

ภาคผนวก ค : เอกสารสอบเทียบความถูกต้อง
ของเครื่องมือเก็บตัวอย่าง

บัญชีรายการเครื่องมือหลักของห้องปฏิบัติการ สำหรับวิเคราะห์คุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือหลักวิเคราะห์คุณภาพอากาศ									
1	Analytical Balance (Readability 0.1 mg)	ฝุ่นละอองรวม (TSP)	Mettler-Toledo	AB204-S / 1128312528	Technology Promotion Association (Thailand-Japan)	22MM331	7 Apr 23	5 Apr 24	-
2	Analytical Balance (Readability 0.1 mg)		Mettler-Toledo	AB204-S/FACT / B108115858	Technology Promotion Association (Thailand-Japan)	22MM332	7 Apr 23	5 Apr 24	-

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

บริษัท ยูโนเทค แอนนาไลติก แอนด์ เอ็นจิเนียริ่ง คอนซัลแตนท์ จำกัด
ห้องปฏิบัติการวิเคราะห์มาตรฐาน ISO/IEC 17025

Certificate Page 1 of 1

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	Total Suspended Particulate (TSP)	Andersen Instruments, Inc.	G25A 158M	Tisch Environmental, Inc.	5072023	5 Jul 23	4 Jul 24	-
2	U-Tube Manometer	Total Suspended Particulate (TSP)	Dwyer	1221-36-W/M -	Technology Promotion Association (Thailand-Japan)	23P1396	9 May 23	8 May 24	-
3	Aneroid Barometer	Total Suspended Particulate (TSP)	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	23P1855	1 Jun 23	31 May 24	-
4	Dial Thermo-Hygrometer	Total Suspended Particulate (TSP)	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	23H1200	5 Jun 23	4 Jun 24	-
5	Wind Speed/Wind Direction	WS/WD	Scarlet Tech Ltd.	WL-21 2112DT0072	Scarlet Tech Ltd.	142/23	31 Mar 23	30 Mar 24	-
6	Sound Level Calibrator (Acoustic Calibrator)	Calibrate Sound Level Meter	Svantek	SV35A 73246	Innovative Instrument Co., Ltd.	23-ACT-110	27 Jun 23	26 Jun 24	-
7	Sound Level Meter	$L_{Aeq, 24 hr}$ L_{A90} L_{Amax} L_{Amin} ค่าระดับการรบกวน	Larson Davis	LxT2 0005286	Sithiporn Associates Co., Ltd.	ACL22081	26 Jan 22	26 Jan 24	-
8	Sound Level Meter	$L_{Aeq, 24 hr}$ L_{A90} L_{Amax} L_{Amin} ค่าระดับการรบกวน	Larson Davis	LxT2 0005344	Innovative Instrument Co., Ltd.	22-ACT-248	1 Apr 22	31 Mar 24	-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
314/4 PATTANAKARN ROAD NO.18, SUKHUMVIT ROAD, SUKHUMVIT 11, BANGKOK 10110
TEL. 0-2715-3000-29 FAX 0-2715-9454



Cert.No.: 23MM331
Page: 1 of 3

Certificate of Calibration

Equipment : Electronic Balance
Manufacturer : Mettler Toledo
Model : AB204-S
Serial No. : 1128312528
ID No. : UAE.AIR.019/2550
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Sol Udomsuk 41, Sukhumvit Road,
Bangchak, Phraekhanong,
Bangkok 10260
Location : Balance Room 2
Received order : 07 April 2023
Calibration Date : 07 April 2023
Ambient Temperature : 15 °C to 40 °C
Relative Humidity : 30 % to 90 %
Calibrated by : Suwit Imjai
Approved by :
() Pormthippa Tameyakul
() Malee Butkruea
Issue Date : 10 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services

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Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-00150C-1
Procedure used :-

Calibration were conducted using In-house calibration procedure CP-0801 according to direct measurement method against standard weight.

Condition of this result of calibration

1. Reference standard instruments:-

Instruments	Model	Serial No.	ID No.	Test report No.	Due date
1) Standard Weight Set (E2)	15864	24053	70RC007	MM-0010-22	20 Jan 2024

- This certificate is valid only to the item calibrated on date and place of calibration.
- This result of calibration was made on requested at the point specified by customer.
- This certificate is not certified for any commercial transaction.
- This certification is traceable to the International System of Unit.

Result of calibration () Without Adjustment (*) After Adjustment by Internal Calibration

Range capacity : 0 g to 220 g Resolution 0.0001 g

Before Adjustment :

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
100	99.9999	+0.0001	0.19	2.03
200	200.0001	-0.0001	0.29	2.00

After Adjustment :

1. Determination of the standard deviation of weighing machine (n = 10)

Applied Weight (g)	Standard Deviation of Reading (g)
100	0.00007
200	0.00007

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Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-00150C-1

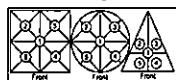
Cert.No.: 23MM331
Page: 3 of 3

Result of calibration

2. Effect of off center loading

A mass of 100 g was placed to various position on the pan.
The weighing machine reading error obtained is given in the table

Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)	Maximum difference between off-center and central loading (g)
-0.0001	-0.0002	+0.0004	-0.0001	-0.0008	0.0005



3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
Unload	0.0000	0.0000	0.15	2.13
0.1	0.0999	+0.0001	0.15	2.13
1	0.9999	+0.0001	0.15	2.13
5	4.9999	+0.0001	0.15	2.13
10	9.9999	+0.0001	0.15	2.11
20	20.0000	0.0000	0.15	2.11
50	50.0000	0.0000	0.16	2.06
70	69.9999	+0.0001	0.16	2.04
100	99.9999	+0.0001	0.19	2.03
150	150.0003	-0.0003	0.29	2.00
200	200.0005	-0.0005	0.29	2.00

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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
314/4 PATTANAKARN ROAD NO.18, SUKHUMVIT ROAD, SUKHUMVIT 11, BANGKOK 10110
TEL. 0-2715-3000-29 FAX 0-2715-9454



Cert.No.: 23MM332
Page: 1 of 3

Certificate of Calibration

Equipment : Electronic Balance
Manufacturer : Mettler Toledo
Model : AB204-S /FACT
Serial No. : B109115858
ID No. : UAE.AIR.018/2555
Submitted by : United Analyst and Engineering Consultant Co., Ltd.
3 Sol Udomsuk 41, Sukhumvit Road,
Bangchak, Phraekhanong,
Bangkok 10260
Location : Balance Room 2
Received order : 07 April 2023
Calibration Date : 07 April 2023
Ambient Temperature : 15 °C to 40 °C
Relative Humidity : 30 % to 90 %
Calibrated by : Suwit Imjai
Approved by :
() Pormthippa Tameyakul
() Malee Butkruea
Issue Date : 10 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-00150C-2
Page: 2 of 3

Procedure used :- Calibration were conducted using in-house calibration procedure CP-0801 according to direct measurement method against standard weight.

Condition of this result of calibration

1. Reference standard instrument:-
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This result of calibration was made on requested at the point specified by customer.
4. This certificate is not certified for any commercial transaction.
5. This certificate is traceable to the International System of Unit.

Result of calibration () Without Adjustment (*) After Adjustment by Internal Calibration

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
100	100.0002	-0.0002	0.21	2.06
200	200.0003	-0.0003	0.29	2.00

Before Adjustment :

Applied Weight (g)	Standard Deviation of Reading (g)
100	0.00009
200	0.00007

After Adjustment :

1. Determination of the standard deviation of weighing machine (n = 10)

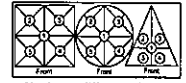
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Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-00150C-2
Page: 3 of 3

Result of calibration

2. Effect of off center loading
A mass of 100 g was placed to various position on the pan.
The weighing machine reading error obtained is given in the table



Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)	Maximum difference between off-center and central loading (g)
+0.0001	-0.0003	+0.0003	+0.0006	+0.0002	0.0005

3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
Unload	0.0000	0.0000	0.18	2.17
0.1	0.0998	+0.0001	0.18	2.17
1	0.9998	+0.0002	0.18	2.17
5	5.0000	0.0000	0.18	2.17
10	10.0000	0.0000	0.18	2.17
20	20.0000	0.0000	0.18	2.15
50	50.0001	-0.0001	0.19	2.11
70	70.0001	-0.0001	0.20	2.07
100	100.0002	-0.0002	0.21	2.06
150	150.0004	-0.0004	0.29	2.00
200	200.0005	-0.0005	0.29	2.00

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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RECALIBRATION
DUE DATE:
July 5, 2023

Certificate of Calibration

Calibration Certification Information					
Cal. Date: July 5, 2022	Rootmeter S/N: 438320	Ta: 297	*K		
Operator: Jim Tisch		Pa: 750.1	mm Hg		
Calibration Model #: G25A	Calibrator S/N: 158M				

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	AP (mm Hg)	AH (in H2O)
1	1	2	1	1.3740	3.2	2.00
2	3	4	1	0.9480	6.4	4.00
3	5	6	1	0.8480	7.9	5.00
4	7	8	1	0.8060	8.7	5.50
5	9	10	1	0.6670	12.7	8.00

Data Tabulation					
Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pa_{std}} \right) \left(\frac{Ta}{Ta_{std}} \right)}$ (y-axis)	Va (x-axis)	Qa (y-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Ta_{std}} \right)}$ (y-axis)
0.9860	0.7447	1.4073	0.9957	0.7521	0.8899
0.9818	1.0557	1.9902	0.9915	1.0459	1.2585
0.9798	1.1354	2.2351	0.9895	1.1668	1.4071
0.9788	1.2143	2.3337	0.9884	1.2263	1.4757
0.9735	1.4595	2.8145	0.9831	1.4735	1.7798
QSTD		1.96745	QA		1.23199
b=		-0.05315	b=		-0.03361
r=		0.99995	r=		0.99995

Calculations			
Vstd ΔVol (Pa-AP) / (Pastd ΔTstd / Ta)	Va ΔVol (Pa-AP) / (Pa ΔT / Ta)		
Qstd ΔVol / ΔTime	Qa ΔVol / ΔTime		

For subsequent flow rate calculations:

$$Qstd = 1/m \left(\sqrt{\Delta H \left(\frac{Pa}{Pa_{std}} \right) \left(\frac{Ta}{Ta_{std}} \right)} \right) \cdot b$$

$$Qa = 1/m \left(\sqrt{\Delta H \left(\frac{Ta}{Ta_{std}} \right)} \right) \cdot b$$

Standard Conditions	
Tstd:	295.15 °K
Pstd:	760 mm Hg
Key	
ΔH:	calibrator manometer reading (in H2O)
ΔP:	rootmeter manometer reading (mm Hg)
Ta:	actual absolute temperature (°K)
Pa:	actual barometric pressure (mm Hg)
b:	Intercept
m:	slope

RECALIBRATION
US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30

Tisch Environmental, Inc.
145 South Miami Avenue
Village of Cleves, OH 45002

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3-EQUIPMENT CALIBRATION AND TESTING SERVICES
51/4 PATTANAKARN ROAD SOI 18, SUANLACANG, SUAN LACANG, BANGKOK 10250
TEL: 0-2719-3005-24 FAX: 0-2719-9484

Certificate of Calibration

Certificate No.: 23P1390
Page: 1 of 2

Equipment : U Tube Manometer
Manufacturer : Dwyer
Model : 1221-3C-W/M
Serial No.:
ID No.: UAE EMA2 064/2555
Condition As-Received : Used Item
Received Date: 26 April 2023
Calibration Date: 08 May 2023
Reference: 2304-0703WSC
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Atmospheric Pressure: 1010 mbar
Submitted by: United Analyst and Engineering Consultant Co., Ltd.
81 Soi Udomsak 41, Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10250

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard according to in-house calibration procedure CP-P04, using "DKD-R 6-1" Calibration of Pressure Gauges, Edition 03/2014 " as a guidelines.

Condition of this result of calibration

1. Reference standards instrument:
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 inH2O
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. This certificate is valid only to the item calibrated on date and place of calibration.
8. This Certificate is traceable to the International System of Unit maintained through:-
-National Institute of Metrology Thailand (NIMT)

Calibrated by: Suwit Ausaroon
Issue Date: 11 May 2023

Approved Signatory: Attapol P.
() Phalinee Prapboopai
() Surin Suwanmanee
(x) Attapol Panurach

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Cert.No.: 23P1396
Page: 2 of 2

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

Range: 0 inH₂O to 36 inH₂O
Scale Interval: 0.1 inH₂O (The Fifth Estimate)

UUC Indication				
Applied Pressure (inH ₂ O)	High-port side (inH ₂ O)	Low-port side (inH ₂ O)	ΔP (inH ₂ O)	Error (inH ₂ O)
0.00	0.00	0.00	0.00	0.00
2.00	1.00	-1.00	2.00	0.00
4.00	2.00	-2.00	4.00	0.00
6.00	3.00	-3.02	6.02	0.02
8.00	4.00	-4.02	8.02	0.02
10.00	5.00	-5.02	10.02	0.02
12.00	6.00	-6.02	12.02	0.02
14.00	7.00	-7.02	14.02	0.02
16.00	8.00	-8.02	16.02	0.02
18.00	9.00	-9.02	18.02	0.02
20.00	10.00	-10.04	20.04	0.04
22.00	11.00	-11.04	22.04	0.04
24.00	12.00	-12.04	24.04	0.04
26.00	13.00	-13.04	26.04	0.04
28.00	14.00	-14.04	28.04	0.04
30.00	15.00	-15.04	30.04	0.04
32.00	16.00	-16.04	32.04	0.04
34.00	17.00	-17.04	34.04	0.04
36.00	18.00	-18.04	36.04	0.04

The uncertainty of measurement was ± 0.11 inH₂O

* UUC = Unit Under Calibration

* ΔP = High-port side - Low-port side

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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Attaporn P.
เอกสารไม่ควบคุม
a 1160345



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
134/1 PATANAKARN ROAD SOI 18, SUKHUMVIT, SUKHUMVIT, BANGKOK 10250
TEL: 0-2317-3046 FAX: 0-2316-9484



Certificate of Calibration

Certificate No.: 23P1855
Page: 1 of 2

Equipment: Aneroid Barometer

Manufacturer: Bongo

Model: -

Serial No.: -

ID No.: UAE ANV.122/2550

Condition As Received: Used Item

Received Date: 20 May 2023

Calibration Date: 02 June 2023

Reference: 2305-0910WGC

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 15) %

Atmospheric Pressure: 1007 mbar

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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, Phra Khanong, Bangkok 10260

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments
Standard according to In-house calibration procedure CAP-10, using "DKO-R 9-1" Calibration of Pressure
Gauges, Edition 03/2014 " as a guidance.

Condition of this result of calibration

1. Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Barometer	DP142	1422505048	MP-0084-23	03 May 2024

2. This instrument was installed in vertical orientation and center of the dial was used as the reference level

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

4. This result of calibration instrument was in absolute pressure

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

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

7. This Certification is traceable to the International System of Unit maintained through:-

- National Institute of Metrology Thailand (NIMT)

Calibrated by: Sukarn Khankaw
Issue Date: 08 June 2023

Approved Signatory: Attaporn P.
[] Phatnong Prapaisit
[] Sure Sornwanan
[x] Attaporn Panurach

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H 0316955



Cert.No.: 23P1855
Page: 2 of 2

Result of calibration: Without adjustment
Function: Absolute Pressure Measurement

Range: 960 hPa to 1030 hPa
Scale Interval: 1 hPa (The Fifth Estimate)

Increasing Pressure									
Applied Pressure (hPa)	958.50	969.50	980.50	990.50	1001.00	1011.15	1020.04	1031.45	
UUC Indication (hPa)	960.0	970.0	980.0	990.0	1000.0	1010.0	1020.0	1030.0	
Error (hPa)	1.50	0.41	-0.35	-0.39	-1.01	-1.15	-0.94	-1.45	

Decreasing Pressure									
Applied Pressure (hPa)	1031.45	1021.61	1012.16	1002.38	992.17	982.20	972.89	963.32	
UUC Indication (hPa)	1030.0	1020.0	1010.0	1000.0	990.0	980.0	970.0	960.0	
Error (hPa)	-1.45	-1.61	-2.16	-2.38	-2.17	-2.20	-2.89	-3.32	

The uncertainty of measurement was ± 0.30 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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a 1165504



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
134/1 PATANAKARN ROAD SOI 18, SUKHUMVIT, SUKHUMVIT, BANGKOK 10250
TEL: 0-2317-3046 FAX: 0-2316-9484



Certificate of Calibration

Certificate No.: 23H1200
Page: 1 of 2

Equipment: Dial Thermo-Hygrometer

Manufacturer: Bongo

Model: -

Serial No.: -

ID No.: UAE ANV.130/2550

Condition As Received: Used Item

Received Date: 28 May 2023

Calibration Date: 30 May 2023

Reference: 2305-0918WGC

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, Phra Khanong, Bangkok 10260

Procedure used: Calibration were conducted using in-house calibration procedure CAP-02 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) Hygro-M2 Dew Point Monitor	5112	23001955	20703	02 Aug 2023
2) Handheld Thermometer With Sensor	1523	3240078	23005	15 Mar 2024

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

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

- National Institute of Standards and Technology (NIST), The United States of America

- Technology Promotion Association (Thailand-Japan), NSO-ONSC Accredited No. Calibration 0008

Calibrated by: Somchai Dumree
Issue Date: 07 June 2023

Approved Signatory: [x] Chakrit Wacwanja
[] Pongthipha Tomyakul
[] Viporn Tanjawanu

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B 0316274



Cert. No.: 23H1200
Page: 2 of 2

Result of Calibration:
Function:

Before Adjustment
Humidity Measurement

Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	Error (%R.H.)	Uncertainty of Measurement (±%R.H.)
25.0	40.1	40	7.9	1.8
25.0	60.0	63	3.0	1.7
25.0	80.0	76	-4.0	1.9

Result of Calibration:
Function:

After Adjustment
Humidity Measurement

Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	Error (%R.H.)	Uncertainty of Measurement (±%R.H.)
25.0	40.1	44	3.9	1.8
25.0	60.0	60	0.0	1.7
25.0	80.0	76	-5.0	1.9

Result of Calibration:
Function:

Without Adjustment
Temperature Measurement

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
19.987	20.0	0.013	0.72
30.016	30.0	-0.016	0.72
39.944	39.5	-0.444	0.72

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%.

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a 1165295



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2884, 0-2399-0469

Calibration Certificate

Issued by Calibration & Test Section, Meteorological Instruments Bureau

Date of Issue 31 March, 2023

Certification No. 142/23

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Object WIRELESS ANEMOMETER

Manufacturer SCARLETT

Type WIRELESS RECEIVER WL-21

WIND SENSOR WL-21

Mfg Code WIRELESS RECEIVER 2112DR0072

WIND SENSOR 2112DI0072

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 1008.2 hPa

NATIONAL STANDARD WIND TUNNEL Thermal Anemometer 642 S/N 91563

HOOK GAGE NO 1425 Wind Aft Plotting Board

NIST Test Reference Number 731/241460

Ultrasonic Anemometer Model DA-650-STV (sensor TR-90AH)

Serial Number 110730023 (sensor 120629589)

JAPAN QUALITY ASSURANCE ORGANIZATION

STANDARD THERMOMETER Theodor Friedrich, Dry No. 8390/94 Wet No. 8399/94

testo, testo 645 Serial No. 02846057 Thermochneider No. 918802

STANDARD BAROMETER Digital Barometer Vaisala Type PTB330 No. 10200015

Digital Barometer Vaisala Type PTB330 No. 10200015

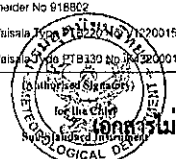
Calibrated by:

Signed:

Mr. Wacharapol Subwat

Mr. Pitsod Promsri

Mechanical Engineer



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2884, 0-2399-0469

The Result of Calibration

Certification No. 142/23

31 March, 2023

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THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2884, 0-2399-0469

The Result of Calibration

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Standard Ultrasonic Anemometer 101sec	HOOK GAGE NO 1425			TESTED ANEMOMETER	
	Pressure	Velocity	Velocity	Velocity	Correction
	mmHg	mmHg	mmHg	m/sec	m/sec
1.00	-	-	-	1.0	0.00
3.02	-	-	-	3.0	0.02
5.00	-	-	-	5.0	0.00
7.04	-	-	-	6.9	0.14
9.02	-	-	-	9.1	-0.08
11.02	-	-	-	10.9	0.12
13.01	-	-	-	12.9	0.11
15.01	-	-	-	14.9	0.11
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.1	-0.08

Wind Aft Plotting Board:

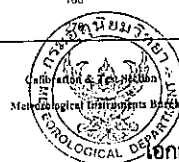
U.S. DEPARTMENT OF COMMERCE WEATHER BUREAU

WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
150	180
270	

Calibrated by:

Mr. Wacharapol Subwat

Mechanical Engineer



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Standard Barometer Pressure	Tested Barometer Pressure	Correction
1014.20	1014	0.20
1014.02	1014	0.02
1011.47	1011	0.47
1011.25	1011	0.25
1011.11	1011	0.11
1011.28	1011	0.38
1011.21	1012	-0.29
1013.48	1013	0.48
1013.81	1014	-0.19
1014.02	1014	0.02
1013.73	1014	-0.27
1013.32	1013	0.32
1014.92	1015	-0.08
1014.75	1015	-0.25
1014.38	1014	0.38
1014.21	1014	0.21
1013.57	1013	0.57
1013.91	1013	0.01
1011.26	1011	0.26
1011.59	1012	-0.41

Average

Calibrated by:

Mr. Wacharapol Subwat

Mechanical Engineer



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THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10760 Tel. 081-451-2804, 0-2399-0469

The Result of Calibration

Certification No. 142/23

Page : 4 of 5

31 March, 2023

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
762.78	761	-0.72
760.68	760	0.68
758.66	759	-0.34
758.50	759	0.50
756.29	758	0.29
758.60	758	-0.40
758.84	760	-0.16
760.17	760	0.17
760.42	760	0.42
760.56	761	-0.42
762.36	760	0.36
760.06	760	0.06
761.25	761	0.25
761.12	761	0.12
763.05	761	-0.15
760.72	761	-0.28
760.24	760	0.24
759.02	760	-0.18
758.51	759	0.51
758.75	759	-0.25

Average

Calibrated by :

Mr. Watchanop Subwat
Mechanical Engineer



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THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10760 Tel. 081-451-2804, 0-2399-0469

The Result of Calibration

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31 March, 2023

Standard Temp °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.24	45.5	-0.26
32.16	32.3	-0.14
18.48	18.5	-0.02

Calibrated by :

Mr. Watchanop Subwat
Mechanical Engineer



เอกสารไม่ควบคุม

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
719/300 U.S. SOI SINTANAKORN 11 TAMBON BANG KALU,
AMPHUR BANG PHU SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL : 0669-2116-1140 FAX : 0669-2116-1140



Page 1 of 2

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 : 23-ACT-110

Request No : Req-2023-1407

Unit Under Calibration Details

Measurement Item : Acoustic Calibrator

Class : I

Manufacturer : SYVANTEK

Range : 94 , 114 dB / 1000 Hz

Model : SV 35A

Instrument Status : Used

Serial Number : 73246

ID : UAE.EFM.104/2561

Calibration Environment and Details

Temperature : (23 ± 2 °C)

Humidity : (50 ± 20 %RH)

Barometric Pressure : (1013 ± 10.0 hPa)

Received Date : 26 June 2023

Calibration Date : 27 June 2023

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	EEI	31 May 2024
THD Multimeter	2015	1047765	NIMT	31 January 2024

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. Pait Mathasorn
Calibration Engineer Supervisor

Issue Date : 27 June 2023

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Issuing and Licensing Company.

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INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
719/300 U.S. SOI SINTANAKORN 11 TAMBON BANG KALU,
AMPHUR BANG PHU SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL : 0669-2116-1140 FAX : 0669-2116-1140



Page 2 of 2

Certificate No : 23-ACT-110

Request No : Req-2023-1407

Sound pressure level

Calibration Results : Without Adjustment

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty (± dB)	Acceptance Limit Class 1 (± dB)
	Measured	Error	Measured	Error		
94 dB / 1000 Hz	93.82	-0.18	-	-	0.13	0.25
114 dB / 1000 Hz	113.77	-0.23	-	-	0.13	0.25

Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)	Acceptance Limit Class 1 (± %)
	Measured (Hz)	Error (%)	Measured (Hz)	Error (%)		
94 dB / 1000 Hz	1000.60	0.00	-	-	0.01	0.70
114 dB / 1000 Hz	1000.00	0.00	-	-	0.01	0.70

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

Calibration Range (Hz)	Without Adjustment	Adjustment	Uncertainty (± %)	Acceptance Limit Class 1 (± %)
	Measured (%)	Measured (%)		
94 dB / 1000 Hz	0.09	-	0.40	2.5
114 dB / 1000 Hz	0.28	-	0.40	2.5

Note :

Acceptance limit was IEC 60942:2017 Class 1

The calibration results exclude the calibration pressure correction.

The calibration results exclude the microphone volume correction.

End of Calibration

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Sirinthorn Rd., Bangbunru, Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL22081
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : LARSON DAVIS
Model : LX12/ Microphone 375B02 / Preamplifier PRML x T2B
Serial No. : 0005286 / 011740 / 056087
ID No. : -

Condition As Found : GOOD

Customer : UNITED ANALYST AND ENGINEERING CONSULTANT (UAE)
81 SOI UDOMSUK 41, SUKHUMVIT ROAD,
BANGCHIAK SUB-DISTRICT,
PHRAKHANONG DISTRICT, BANGKOK 10260
THAILAND.

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

Received Date : 18 JANUARY 2022
Calibration Date : 26 JANUARY 2022
Date of Issue : 28 JANUARY 2022

Calibrated by : Nathakorn Pitsupaisan

Approved by :

T. Petchuraj
(Thanakul Petchuraj)

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

QF-TS12-04-04-020664

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SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22081
Job No. : VC65AC0044
Pages : 3 of 8

Summary of Measurement Result :

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

QF-TS12-04-04-020664

เอกสารไม่ควบคุม

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22081
Job No. : VC65AC0044
Pages : 2 of 8

Calibration Procedure : CP-AC-02

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM). The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0012-21	10-Feb-22
Waveform Generator	33511B	MY52302742	EF-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL-0P_05/0264	10-Feb-22
Digital Multimeter	33461A	MY53220076	EEL-0P_03/0264	08-Feb-22
Digital Multimeter	34461A	MY60034273	1-15180725251-1	15-Sep-22
Programmable Attenuator	MAT-1070	62100114	1500-07774E	08-Mar-22
Condenser Microphone	4180	2977900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-42KAI	34560495	AA-3003-21	16-Feb-22

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

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

3.1 National Institute of Metrology (Thailand).

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

QF-TS12-04-04-020664

เอกสารไม่ควบคุม

T. Petchuraj

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL22081
Job No. : VC65AC0044
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.96)	94.0	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
31.0

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

Frequency Weighting	Measured value (dB)
A-weight	30.8
C-weight	30.6
Flat	36.8

3. Acoustical signal tests of frequency weightings

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

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	-0.1	0.1	0.0	±1.5
1000	-0.2	-0.2	-0.2	±1.0
8000	3.1	3.2	3.2	±5.0

QF-TS12-04-04-020664

เอกสารไม่ควบคุม

T. Petchuraj

Continuation of Calibration Certificate

Cert. No. : ACL22081
Job No. : VC65AC0044
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.0	0.0	±5.0
16000	-0.1	0.0	0.1	±5.0(-∞)

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

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

5.2 Time weighting at 1 kHz

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

6. Long-term stability

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

QP-TS12-04-04-020664

เอกสารไม่ควบคุม

T. Rth.

Continuation of Calibration Certificate

Cert. No. : ACL22081
Job No. : VC65AC0044
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
140	94.0	94.0	0.0	±0.5

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.8	-0.2	1.5; -5.0
	2	8	117.0	116.7	-0.3	1.0; -2.5
	200	800	134.0	133.9	-0.1	±1.0
Slow	2	8	108.0	107.8	-0.2	1.5; -5.0
	200	800	127.6	127.5	-0.1	±1.0
SEL	0.25	1	N/A	N/A	N/A	1.5; -5.0
	2	8	N/A	N/A	N/A	1.0; -2.5
	200	800	N/A	N/A	N/A	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepen (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.7	-0.7	±3.0

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

QP-TS12-04-04-020664

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T. Rth.

Continuation of Calibration Certificate

Cert. No. : ACL22081
Job No. : VC65AC0044
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
135.0	135.1	0.1	±1.1
134.0	134.1	0.1	±1.1
133.0	133.1	0.1	±1.1
132.0	132.1	0.1	±1.1
131.0	131.1	0.1	±1.1
129.0	129.1	0.1	±1.1
124.0	124.1	0.1	±1.1
119.0	119.1	0.1	±1.1
114.0	114.1	0.1	±1.1
109.0	109.1	0.1	±1.1
104.0	104.1	0.1	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.1	0.1	±1.1
44.0	44.2	0.2	±1.1
39.0	39.6	0.6	±1.1

QP-TS12-04-04-020664

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T. Rth.

Continuation of Calibration Certificate

Cert. No. : ACL22081
Job No. : VC65AC0044
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.2	89.4	0.2	±1.5

12. High level stability

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

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

End of Calibration Certificate

QP-TS12-04-04-020664

เอกสารไม่ควบคุม

T. Rth.

Certificate of Calibration

Customer : UNIFIED ANALYSIS AND ENGINEERING CONSULTANT CO., LTD.
Name : B1 Soi Udonnuek 41, Sukhumvit Road, Bangkok, Prakanong, Bangkok
Address : 10250
Certificate No : 22-ACT-248
Request No : Req-2022-0628

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : Larson Electronics
Model : LA-2
Serial Number : 0065344
ID : UAE EFMA0472561
Resolution : 0.1 dB
Calibration Environment and Details
Temperature : 23 °C ± 2 °C
Humidity : 50 % RH ± 20 % RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 23 March 2022
Calibrated Date : 1 April 2022
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-1:2003 Electroacoustics - Sound level meters - Part 1: Periodic tests
Location of Calibration : Lab Acoustic
Reference Standard

Instrument	Brand	Model	SN	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	15 September 2022	GRAS
Multi-frequency Calibrator	Quest	Quest-cal	17A000234	24 June 2022	TSJ
Audio Generator	Swan	Swan401	131	18 October 2022	WV 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. Nopadol Lompan
Calibration Officer
Approved By : Mr. Pait Mahaboon
Calibration Engineer Supervisor
Issue Date : 1 April 2022

The results related only to the items calibrated. The certificate shall not be reproduced except in full, without written approval of the Calibration Laboratory.

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Certificate No : 22-ACT-248
Request No : Req-2022-0628

1. Indication at the calibration check frequency

UUC Setting	Measured	Before Adjust	Adjust	UUC	ERR	UNCERTAINTY	Acceptance
FAST / 31-139	(dB)	(dB)	(dB)	(dB)	(dB)	(± dB)	(± dB)
Calibrator Setting	113.85	113.7	-0.15	113.9	0.05	0.29	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN 58070

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 31-139	(dB)	(± dB)
UUC Weighting	28.1	0.10

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

UUC Setting	Measured	UNCERTAINTY
FAST / 31-139	(dB)	(± dB)
UUC Weighting	28.5	0.10
A	28.4	0.10
Z	32.6	0.10

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

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY	Acceptance Limit
FAST / 31-139	A C Z	(± dB)	(± dB)
STD Setting	(dB) (dB) (dB)	(± dB)	(± dB)
125 Hz	0.0 0.1 0.1	0.50	2.0
1000 Hz	0.0 0.0 0.0	0.60	1.0
4000 Hz	0.2 0.2 0.2	0.60	3.0
8000 Hz	0.0 0.0 0.1	0.70	5.0

The results related only to the items calibrated. The certificate shall not be reproduced except in full, without written approval of the Calibration Laboratory.

เอกสารนี้เกี่ยวข้องกับ

Certificate No : 22-ACT-248
Request No : Req-2022-0628

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	Acceptance Limit
FAST / 31-139	A C Z	(± dB)	(± dB)
STD Setting	(dB) (dB) (dB)	(± dB)	(± dB)
80 Hz	-0.2 -0.1 -0.1	0.2	1.0
125 Hz	-0.1 0.0 0.0	0.2	1.5
250 Hz	-0.1 0.0 0.0	0.2	1.5
500 Hz	-0.1 0.0 0.0	0.2	1.5
1000 Hz	0.0 0.0 0.0	0.2	1.0
2000 Hz	0.0 0.0 0.0	0.2	2.0
4000 Hz	0.0 0.0 0.0	0.2	3.0
8000 Hz	-0.1 -0.1 0.0	0.2	5.0
16000 Hz	-0.1 -0.1 -0.1	0.2	±5.0dB

6. Frequency and time weightings at 1 kHz

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
FAST / 31-139	REF	UUC	ERR	(± dB)
UUC Weighting	(dB)	(dB)	(dB)	(± dB)
A	114.00	114.0	0.0	0.2
C	114.00	114.0	0.0	0.2
Z	114.00	114.0	0.0	0.2

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
31-139 / A	REF	UUC	ERR	(± dB)
UUC Time Response	(dB)	(dB)	(dB)	(± dB)
Fast	114.00	114.0	0.0	0.1
Slow	114.00	114.0	0.0	0.1
Eq	114.00	114.0	0.0	0.1

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7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / 31-139	UUC	(± dB)	(± dB)
STD Setting	(dB)	(± dB)	(± dB)
Initial	114.0		
Final	114.0		
Deviation	0.0	0.1	0.3

B. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY	Acceptance Limit
FAST / 31-139	REF	UUC	ERR	(± dB)
STD dB	(dB)	(dB)	(dB)	(± dB)
129.00	129	129.0	0.0	1.5
134.00	134	134.0	0.0	1.5
139.00	139	139.0	0.0	1.5
124.00	124	124.0	0.0	1.1
119.00	119	119.0	0.0	1.1
114.00	114	114.0	0.0	1.1
109.00	109	109.0	0.0	1.1
104.00	104	104.0	0.0	1.1
99.00	99	99.0	-0.1	1.1
94.00	94	94.0	0.0	1.1
89.00	89	89.0	0.0	1.1
84.00	84	84.0	0.0	1.1
79.00	79	79.0	0.0	1.1
74.00	74	74.0	0.0	1.1
69.00	69	69.0	0.0	1.1
64.00	64	64.0	0.0	1.1
59.00	59	59.0	0.0	1.1
54.00	54	54.0	0.0	1.1
49.00	49	49.0	0.0	1.1
44.00	44	44.1	0.1	1.1
39.00	39	39.4	0.4	1.1
34.00	34	34.5	0.5	1.1

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