.000146	200.0049	-0.0047	0.28	2.00

4. Effect of Tare test:

Tare Load (g)	Test Load (g)	Indication (g)	Correction (g)
100	20.000028	20.0004	-0.0003
	40.000054	40.0009	-0.0008
	60.000070	60.0013	-0.0012
	80.000098	80.0017	-0.0016
	100.000042	100.0021	-0.0021

Remark:

The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k, providing a level of confidence of approximately 95%

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Certificate of Calibration

Certificate No.: 260311-2-BL001-26
Code No.: BL001-26
Page: 1 of 4

Customer Name: United Analyst and Engineering Consultant Co., Ltd.
Address: 3 Soi Udom suk 41, Sukhumvit Rd., Bang Chak, Phra Khanong, Bangkok 10260

Equipment: Electronic Balance
Manufacturer: Mettler Toledo
Model: XSR2050U
Serial No.: C210685394
Asset No.: UAE.WAO.010/2565
Building: UAE number 3 **Floor:** 2 **Room:** 208

Received Date: March 11, 2026

Date of Calibration: March 12, 2026

Calibration Conditions:
Temperature: 23.0 °C to 23.6 °C
Humidity: 51.5 % to 54.4 %
Pressure: 755.7 mmHg to 757.9 mmHg

Calibrated by: Thanachat Chatpahol

Approved by: Suwit Chotnok

Signature:

chit

Issued Date: March 16, 2026

- Note:** 1) The Uncertainties are for a confidence probability of approximately 95%
2) This Certificate is valid only to the item calibrated on date and place of calibration.
3) 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 units 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 United Analyst and Engineering Consultant Co., Ltd. (UAE)

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Certificate No.: 260311-2-BL001-26
Code No.: BL001-26
Page: 2 of 4

Equipment: Electronic Balance
Model: XSP205DU
Serial No.: C210685394
Max. Capacity: 81 g / 220 g
Calibration Date: March 12, 2026
Condition As-Received: In Condition

Manufacturer: Mettler Toledo
Readability: 0 to 81 (g) 0.01 mg, > 80 to 200 (g) : 0.1 mg
ID No.: UAE.WAO.010/2565

Condition of Equipment:

Condition of This Result of Calibration:

1. Calibration Method: This instrument was calibrated by method UAC-CP-CAL-008. In House Method based on UANIS Lab 18 : 2022

Reference Standards:

Reference Standard:	Model	Serial No.	Calibrated By	Certificate No.	Traceability	Due Date
Standard Weight Class E2 (OIML)	1 mg to 1 kg	C310641605	METTLER TOLEDO GmbH	C310641605	METTLER TOLEDO GmbH	3-Mar-27
Standard Weight Class E2 (OIML)	1 mg to 1 kg	B749109122	ANAC	25-009359	ANAC	21-Jan-27

Instruments:

Instruments:	Model	Serial No.	Calibrated By	Certificate No.	Traceability	Due Date
Thermo-Hygro Baro Meter	AMB 3825D	AK64517	SUCCESS	50-H-00992/68	Success Gateway	26-Feb-26
Thermo-Hygro Baro Meter	AMB 3825D	AK64517	TFA	25P48364	TFA	18-Dec-26

- This certification is traceable to SI unit.
- This certification is traceable to SI unit.
- This certification was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Through the reference standard laboratory of Mettler-Toledo GmbH (C310641605, SAK accreditation number ICS 0052).
- Through the reference standard laboratory of ANAC (25-009359, TFA accreditation number 0130).

Calibration Results:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
80	0.00019
220*	0.00055

2. Eccentric or off-center loading

A mass of 100 g was placed and moved to various position on pan. The balance reading obtained is given in the table.

1	2	3	4	5	Maximum Difference (g)
(g)	(g)	(g)	(g)	(g)	
100.0002	100.0002	100.0003	100.0004	100.0003	0.0001

Certificate No.: 260311-2-BL001-26
Code No.: BL001-26
Page: 3 of 4

Equipment: Electronic Balance
Model: XSP205DU
Serial No.: C210685394
Max. Capacity: 81 g / 220 g
Calibration Date: March 12, 2026

Manufacturer: Mettler Toledo
Readability: 0 to 81 (g) 0.01 mg, > 80 to 200 (g) : 0.1 mg
ID No.: UAE.WAO.010/2565

Calibration Result:

(Continued)

Calibration Range: 0 to 80 (g)

Calibration Adjustment: Internal Calibration

3. Error of Indication from nominal or conventional mass value: (Range: 0 to 81 (g); Resolution: 0.00001 g)

Nominal Value (g)	Reference Value (g)	Indication (g)	Correction (g)	Uncertainty (± mg)	Coverage Factor k
Unload	0.0000000	0.00000	0.00000	0.032	2.65
0.001	0.0010020	0.00101	0.00000	0.032	2.65
0.005	0.0050025	0.00501	-0.00001	0.032	2.65
0.01	0.0100005	0.01001	-0.00001	0.032	2.65
0.05	0.0500003	0.05001	-0.00001	0.032	2.65
0.10	0.1000003	0.10000	0.00001	0.032	2.65
0.50	0.5000121	0.50001	0.00000	0.032	2.65
1	1.0000119	1.00003	-0.00002	0.032	2.52
2	2.0000125	2.00003	-0.00002	0.032	2.52
5	5.0000146	5.00003	-0.00002	0.032	2.32
10	10.0000330	10.00006	-0.00003	0.034	2.21
20	20.000028	20.00006	-0.00003	0.041	2.07
30	30.000061	30.00017	-0.00011	0.055	2.00
40	40.000054	40.00021	-0.00016	0.066	2.00
50	50.000037	50.00023	-0.00019	0.068	2.00
60	60.000070	60.00029	-0.00022	0.084	2.00
80	80.000098	80.00039	-0.00030	0.12	2.00

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Certificate No.: 260311-2-BL001-26
Code No.: BL001-26
Page: 4 of 6

Equipment: Electronic Balance
Model: XSP205DU
Serial No.: C210685394
Max. Capacity: 81 g / 220 g
Calibration Date: March 12, 2026

Manufacturer: Mettler Toledo
Readability: 0 to 81 (g) 0.01 mg, > 80 to 200 (g) : 0.1 mg
ID No.: UAE.WAO.010/2565

Calibration Result:

(Continued)

Calibration Range: > 81 to 200 (g)

Calibration Adjustment: Internal Calibration

3. Error of Indication from nominal or conventional mass value: (Range: > 81 - 220 (g); Resolution: 0.0001 g)

Nominal Value (g)	Reference Value (g)	Indication (g)	Correction (g)	Uncertainty (± mg)	Coverage Factor k
Unload	0.0000000	0.0000	0.0000	0.032	2.65
90	90.0000910	90.0004	-0.0003	0.16	2.00
100	100.0000420	100.0003	-0.0003	0.16	2.00
110	110.0000750	110.0004	-0.0003	0.18	2.00
120	120.0000680	120.0004	-0.0003	0.19	2.00
130	130.0001010	130.0005	-0.0004	0.20	2.00
140	140.0000960	140.0004	-0.0003	0.21	2.00
150	150.0000790	150.0005	-0.0004	0.22	2.00
160	160.0001120	160.0004	-0.0003	0.23	2.00
170	170.0001050	170.0003	-0.0002	0.24	2.00
200	200.0001460	200.0001	0.0000	0.26	2.00

4. Effect of Tare test:

Tare Load (g)	Test Load (g)	Indication (g)	Correction (g)
100	20.000028	20.0001	0.0000
	40.000054	40.0001	0.0000
	60.000070	60.0000	0.0001
	80.000098	80.0000	0.0001
	100.000109	100.0000	0.0001

Remark:-

The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k, providing a level of confidence of approximately 95%

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Certificate of Calibration

Certificate No.: 260311-2-BL002-26

Code No.: BL002-26

Page: 1 of 4

Customer Name: United Analyst and Engineering Consultant Co., Ltd.
Address: 3 Soi Udomsuk 41, Sukhumvit Rd., Bang Chak, Phrakhanong, Bangkok 10260

Equipment: Electronic Balance

Manufacturer: Mettler Toledo

Model: XSP205DU

Serial No.: C009071872

Asset No.: UAE.WAO.012/2563

Building : UAE number 3 Floor : 2 Room : 208

Received Date: March 11, 2026

Date of Calibration : March 12, 2026

Calibration Conditions: Temperature: 23.8 °C to 24.1 °C
Humidity: 50.0 % to 59.0 %
Pressure: 755.5 mmHg to 755.6 mmHg

Calibrated by: Thanachat Chatphol

Approved by: Suwit Chotnok

Signature: e.cit

Issued Date: March 16, 2026

Note: 1) The Uncertainties are for a confidence probability of approximately 95%

2) This Certificate is valid only to the item calibrated on date and place of calibration.

3) 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 units 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 United Analyst and Engineering Consultant Co., Ltd. (UAE)

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Certificate No.: 260311-2-BL002-26
Code No.: BL002-26
Page: 2 of 4

Equipment: Electronic Balance
Model: XSR2050U
Serial No.: C09071872
Max. Capacity: 81 g / 220 g
Calibration Date: March 12, 2026
Condition As-Received: in Condition

Manufacturer: Mettler Toledo
Readability: 0 to 81 (g) 0.01 mg > 80 to 200 (g) 0.1 mg
ID No.: UAE.WAO.012/2563

Condition of Equipment:

Condition of This Result of Calibration: This instrument was calibrated by method UAE-CAL-008 In-House Method based on ISO 18: 2022

1. Calibration Method:

2. Reference Standards: Standard Weight Class 12 (OIML) 1 mg to 1 kg C310641605 METTLER TOLEDO GmbH 25-000359 Mettler Toledo GmbH 3-Mar-27

Standard Weight Class 12 (OIML) 1 mg to 1 kg 8789109122 AMANC 25-000359 Mettler Toledo GmbH 21-Jan-27

Instrument Model Serial No. Calibrated By Certificate No. Success Through Due Date
Thermo-Hygro-Baro Meter MHB 38250 AK6457 SUCCES 2564664 Success Gateway TNA 26-Nov-26
Thermo-Hygro-Baro Meter MHB 38250 AK6457 TNA 2564664 TNA 18-Dec-26

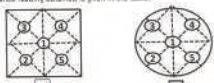
3. This certification is traceable to SI Unit.
4. This certification is certified only for the instrument we calibrated.
5. This result of calibration was found accurate as shown on date and place of calibration only.
6. Through the reference standard laboratory of Mettler Toledo GmbH C310641605, NIS accreditation number SC3-0032.
7. Through the reference standard laboratory of AMANC 25-000359, TIS accreditation number 0132.

Calibration Result:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
80	0.00008
200*	0.00043

2. Eccentric or off-center loading
A mass of 100 g was placed and moved to various position on pan.
The mass reading obtained is given in the table.



1 (g)	2 (g)	3 (g)	4 (g)	5 (g)	Maximum Difference (g)
100.0000	100.0000	100.0000	100.0000	100.0000	0.0000

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Certificate No.: 260311-2-BL002-26
Code No.: BL002-26
Page: 3 of 4

Equipment: Electronic Balance
Model: XSR2050U
Serial No.: C09071872
Max. Capacity: 81 g / 220 g
Calibration Date: March 12, 2026

Manufacturer: Mettler Toledo
Readability: 0 to 81 (g) 0.01 mg > 80 to 200 (g) 0.1 mg
ID No.: UAE.WAO.012/2563

Calibration Result:

Calibration Range: 0 to 80 (g)
Calibration Adjustment: Internal Calibration

3. Error of Indication from nominal or conventional mass value: (Range: 0 to 81 (g) ; Resolution: 0.0001 g)

Nominal Value (g)	Reference Value (g)	Indication (g)	Correction (g)	Uncertainty (± mg)	Coverage Factor k
Unloaded	0.0000000	0.0000	0.0000	0.015	2.25
0.001	0.0010020	0.0010	-0.0000	0.015	2.23
0.005	0.0050025	0.0050	-0.0002	0.015	2.23
0.01	0.0100005	0.0100	-0.0002	0.015	2.23
0.05	0.0500003	0.0500	-0.0001	0.015	2.21
0.10	0.1000005	0.1000	-0.0001	0.015	2.20
0.50	0.5000121	0.5000	-0.0002	0.016	2.15
1	1.0000119	1.0000	-0.0000	0.016	2.12
2	2.0000125	2.0000	-0.0001	0.017	2.09
3	3.0000146	3.0000	-0.0002	0.020	2.05
10	10.0000330	10.0001	-0.0002	0.025	2.00
20	20.000028	20.0001	-0.0005	0.033	2.00
30	30.000061	30.0001	-0.0004	0.051	2.00
40	40.000054	40.0001	-0.0004	0.063	2.00
50	50.000037	50.0001	-0.0005	0.064	2.00
60	60.000070	60.0001	-0.0004	0.081	2.00
80	80.000098	80.0001	-0.0001	0.11	2.00

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Certificate No.: 260311-2-BL002-26
Code No.: BL002-26
Page: 4 of 4

Equipment: Electronic Balance
Model: XSR2050U
Serial No.: C09071872
Max. Capacity: 81 g / 220 g
Calibration Date: March 12, 2026

Manufacturer: Mettler Toledo
Readability: 0 to 81 (g) 0.01 mg > 80 to 200 (g) 0.1 mg
ID No.: UAE.WAO.012/2563

Calibration Result:

Calibration Range: > 80 to 200 (g)
Calibration Adjustment: Internal Calibration

3. Error of Indication from nominal or conventional mass value: (Range: > 80 to 200 (g) ; Resolution: 0.0001 g)

Nominal Value (g)	Reference Value (g)	Indication (g)	Correction (g)	Uncertainty (± mg)	Coverage Factor k
Unloaded	0.0000000	0.0000	0.0000	0.02	2.25
90	90.0000910	90.0000	0.0000	0.16	2.09
100	100.0000420	100.0000	0.0000	0.16	2.00
110	110.0000750	110.0000	0.0000	0.17	2.00
120	120.0000680	120.0000	0.0001	0.18	2.00
130	130.0001010	130.0000	0.0000	0.20	2.00
140	140.0000960	140.0000	0.0001	0.21	2.00
150	150.0000790	150.0000	0.0001	0.21	2.00
160	160.0001130	160.0000	0.0001	0.23	2.00
170	170.0001050	170.0000	-0.0002	0.24	2.00
200	200.0001460	200.0004	-0.0002	0.26	2.00

4. Effect of Tare test:

Tare Load (g)	Test Load (g)	Indication (g)	Correction (g)
100	20.000028	20.0000	0.0000
	40.000054	40.0002	-0.0001
	60.000070	60.0002	-0.0001
	80.000098	80.0002	-0.0001
	100.000042	100.0003	-0.0002

Remark:

The report uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k, providing a level of confidence of approximately 95%.

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Calibration Certificate

Certificate No.: 260203-007-01
Page: 1 of 2

Equipment: Autoclave
Manufacturer: ALP
Model: CL-403
Serial No.: 808763
ID No.: UAE.MC.026/2063
Order No.: 26020303
Operation No.: 26020303-007
Date of Receipt: 11 March 2026
Date of Calibration: 11 March 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangkok, Prakhong, Bangkok 10260

Metrological traceability:

1. Calibration Method:

- This instrument was calibrated by inserting 3 standard data loggers with RTDs into its autoclave, in accordance with W-TL-018.
- based on BS 2646-1:2021, Autoclaves for sterilization in laboratories Part 1: Design, construction, safety and performance - specification.
- The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).
- All data shown below are final values, and the initial data may be obtained upon request.

2. Reference Standard Instrument:

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with RTD (Data Logger)	HTemp140-PT	B33753	2502245-002-01	22 March 2026	NATIONAL FOOD INSTITUTE
	HTemp140	B35602	2601300-004-01	19 January 2027	NATIONAL FOOD INSTITUTE
	PTTemp140	R08546	2601300-003-01	19 January 2027	NATIONAL FOOD INSTITUTE

3. This certificate is traceable to the International System of Units (SI).

4. This certificate is valid only for the instrument that was calibrated.

5. The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by: Mr.Nuttapol Niyomchai
Specialist

Approved by: (Mr. Phengphet Tuantit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 19 March 2026

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 units of measurement related to the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

P-CS-006 Revision 02 Date: 01-10-08

เอกสารไม่ควบคุม



Calibration Certificate

Certificate No.: 2603203-007-01
Page : 2 of 2

Calibration Condition:

Equipment: Autoclave
Resolution: 0.1 °C
Condition of the item: Normal & Good
Without adjustment / As Found
Setting program sterilization STERILIZE/NORMAL
Time of sterilization 15 Minute at 115.0, 121.0 °C

Place of Calibration: Room 301
UNITED ANALYST AND ENGINEERING CONSULTANT CO. LTD.
Environment Conditions: Ambient Temperature : (28.0 ± 1) °C
Relative Humidity : (47.5 ± 3) %
Line Voltage : (228.5 ± 4) V

Calibration Results:

Table 1 : Reporting of Temperature

Calibration Point (°C)	Std.# 1	Measured Temperature (°C) @ Sensor No.	Std.# 2 (REF)	Std.# 3	Measurement Uncertainty (°C)
115.0	115.29	115.30	115.30	118.37	0.64
121.0	121.17	121.18	121.00	121.00	0.64

Table 2 : Reporting of Characterization Results

UUC* Setting (°C)	Max.	UUC* Reading (°C)	Average	MPa	Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
115.0	115.1	114.9	115.0	0.08	0.23	0.03	0.51
121.0	121.1	120.9	121.0	0.12	0.34	0.07	0.67

Note

- UUC* : Unit Under Calibration
- The quoted uncertainty include "Stability" and "Loading effect (20% of Temp Uniformity)"
- Stability = One-half of the greatest maximum difference of measured temperatures at any one sensor, for at least half an hour after reaching steady state.
- 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.
- Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

For more information, details of the sensor installation should be reported.

Standard of location
Std #1 : Attached to the food temperature probe, within 20 mm
Std #2 (REF) : In the upper half of the chamber
Std #3 : In the chamber door, within 100 mm



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

----- End of Report -----

F-CS-001 Revision: 02 Date: 31-10-68

TPA (Technology Promotion Association (Thailand-Japan))
330/331 Moo 36, Anusorn Road, Bang Yai Sub-town, Bang Phra District, Bangkok 10700, Thailand
Tel : +662-014-2000 Fax : +662-014-2001
nfi.com

เอกสารไม่ควบคุม



Certificate of Calibration

Cert. No.: 25TM1001
Page : 1 of 3

Equipment : BOD Incubator

Manufacturer : ARCO

Model : UCA-1320

Serial No. : -

ID No. : UAE.WAO.018/2559

Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsak 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260

Location : Lab Floor 2

Received Order : 07 July 2025

Calibration Date : 07 July 2025

Ambient Temperature : (28 ± 10) °C

Relative Humidity : (50 ± 30) %

AC Line Voltage : (220 ± 22) V

Calibrated by : Man Pattanapongpaiboon

Approved by : Kunchit
Approved Signatory

() Chakrit Waewwanjua

() Suwit Imjai

(✓) Kunchit Promprat

Issue Date : 17 July 2025

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.

เอกสารไม่ควบคุม



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2507-0146OC-2

Cert. No.: 25TM1001
Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY59003411	24LM182	TPA	24 Dec 2025

2. This certificate is valid only to the item calibrated on date and place of calibration.

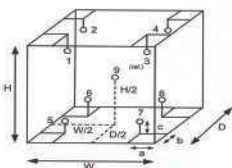
3. This measurement result is traceable to the International System of Unit maintained through :

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration : (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available



Probe Installation Details :

a = 10 cm
b = 10 cm
c = 10 cm

Dimension of Chamber :

D = 0.62 m
W = 1.2 m
H = 1.2 m
Capacity = 0.89 m³

Environment during calibration	
Beginning	Finished
Temp. (°C)	28
REL.Humid. (%)	54
AC Supply (Volt)	224

Position :	Ref. Std. ID No.:
1	25-20RTD-2/1
2	25-20RTD-2/2
3	25-20RTD-2/3
4	20RTD-2/4
5	20RTD-2/5
6	20RTD-2/6
7	20RTD-2/7
8	20RTD-2/8
9 (ref.)	20RTD-2/9



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2507-0146OC-2
Result of Calibration : (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 25TM1001
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
20.0	20.0	19.9	0.18	0.80	0.83	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.202	19.900	20.390	20.077	20.111	20.044	20.275	20.173	19.835	0.38

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature 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 or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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เอกสารไม่ควบคุม

เอกสารไม่ควบคุม



Certificate of Testing

Cert.No.: 25TW236
Page.: 1 of 2

Equipment : DO Meter
Manufacturer : Horiba
Model : LAQUA-DO210
Serial No. : HE9M0013
ID No. : UAE,EFM,016/2563 (EFM,DO,05/63)
Received Date : 18 November 2025
Test Date : 20 November 2025
Reference : 2511-0529WSC-1
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In - house method : CP-CH9
by Comparison Technique with Azide Modification Method
Tested by : Walalak Sirinthean
Approved by : 
Approved Signatory
() Chakrit Waewwanjua
() Ponpan Paipim
(✓) Salthip Meangmai
Issue Date : 21 November 2025

Condition of this result of calibration

1. Reference Standard Instruments :
This measurement result is traceable to the International System of Unit through the reference standards
laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	ID No.	Certificate No.	Due Date
1. Burette	130BU10	25OG1126	18 Mar 2027
2. Balance	110RC001	25MM316	02 July 2026

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate 5-Hydrate AR	KEMAUS	2203162447	99.6%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: 9K9M0021

Titration Method (Azide Modification Method)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.22	8.20	0.0055

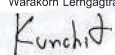
This report was certified only for the instrument we tested. It is allowable to use for study
Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced
other in full, without written approval of the laboratory

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Certificate of Calibration

Cert. No.: 25LM172
Page.: 1 of 2

Equipment : DO Meter with Sensor
Manufacturer : Horiba
Model : LAQUA-DO210
Serial No. : HE9M0013
ID No. : UAE,EFM,016/2563(EFM,DO,05/63)
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : TPA On Site Calibration Laboratory
Received Order : 18 November 2025
Calibrated Date : 21 November 2025
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Warakorn Lernagatrakul
Approved by : 
Approved Signatory
() Chakrit Waewwanjua
() Suwit Imjai
(✓) Kunchit Promrat
Issue Date : 24 November 2025

Equipment : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2511-0529WSC-2

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with
Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Digital Thermometer	A7B843	25I17	TPA	06 Jan 2026

2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This measurement result is traceable to the International System of Unit maintained through :

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :-

Function : (*) Without Adjustment
Temperature measurement.

This instrument was connected with temperature sensor, S/N.: 9K9M0021

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
15.0	80	14.998	15.0	0.002	0.16	2.00
30.0	80	30.003	29.9	-0.103	0.16	2.00
45.0	80	45.000	44.8	-0.200	0.16	2.00

UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a
coverage factor *k*, providing a level of confidence of approximately 95 %.

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The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.



Certificate of Testing

Cert.No.: 26TW50
Page.: 1 of 2

Equipment : DO Meter
Manufacturer : YSI
Model : 5100
Serial No. : 11B 101863
ID No. : UAE.WAO.004/2554
Received Date : 27 February 2026
Test Date : 02 March 2026
Reference : 2802-0915DSC-1
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangkok,
Phrakhanong, Bangkok 10260
Laboratory Condition : Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : In-house method : CP-CH9
by Comparison Technique with Azide Modification Method
Tested by : Waialak Sirinthean
Approved by : *Sailthip*
Approved Signatory
() Chakrit Waeewwanja
() Porpan Paipim
(✓) Sailthip Meangmai
Issue Date : 03 March 2026

เอกสารไม่ควบคุม



Cert.No.: 26TW50
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :
This measurement result is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	ID No.	Certificate No.	Due Date
1. Burette	130BU10	25CG1126	18 Mar 2027
2. Balance	110RC001	25MM316	02 July 2026

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate 5-Hydrate AR	KEMAUS	2203162447	99.6%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: 24F100202

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.20	8.20	0.0084

This report was certified only for the instrument we tested. It is allowable to use for study
Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced
other in full, without written approval of the laboratory

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เอกสารไม่ควบคุม

FOSS

Customer Service Report

Date: Feb 12, 2026
Job No.: 14590
Instrument: D12520

FOSS South East Asia
3388 Sirinrat Building, 25th - 26th Floor, Unit No. 3388/90,
Rama IV Road, Klongton, Klongtoey, Bangkok, Thailand 10110

Report No.: 15257
Customer: UAE
Address: Bangkok
Serial: 9905060

Travel To Customer (Hrs):
Start Finish: - -

Labour (Hrs):
13.50
15.00
1.5

Travel From Customer (Hrs):
- -

Application	Special	Standard
Distributor	Courtesy Visit	Installation
Digital Service	PMA Approval Check	Quote
Internal	Warranty	Repair
Training	Sales Support	Investigate

PMA Type: Smartcare Smartcare Pro Fosscore ✓
Smartcare Advance Fosscore Pro N/A

Details of Work / Test
- PM
- Visual Check
+ No leak -ok
+ No damage -ok
- Change PM kit ✓ + Set -ok
- Function Check
+ Quick mode -ok
+ Set Temp / timer -ok
+ Run -ok
- Heating -ok
- Lift up/down -ok
- Clean x20 holes with brush hand

Instrument Ready for Use: OK ✓ Not OK*

Part No.	Batch	Description	Qty
60099736	37.09.2026	FOSS Air Mit. Detector 25 pin, 12 units	1

I confirm this report is accurate and complete

Signed FOSS: *[Signature]*
Name: Anon Pichai / Sukharn
Tel:
Email:
Signed Customer: *[Signature]*
Name:
Tel:
Email:
*Remark:
เอกสารไม่ควบคุม

Please scan QR code



มูลนิธิสถาบันพัฒนาอุตสาหกรรมอาหาร
Foundation for Industrial Development National Food Institute
Food Industrial Laboratory Service Center



Calibration Certificate

Certificate No.: 2602300-001-01
Page : 1 of 2

Equipment: CHAMBER (Hot Air Oven)
Manufacturer: MEMERT
Model: UF55
Serial No.: B212.0411
ID No.: UAE.WAO.005/2556
Order No.: 2602300
Operation No.: 2602300-001
Date of Receipt: 11 March 2026
Date of Calibration: 11 March 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangkok, Phrakhanong, Bangkok 10260

Metrological traceability:

1. Calibration Method:
- This instrument was calibrated by inserting 9 standard thermometers into its chamber, in accordance with W-TE-014, based on TLAS G-20-102-06 (E) Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).
- All data shown below are final values, and the initial data may be obtained upon request.

2. Reference Standard Instrument:

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34872A RTD	MY99002902 C10001-200 R100001-200	2502797-002-01	3 May 2026	NATIONAL FOOD INSTITUTE

3. This certificate is traceable to the International System of Units (SI).

4. This certificate is valid only for the instrument that was calibrated.

5. The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by: Mr. Monas Somsak
Specialist

Date of Issue: 18 March 2026

Approved by: *[Signature]*
(Mr. Phrasaphat Tuangit)
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

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 units 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 National Food Institute.

FCS-009 Revision 02 Date: 01-10-08

ศูนย์บริการลูกค้า (30) ถนนสุขุมวิท แขวงคลองตัน เขตคลองเตย กรุงเทพมหานคร 10110
20089 Soi. 16, Asoke-Aran Road, Bang. 11 Khwa. Sukwitt, Bang. 11 Thai District, Bangkok, 10110, Thailand
Tel: +662-0452, 06280 Fax: +662-0452, 05565

เอกสารไม่ควบคุม



Calibration Certificate

Certificate No.: 2602300-001-01
Page : 2 of 2

Calibration Condition:

Equipment: CHAMBER (Hot Air Oven)
UUC* Resolution: 0.1 °C
Condition of the item: Normal & Good
Without adjustment / As Found
Time of record: 1 hour 9 minute / point

Place of Calibration: Laboratory
UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Conditions: Ambient Temperature (29.8 ± 1.0) °C
Relative Humidity (47.8 ± 4) %
Line Voltage (222 ± 3) V.

Calibration Results:

Table 1 : Reporting of Temperature

Calibration Point (°C)	Std.#1	Std.#2	Std.#3	Std.#4	Std.#5	Std.#6	Std.#7	Std.#8	Std.#9	Measurement Uncertainty (±°C)
104.0	104.22	103.67	103.90	104.17	103.58	104.22	104.17	104.00		0.53
120.0	120.21	119.76	119.86	120.18	119.53	119.58	120.24	120.20	119.96	0.73
180.0	180.27	179.37	179.73	180.31	178.91	179.13	180.35	180.25	179.84	0.90

Table 2 : Reporting of Characterization Results

UUC* Setting (°C)	Max	UUC* Reading (°C)	Min	Average	Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
104.0	104.0		104.0	104.0	0.05	0.44	0.75
120.0	120.0		120.0	120.0	0.06	0.43	0.79
180.0	180.0		180.0	180.0	0.07	0.93	1.56

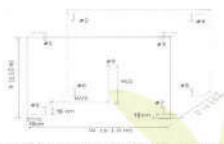
Note

- UUC* : Unit Under Calibration
- The quoted uncertainty includes contributions from "Stability" and "Loading Effect (20% of Temperature Uniformity)".
- Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.
- 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.
- Overall Variation = The difference of The maximum and minimum measured temperatures throughout observation time.

For more information, details of the sensor installation should be reported.

Fresh air Damper: ☒ Open ☐ Close ☐ 100% Fan speed ☐ Not Available

Dimension of inside chamber and sensor installation location (mm):
W x H x D: 40 x 40 x 33
a x b x c: 10 x 10 x 10



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

----- End of Report -----

F-CS-009 Revision: 02 Date: 01-10-68

2008 36, Anu Amn Road, Bang Yi Khan Suburban, Bang Phai District, Bangkok 10703, Thailand
Tel: +66(0) 2462 86608 Fax: +66(0) 2462 85543

เอกสารไม่ควบคุม



Calibration Certificate

Certificate No.: 2503682-004-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Sol Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)

Manufacturer: BINDER

Model: KB 400

Serial No.: 20220000022479

ID No.: UAE.MIC.028/2566

Order No.: 2503682

Operation No.: 2503682-004

Date of Receipt: 1 July 2025

Date of Calibration: 1 July 2025

Calibrated by: Mr.Pheraphat Tuanjit Scientist
Approved by: *P. Janghambit*
(Miss Preeyaporn Jaengkarnkit)
Vice President, Department of Laboratory Services
Responsible for the Technical Management Team

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

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 units of measurement related at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 30-04-63

2008 36, Anu Amn Road, Bang Yi Khan Suburban, Bang Phai District, Bangkok 10703, Thailand
Tel: +66(0) 2462 86608 Fax: +66(0) 2462 85543

เอกสารไม่ควบคุม



Calibration Report

Certificate No.: 2503682-004-01
Equipment: CHAMBER (Incubator)
Model: KB 400 Serial No.: 20220000022479
Resolution: 0.1 °C ID No.: UAE.MIC.028/2566
Manufacturer: BINDER
Date of Calibration: 1 July 2025 Page 2 of 3

Location: Microbiology Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (21 ± 1) °C
Relative Humidity (55 ± 10) %
Line Voltage (230 ± 5) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 13 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY90003377	2501168-001-01	13 January 2026	NATIONAL FOOD INSTITUTE
	RTD	CH101-303 / RTD4101-303			

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good

UUC Description : 1 Hour 9 Minute At 35.0 °C

Time of Record: ☒ Open ☐ Close ☐ 100% Fan speed ☐ Not Available

7. Result of Calibration : ☒ Without adjustment ☐ After adjustment

F-CS-012 Revision: 01 Date: 20-04-63

2008 36, Anu Amn Road, Bang Yi Khan Suburban, Bang Phai District, Bangkok 10703, Thailand
Tel: +66(0) 2462 86608 Fax: +66(0) 2462 85543

เอกสารไม่ควบคุม



Calibration Report

Certificate No.: 2503682-004-01
Equipment: CHAMBER (Incubator)
Model: KB 400 Serial No.: 20220000022479
Resolution: 0.1 °C ID No.: UAE.MIC.028/2566
Manufacturer: BINDER
Date of Calibration: 1 July 2025

Calibration point: 35.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	20.1	45	225.0
MAX	22.0	65	235.0

Table 1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.13 is REF)													Uncertainty ± (°C)
35.0	35.19	35.03	34.83	35.21	34.96	34.94	34.84	34.84	35.06	34.94	35.15	34.79	34.92	0.27

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Temperature Stability ± (°C)	Temperature Uniformity (°C)	Overall Variation (°C)
34.8	MIN	MAX	Average			
	34.8	34.8	34.8	0.040	0.29	0.50

Note: The quoted uncertainty include "Stability" and "Loading effect (20% of Temp Uniformity)"

UUC* = Unit Under Calibration

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.

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.

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

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

----- End -----

F-CS-012 Revision: 01 Date: 20-04-63

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เอกสารไม่ควบคุม



Date: Feb 12, 2026
Job No.: 14589
Instrument: KTA DistillatorCustomer: UAE
Address: Bangkok
Serial: 91405393Start Finish: 07.40 07.50 1.5
Labour (Hrs): 07.30 13.30 4
Travel From Customer (Hrs):

Application	Special	Job Type	Standard
Distributor	Courtesy Visit	Installation	In House
Digital Service	PMA Approval Check	Quote	PM
Internal	Warranty	Repair	HC Visit
Training	Sales Support	Investigate	Others

PMA Type	Smartcare	Smartcare Pro	Fosscore
	Smartcare Advance	Fosscore Pro	N/A

Details of Work / Test
- Visual Check - OK
+ No leak - OK
+ No damage - OK
- change BM & 1 Set - OK
- Function Check - OK
+ Dilution - OK
+ Alarm - OK
+ Receiver - Not Use
+ Steam Drift - OK

Part No.	Batch	Description	Qty
60100146	11-03-2025	BM kit Kjeltec & Distillator	1

Signed FOSS	Signed Customer
Name: Aswara Mithan Dokkhan	Name: ปัทมา
Tel: 0114503094	Tel: 0114503094
Email: P.Mithan@foss.com	Email: P.Mithan@foss.com

*Remark:

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Please scan QR code



Certificate of Calibration

Cert.No.: 25CH1433
Page: 1 of 3

Equipment : pH Meter
Manufacturer : Horiba
Model : LAQUA-PH210
Serial No. : HA0A0005
ID No. : UAE.EFM.004/2563(EFM,pH.04/63)
Condition As-Received: Used Item
Received Date : 09 December 2025
Calibration Date : 11 December 2025
Reference : 2512-0243WSC-2
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Odomsuk 41, Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In-house method :
- CP-CH5 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with temperature standard

Calibrated by : Warakorn Lemaoqrakul

Approved by : Approved Signatory

(✓) Chakrit Waewwanjua
() Ponpan Paipim
() Salthip Meangmal

Issue Date : 12 December 2025

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services

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Cert.No.: 25CH1433
Page: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	25E2743	25 Aug 2026
2) Ref. Standard Thermometer	4982054	110RC044	25I708	03 July 2026

- This measurement result is traceable to SI through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through Hach Lenge GmbH Ltd.,
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00
: The measurement results are traceable to SI through CPA chem Ltd.,
ANSI/ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.007	CPA chem	1114384	12 June 2027
pH 6.999	Hach Lenge GmbH	C03273	13 May 2027
pH 10.010	CPA chem	1114385	08 June 2026

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration Results

Function : mV Measurement

Performing standard curve by Document Process Calibrator at pH (4.7)(7,10)

Performance standard curve of Document Process Separator at pH (4) (7) (10)						
Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement	Coverage factor
	pH	mV	mV	pH	($\pm mV$)	k
pH Meter	4.00	177.48	177.4	4.01	0.058	2.00
S/N.: HA0A0005	7.00	0.00	0.1	7.00	0.058	2.00
	7.00	0.00	0.1	7.00	0.058	2.00
	10.00	-177.48	-177.2	10.01	0.058	2.00

Cert.No.: 25CH1433
Page: 3 of 3

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4.7)(7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor
pH Electrode	4.007	4.01	175.4	0.0085	2.05
S/N.: -	6.999	7.00	-0.3	0.0095	2.00
	6.999	7.01	-0.5	0.0096	2.00
	10.010	10.01	-170.6	0.0092	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : -

- Serial No. : -

Dimension of probe

- Length : 112 mm.

- Diameter : 16 mm.

- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
15.0	15.002	15.0	-0.002	0.13	2.00
30.0	30.002	30.0	-0.002	0.13	2.00
45.0	45.003	45.0	-0.003	0.13	2.00

Remark : - UUC* = Unit Under Calibration

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

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