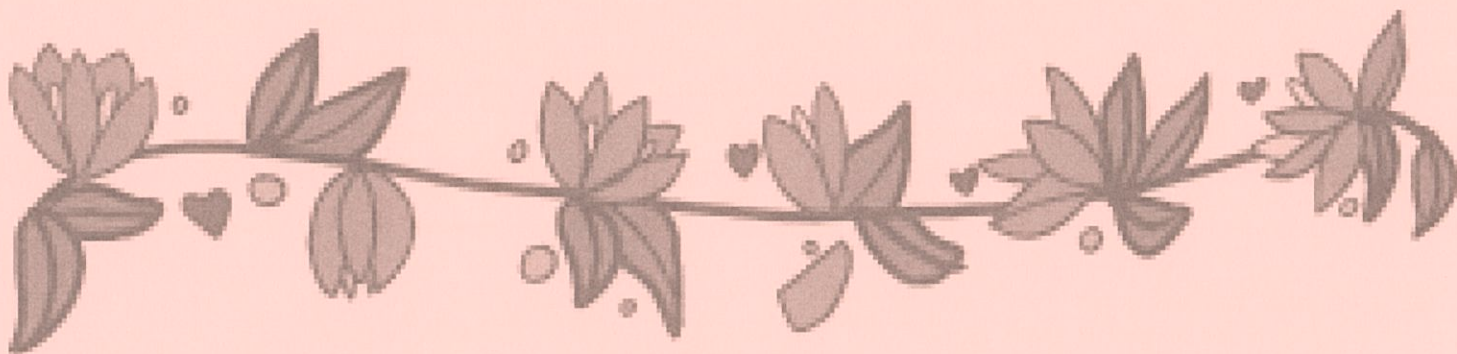


ภาคผนวก ฉ  
เอกสารสอบเทียบเครื่องมือ

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### 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
<b>Ambient</b>									
1	Orifice Transfer Standard Calibrator	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Tisch Environmental, Inc.	TE-5025A 3383	Jiranatee Associates Co., Ltd.	CL-003-65	26 Jul 22	25 Jul 24	-
2	U-Tube Manometer	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Dwyer	1221-36-W/M -	Technology Promotion Association (Thailand-Japan)	23P1402	9 May 23	8 May 24	-
4	Aneroid Barometer	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	22P2728	22 Jul 22	21 Jul 23	-
5	Dial Thermo-Hygrometer	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	22H1588	27 Jul 22	26 Jul 23	-
6	Wind Speed/Wind Direction	WS/WD	LSI LASTEM	E-LOG305 20020301	Thai Meteorological Department	413/22	12 Jul 22	11 Jul 23	-
7	Wind Speed/Wind Direction	WS/WD	LSI LASTEM	E-LOG305 21020224	Thai Meteorological Department	414/22	12 Jul 22	11 Jul 23	-
8	Wind Speed/Wind Direction	WS/WD	LSI LASTEM	05103-5 19040403	Thai Meteorological Department	415/22	12 Jul 22	11 Jul 23	-
9	Sound Level Calibrator (Acoustic Calibrator)	Calibrate Sound Level Meter	SvanteK	SV35A 73249	Innovative Instrument Co., Ltd.	22-ACT-406	1 Jul 22	30 Jun 23	-
10	Sound Level Meter	L <sub>Aeq,24 hr</sub> , L <sub>Aeq,1 hr</sub> , L <sub>A90</sub>	Larson Davis	LXT2 0005398	Innovative Instrument Co., Ltd.	22-ACT-035	21 Jan 22	20 Jan 24	-
11	Sound Level Meter	L <sub>Aeq,24 hr</sub> , L <sub>Aeq,1 hr</sub> , L <sub>A90</sub>	Larson Davis	LXT2 0005400	Innovative Instrument Co., Ltd.	22-ACT-036	21 Jan 22	20 Jan 24	-

### 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
<b>Water</b>									
1	pH Meter	pH	Horiba	LAQUA-PH210 HADE0006	Technology Promotion Association (Thailand-Japan)	23CH99	23 Jan 23	22 Jan 24	-



JIRANATE ASSOCIATES CO., LTD.

Accredited calibration laboratory

ISO/IEC 17025:2017  
MET 751.751.2025  
CALIBRATION 0367

Flow measurement services department  
Calibration services department

66/14-15 9/1/5-36  
Petchkasem 7/71 Rd Wattana, Bangkok  
Bangkok 10000 (Thailand)  
Tel: 02-000-0000  
Mobile: 08686393453  
E-mail: jiracalib@jirajate.com  
Web site: www.jirajate.com

## CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

Certificate No. : CL-003 65

**MEASUREMENT ITEM**  
**MANUFACTURER**  
**MODEL/TYPE**  
**SERIAL NUMBER**  
**ID NUMBER**  
**CONDITION AS RECEIVED**  
**CUSTOMER**

: Top Load Office  
: Tisch Environmental, Inc.  
: TE-5025A  
: 3383  
: UAE ETM.063/2560  
: Used Item  
: United Analyst and Engineering Consultant Co., Ltd.  
81 Soi Udomsuk 41, Sukhumvit Road, Bangkok, Prachanong,  
Bangkok 10260

**RECEIVED DATE**  
**MEASUREMENT DATE**  
**ISSUE DATE**

: 15 Jul 2022  
: 25 Jul 2022  
: 26 Jul 2022

### ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:  
Temperature :  $23.0 \pm 3.0$  °C  
Relative Humidity :  $55.0 \pm 15.0$  %RH  
Atmospheric Pressure :  $1010 \pm 10$  hPa

### CALIBRATION CONDITION:

Preconditioning : 24 hours at ambient conditions.  
Measurement Condition : The average values during measurement are 24.8 °C and 55.1 %RH.

### TABULATION OF RESULTS:

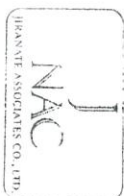
The table on next page give the measured values.

**Calibration procedure:**  
The Office gas flow device was calibrated against Standard Rotary Displacement Meter (Roods Meter) Model 665/JMC/W3-4b. The W-CL-004 was used as a calibration guideline.

**Traceability:**  
This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the VSL (National Metrology Institute of Netherlands) via Certificate number: 02211901

**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

Calibrated by:  
☐ Mr. Satevit Thachalad  
☒ Miss Jitraporn Lertsomphol



Approved signatory

Mr. Panying Booncharoen  
Calibration Department Manager

THIS CERTIFICATE REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION IS WRITING FROM THE LABORATORY



JIRANATE ASSOCIATES CO., LTD.

Continuation of Certificate of Calibration Number CL-003-65

Page 2 of 2 Pages

### MEASUREMENT RESULTS:

The Office gas flow device was calibrated by direct comparison method with the Standard Rotary Displacement Meter (Roods 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 <sup>3</sup> /min	Pressure [Pa] mmHg	Temperature [T <sub>a</sub> ] °C	Temperature [T <sub>m</sub> ] °C	Δp, meter mmHg	Δp, Office InH <sub>2</sub> O	γ	Standard Flow [Q <sub>s</sub> ] m <sup>3</sup> /min
1	0.607	754.265	24.640	23.960	55.399	1.699	1.299	0.643
2	1.000	754.236	24.950	24.350	62.172	3.444	1.849	0.913
3	1.118	754.323	24.730	24.210	41.925	4.582	2.133	1.051
4	1.169	754.212	24.640	24.160	31.045	5.150	2.262	1.116
5	1.416	754.175	24.680	24.210	30.117	7.629	2.754	1.353

Slope (m) : 2.04804  
Intercept (b) : -0.01939  
Correlation coefficient (r) : 0.99982  
Uncertainty (k=2): 0.011 m<sup>3</sup>/min

Table 2: The results of Q actual calibration data

Plate	Flow rate m <sup>3</sup> /min	Pressure [Pa] mmHg	Temperature [T <sub>a</sub> ] °C	Temperature [T <sub>m</sub> ] °C	Δp, meter mmHg	Δp, Office InH <sub>2</sub> O	γ	Standard Flow [Q <sub>s</sub> ] m <sup>3</sup> /min
1	0.607	754.265	24.640	23.960	55.399	1.699	0.819	0.647
2	1.000	754.236	24.950	24.350	62.172	3.444	1.167	0.919
3	1.118	754.323	24.730	24.210	41.925	4.582	1.345	1.058
4	1.169	754.212	24.640	24.160	31.045	5.150	1.426	1.123
5	1.416	754.175	24.680	24.210	30.117	7.629	1.735	1.361

Slope (m) : 1.28277  
Intercept (b) : -0.01223  
Correlation coefficient (r) : 0.99982  
Uncertainty (k=2): 0.012 m<sup>3</sup>/min

\*\*\*End of Certificate of Calibration\*\*\*



เอกสารไม่ควบคุม





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250  
TEL. 0-2717-3005-24 FAX 0-2719-9484

## Certificate of Calibration

Certificate No. : 23P1402  
Page : 1 of 2

Equipment : U Tube Manometer  
Manufacturer: Dwyer  
Model : 1221-36-W/M  
Serial No.:  
ID No.: UAE EFM-180/2561  
Condition As-Received: Used Item  
Received Date: 26 April 2023  
Calibration Date: 09 May 2023

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

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

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

Reference: 2304-0703WSC

Ambient Temperature: ( 23 ± 2 ) °C

Relative Humidity: ( 50 ± 15 ) %

Atmospheric Pressure: 1010 mbar

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 instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Pressure Calibrator	PC106P	1189	MP-0137-22	24 Aug 2023
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 inH <sub>2</sub> O				

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

-National Institute of Metrology, Thailand (NIMT)

Calibrated by: Suwit Aussarreo  
Issue Date: 11 May 2023

Approved Signatory : *Attapol P.*  
[ ] Phalinee Prabpai  
[ ] Sura Suwannasri  
[x] Attapol Panurach

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B 0314242



Cert.No.: 23P1402  
Page: 2 of 2

Result of calibration:- Without adjustment  
Function:- Pressure Measurement  
Increasing Pressure  
Range: 0 inH<sub>2</sub>O to 36 inH<sub>2</sub>O  
Scale Interval: 0.1 inH<sub>2</sub>O (The Fifth Estimate)

UUC Indication			
Applied Pressure (inH <sub>2</sub> O)	High-port side (inH <sub>2</sub> O)	Low-port side (inH <sub>2</sub> O)	Error (inH <sub>2</sub> O)
0.00	0.00	0.00	0.00
2.00	1.00	-1.00	0.00
4.00	2.00	-2.00	0.00
6.00	3.00	-3.00	0.00
8.00	4.00	-4.00	0.00
10.00	5.00	-5.00	0.00
12.00	6.00	-6.00	0.00
14.00	7.00	-7.02	0.02
16.00	8.00	-8.02	0.02
18.00	9.02	-9.04	0.06
20.00	10.02	-10.04	0.06
22.00	11.00	-11.04	0.04
24.00	12.02	-12.06	0.08
26.00	13.02	-13.06	0.08
28.00	14.02	-14.04	0.06
30.00	15.02	-15.02	0.04
32.00	16.00	-16.02	0.02
34.00	17.00	-17.00	0.00
35.80	17.96	-17.98	0.14

The uncertainty of measurement was ± 0.11 inH<sub>2</sub>O

\* UUC = Unit Under Calibration

\* AP = 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 %.

-o0o-

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a 1160343

## THAI METEOROLOGICAL DEPARTMENT

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

## Calibration Certificate



Issued by : Calibration &amp; Test Section : Meteorological Instruments Bureau

Date of Issue : 12 July, 2022 Certification No. 413/22

Page : 1 of 7

Object : เครื่องมือตรวจวัดอุตุนิยมวิทยา

Manufacturer : LSI

Type : Dato Logger E-LOG 305 wind speed and wind direction DNA 821  
Thermogrometers DMA875 Barometer DOA 801  
Mfg Code : Dato Logger 020020301 wind speed and wind direction 20010221  
Thermogrometers 19100298 Barometer 20030067

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 1014.6 hPa

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 S/N 91563

: HOOK GAGE NO 1425 : Wind Aloft Plotting Board

N.I.S.T. Test Reference Number 731/241460

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

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8359/94

: testo, testo 645 Serial No. 02848057 : Thermosneider No.918802

STANDARD BAROMETER

: Digital Barometer Vaisala WMA P/B228-NOV/1320015

: Digital Barometer Vaisala WMA P/B30-NOV/1320001

Calibrated by : Naltrapol

Mr. Watcharapol Subwat

Mechanical Engineer

Signed :

Mr. Pisod Promsut



กรมอุตุนิยมวิทยา

Sub-Department

## THAI METEOROLOGICAL DEPARTMENT

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

## The Result of Calibration

Wind Speed And Wind Direction

Certification No. 413/22

12 July, 2022 Model DNA821 S/N 20010221 Page : 2 of 7

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches	Vacuum inches	Pressure hPa	Velocity m/sec	Correction m/sec
1.00	-	-	-	1.1	-0.10
3.02	-	-	-	2.9	0.12
5.00	-	-	-	4.5	0.50
7.04	-	-	-	6.8	0.24
9.02	-	-	-	8.5	0.52
11.02	-	-	-	10.8	0.22
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.8	0.21
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.8	0.22

Wind Aloft Plotting Board.

U.S.DEPARTMENT OF COMMERCE WEATHER BUREAU

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

Calibrated by :

Naltrapol

Mr. Watcharapol Subwat

Mechanical Engineer



กรมอุตุนิยมวิทยา

Sub-Department



## The Result of Calibration

Barometer Model DQA801 s/n 20030067

Certification No. 413/22

12 July, 2022

Page : 3 of 7

Standard Barometer Pressure	Tested Barometer Pressure	Correction
1010.77	1011.0	-0.23
1008.67	1008.9	-0.23
1010.49	1010.8	-0.31
1010.67	1011.0	-0.33
1010.78	1011.1	-0.32
1011.09	1011.5	-0.41
1011.21	1011.7	-0.49
1011.06	1011.5	-0.44
1010.80	1011.1	-0.30
1010.62	1011.0	-0.38
1010.45	1010.8	-0.35
1009.93	1010.3	-0.37
1009.78	1010.2	-0.42
1009.43	1009.8	-0.37
1009.29	1009.9	-0.61
1008.93	1009.4	-0.47
1008.66	1009.0	-0.34
1008.33	1008.7	-0.37
1008.15	1008.5	-0.35
1007.28	1007.6	-0.32

Average

Calibrated by :

Mr. Watchapol Subwat

Mechanical Engineer



กรมอุตุนิยมวิทยา  
การสอบเทียบและทดสอบ  
กรมอุตุนิยมวิทยา



## The Result of Calibration

Barometer Model DQA801 s/n 20030067

Certification No. 413/22

12 July, 2022

Page : 4 of 7

Standard Barometer Pressure	Tested Barometer Pressure	Correction
758.14	758.3	-0.17
756.56	756.7	-0.17
757.93	758.2	-0.23
758.06	758.3	-0.25
758.15	758.4	-0.24
758.38	758.7	-0.31
758.47	758.8	-0.37
758.36	758.7	-0.33
758.16	758.4	-0.23
758.03	758.3	-0.29
757.90	758.2	-0.26
757.51	757.8	-0.28
757.40	757.7	-0.32
757.13	757.4	-0.28
757.03	757.5	-0.46
756.76	757.1	-0.35
756.56	756.8	-0.26
756.31	756.6	-0.28
756.17	756.4	-0.26
755.52	755.8	-0.24

Average

Calibrated by :

Mr. Watchapol Subwat

Mechanical Engineer



กรมอุตุนิยมวิทยา  
การสอบเทียบและทดสอบ  
กรมอุตุนิยมวิทยา

THAI METEOROLOGICAL DEPARTMENT

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



The Result of Calibration

Thermogrimeters Model DMA 875 s/n 19100298

Certification No. 413/22

12 July, 2022

Page : 5 of 7

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.24	45.31	-0.07
30.36	30.46	-0.10
15.12	15.19	-0.07

Calibrated by : *Wachapol*

Mr. Wachapol Subwat  
Mechanical Engineer



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THAI METEOROLOGICAL DEPARTMENT

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



The Result of Calibration

Thermogrimeters Model DMA 875 s/n 19100298

Certification No. 413/22

12 July, 2022

Page : 6 of 7

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
84.25	82.3	1.95
62.14	62.0	0.14
41.32	42.3	-0.98

Calibrated by : *Wachapol*

Mr. Wachapol Subwat  
Mechanical Engineer



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Date of Issue 12 July, 2022

Certification No.413/22

Page : 7 of 7

## ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ชื่อ LSI แบบ TIPPING BUCKET ขนาด 324 cm<sup>2</sup> Model DQA 230.1 Serial 20020189 ทำการสอบเทียบกับแก้วฝนแบบ แก้วดวง GAUGE DIAMETER 8.0 INCHES , NEGRETTE & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ ( 0.2 mm/ TIP)



ลงชื่อ.....  
(นายวัชรพล ทวีพิพัฒน์)  
วิศวกรชำนาญการ

เอกสารไม่ควบคุม

INNOVATIVE INSTRUMENT CALIBRATION LAB  
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE  
7139 MOO 13, SOI SINTINAKORN 11 TAMBON BANG KAEO,  
AMPHOE BANG PHU SAMUT PRAKAN PROVINCE 10540 THAILAND  
TEL : (66)9-2116-5860-1 FAX : (66)9-2116-7140



## 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 : 22-ACT-406

Request No : Req-2022-1080

### Unit Under Calibration Details

Measurement item : Acoustic Calibrator  
Manufacturer : SVANTEK  
Model : SV 35A  
Serial Number : 73249  
ID : UAE.FFM.105.2561  
Class : 1  
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 : 15 June 2022  
Calibration Date : 1 July 2022  
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 2023
THD Multimeter	2015	1047765	NIMT	2 February 2023

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. Pacit Muthavorn

Calibration Engineer Supervisor

Issue Date :

1 July 2022

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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Certificate No : 22-ACT-406

Request No : Req-2022-1080

Sound pressure level				
Calibration Range (dB)	Without Adjustment		Adjustment (dB)	
	Measured	Error	Measured	Error
94 dB / 1000 Hz	93.82	-0.18	-	-
114 dB / 1000 Hz	113.81	-0.19	-	-
				Acceptance limit Class 1 ( ± dB)
				0.11
				0.25

#### Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment	
	Measured (Hz)	Error (%)	Measured (Hz)	Error (%)
94 dB / 1000 Hz	1000.00	0.00	-	-
114 dB / 1000 Hz	1000.00	0.00	-	-
				Acceptance limit Class 1 ( ± %)
				0.10
				0.70

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

Calibration Range (Hz)	Without Adjustment		Adjustment	
	Measured (%)	Error (%)	Measured (%)	Error (%)
94 dB / 1000 Hz	0.17	-	-	-
114 dB / 1000 Hz	0.04	-	-	-
				Acceptance limit Class 1 ( ± %)
				0.40
				2.5

#### Note :

- Acceptance limit was IEC60942:2017 Class 1
- The calibration results exclude the calibrator pressure correction
- The calibration results exclude the microphone volume correction

End of Calibration

#### 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 : 22-ACT-035  
Request No : Req-2022-0094

#### Unit Under Calibration Details

Measurement item : Sound level Meter  
Manufacturer : LARSON DAVIS  
Model : LX12  
Serial Number : 0005398  
ID : UAE EFM 0352564  
Resolution : 0.1 dB  
Microphone Class : 2  
Microphone Model : 375A04  
Microphone S/N : 328675  
Preamplifier Model : PRMLXTC2  
Preamplifier S/N : 073793  
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 : 14 January 2022  
Calibrated Date : 21 January 2022  
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
Standard Microphone	GRAS	40AN	188273	15 September 2022	GRAS
Multifrequency Calibrator	Quest	Quest-cal	FFA000234	14 June 2022	TSI
Audio Generator	Svanick	Scan401	131	18 October 2022	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 Luangrat  
Calibration Officer

Approved By :   
Mr. Paci Mahasorn  
Calibration Engineer Supervisor  
Issue Date : 21 January 2022

Certificate No : 22-ACT-035  
Request No : Req-2022-0094

1. Indication at the calibration check frequency

UUC Setting	Nominal Level (dB)	Before Adjust		Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
FAST / A 37-139							
Calibrator Setting							
1000 Hz 114.00 dB	113.85	114.0	+0.15	113.9	0.05	0.20	0.3

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 (dB)	UNCERTAINTY (± dB)
FAST / 37-139		
UUC Weighting		
A	28.1	0.10

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

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 37-139		
UUC Weighting		
A	27.9	0.10
C	27.3	0.10
Z	31.9	0.10

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

UUC Setting	FAST / 37-139	Deviation from various Frequency Weighting Response curve				UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		A (dB)	C (dB)	Z (dB)	ERR (dB)		
STD Setting							
125 Hz		0.0	0.0	0.0	0.50	2.0	
1000 Hz		0.0	0.0	0.0	0.60	1.0	
4000 Hz		0.4	0.3	0.3	0.60	3.0	
8000 Hz		-0.1	-0.2	-0.1	0.70	5.0	

Certificate No : 22-ACT-035  
Request No : Req-2022-0094

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

UUC Setting	FAST / 37-139	Deviation from various Frequency Weighting Response curve				UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		A (dB)	C (dB)	Z (dB)	ERR (dB)		
STD Setting							
63 Hz		-0.2	-0.1	-0.1	-0.1		2.0
125 Hz		-0.1	0.0	-0.1	-0.1		1.5
250 Hz		-0.1	0.0	-0.1	-0.1		1.5
500 Hz		-0.1	0.0	-0.1	-0.1		1.5
1000 Hz		0.0	0.0	0.0	0.0	0.2	1.0
2000 Hz		0.0	0.0	0.0	0.0		2.0
4000 Hz		0.0	0.0	0.0	0.0		3.0
8000 Hz		-0.1	-0.1	0.0	0.0		5
16000 Hz		-0.1	-0.1	-0.1	-0.1		+5, -INF.

6. Frequency and time weightings at 1kHz

UUC Setting	FAST / 37-139	UUC Weighting	Measured		STD REF (dB)	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
			UUC (dB)	ERR (dB)			
A			114.00	0.0	114.00		0.2
C			114.00	0.0	114.00	0.2	0.2
Z			114.00	0.0	114.00		0.2

UUC Setting	37-139 / A	Measured		STD REF (dB)	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)			
UUC Time Response						
Fast		114.00	0.0	114.00		0.1
Slow		114.00	0.0	114.00	0.2	0.1
1eq		114.00	0.0	114.00		0.1

Certificate No : 22-ACT-035  
Request No : Req-2022-0094

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 37-139	UUC (dB)		
STD Setting			
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.3

8. Level linearity on the reference level range

UUC Setting	Anticipated REF (dB)	Deviation UUC (dB)	ERR (dB)	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 37-139					
STD dB					
139.00	139	139.0	0.0		1.1
134.00	134	134.0	0.0		1.1
129.00	129	129.0	0.0		1.1
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	0.0		1.1
94.00	94	93.9	-0.1		1.1
89.00	89	88.9	-0.1		1.1
84.00	84	83.9	-0.1	0.3	1.1
79.00	79	78.9	-0.1		1.1
74.00	74	73.9	-0.1		1.1
69.00	69	69.0	0.0		1.1
64.00	64	63.9	-0.1		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		0.8
44.00	44	44.1	0.1		1.1
39.00	39	39.3	0.3		1.1
34.00	34	34.3	0.3		1.1
37.00	37	37.5	0.5		1.1

Certificate No : 22-ACT-035  
Request No : Req-2022-0094

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A	REF (dB)	UUC (dB)	ERR (dB)	
UUC Range	43.2	43.4	0.2	1.1
37-139	114	114.0	0.0	1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
A / 37-139	Toneburst (ms)	Ref (dB)	UUC (dB)	ERR (dB)	
UUC Time Response					
Fast	200 2	135.0 118.0	135.0 117.9	0.0 -0.1	1 +1.0, -2.5
Slow	0.25 200 2	109.0 128.6 109.0	108.7 128.5 108.9	-0.3 -0.1 -0.1	+1.5, -5.0 1 +1.0, -5.0
SEL	200 2 0.25	129.0 109.0 100.0	129.0 109.1 99.9	0.0 +0.1 -0.1	1 +1.0, -2.5 +1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / C / 95-142	REF (dB)	UUC (dB)	ERR (dB)	
STD Setting				
Complete cycle	137.4	136.8	-0.60	3.0
Positive half cycle	136.4	136.1	-0.30	2.0
Negative half cycle	136.4	136.1	-0.30	2.0





Certificate No : 22-ACT-035  
Request No : Req-2022-0094

#### 12. Overload indication

UIC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 37-139	UIC	(± dB)	(± dB)
STD Setting	(dB)		
Positive one-half cycle	142.3		
Negative one-half cycle	142.0		
Deviated	0.3	0.2	1.5

#### 13. High Level Stability

UIC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 37-139	UIC	(± dB)	(± dB)
STD Setting	(dB)		
Initial	138.0		
Final	138.0		
Deviated	0.0	0.1	0.3

End of Certificate

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#### Certificate of Calibration

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

Certificate No : 22-ACT-036  
Request No : Req-2022-0095

#### Unit Under Calibration Details

Measurement item : Sound Level Meter  
Manufacturer : IARSON DAVIS  
Model : Lx12  
Serial Number : 0005490  
ID : UAE EFM.037.2564  
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 : 14 January 2022  
Calibrated Date : 21 January 2022  
Calibration Procedure : In-house method CP-SI-M-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	Date calibration	Traceability
Standard Microphone	GRAS	40AN	188273	15 September 2022	GRAS
Multi-frequency Calibrator	Quest	Quest-cal	EFA000234	14 June 2022	TSI
Audio Generator	Sennheiser	Stant01	131	18 October 2022	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 Luangrat

Mr. Noppadon Luangrat  
Calibration Officer

Approved By : Mr. Paet Mahavorn

Mr. Paet Mahavorn  
Calibration Engineer Supervisor  
Issue Date : 21 January 2022

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Certificate No : 22-ACT-036  
Request No : Req-2022-0095

1. Indication at the calibration check frequency

UUC Setting	Nominal Level (dB)	Before Adjust		Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
FAST / A / 37-139							
Calibrator Setting							
1000 Hz 114.00 dB	113.85	113.9	+0.05	113.9	0.05	0.20	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SYANTEK, Model SY 35A, SN:58079

2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 37-139		
UUC Weighting		
A	29.0	0.10

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

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 37-139		
UUC Weighting		
A	28.8	0.10
C	28.2	0.10
Z	32.9	0.10

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

UUC Setting	Deviation from various Frequency Weighting Response curve					UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A	C	Z				
FAST / 37-139							
STD Setting	(dB)	(dB)	(dB)				
125 Hz	-0.1	0.1	0.0	0.50		2.0	
1000 Hz	0.0	0.0	0.0	0.60		1.0	
4000 Hz	0.5	0.5	0.6	0.60		3.0	
8000 Hz	0.4	0.4	0.5	0.70		5.0	

Certificate No : 22-ACT-036  
Request No : Req-2022-0095

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)	Acceptance Limit (± dB)
	A (dB)	C (dB)	Z (dB)			
FAST / 37-139						
STD Setting						
63 Hz	-0.2	-0.1	0.0			2.0
125 Hz	-0.1	0.0	0.0			1.5
250 Hz	-0.1	0.0	0.0			1.5
500 Hz	-0.1	0.0	0.0			1.5
1000 Hz	0.0	0.0	0.0		0.2	1.0
2000 Hz	0.0	0.0	0.0			2.0
4000 Hz	0.0	0.0	0.0			3.0
8000 Hz	-0.1	0.0	0.0			5
16000 Hz	-0.1	-0.1	0.0			+5, -1NF

6. Frequency and time weightings at 1kHz

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
FAST / 37-139					
UUC Weighting					
A	114.00	114.0	0.0		0.2
C	114.00	114.0	0.0	0.2	0.2
Z	114.00	114.0	0.0		0.2

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
37-139 / A					
UUC Time Response					
Fast	114.00	114.0	0.0		0.1
Slow	114.00	114.0	0.0	0.2	0.1
Leq	114.00	114.0	0.0		0.1

Certificate No : 22-ACT-036  
Request No : Req-2023-0095

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A : 37-139	UUC (dB)	(± dB)	(± dB)
STD Setting			
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.3

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY	Acceptance Limit
FAST / A : 37-139	REF (dB)	UUC (dB) ERR (dB)	(± dB)	(± dB)
STD dB				
139.00	139	139.0 0.0		1.1
134.00	134	134.0 0.0		1.1
129.00	129	129.0 0.0		1.1
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 0.0		1.1
94.00	94	93.9 -0.1		1.1
89.00	89	88.9 -0.1		1.1
84.00	84	83.9 -0.1	0.3	1.1
79.00	79	78.9 -0.1		1.1
74.00	74	73.9 -0.1		1.1
69.00	69	69.0 0.0		1.1
64.00	64	63.9 -0.1		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		0.8
44.00	44	44.1 0.1		1.1
39.00	39	39.3 0.3		1.1
34.00	38	38.3 0.3		1.1
37.00	37	37.5 0.5		1.1

Certificate No : 22-ACT-036  
Request No : Req-2023-0095

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
FAST / A	REF (dB)	UUC (dB) ERR (dB)	(± dB)	(± dB)
UUC Range				
	42.9	43.2 0.3		1.1
37-139	114	114.0 0.0	0.3	1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY	Acceptance Limit
A : 37-139	Toneburst (ms)	Ref (dB)	UUC (dB) ERR (dB)	(± dB)	(± dB)
UUC Time Response					
Fast	200	135.0	135.0 0.0		1
	2	118.0	117.8 -0.2		+1.0, -2.5
	0.25	109.0	108.8 -0.2		+1.5, -5.0
Slow	200	128.6	128.5 -0.1	0.3	1
	2	109.0	108.8 -0.2		+1.0, -5.0
SLL	200	129.0	129.0 0.0		1
	2	109.0	109.0 0.0		+1.0, -2.5
	0.25	100.0	99.9 -0.1		+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY	Acceptance Limit
FAST / C : 95-142	REF (dB)	UUC (dB) ERR (dB)	(± dB)	(± dB)
STD Setting				
Complete cycle	137.4	136.9 -0.50		3.0
Positive half cycle	136.4	136.2 -0.20	0.2	2.0
Negative half cycle	136.4	136.2 -0.20		2.0





Certificate No : 22-ACT-036  
Request No : Req-2022-0095

#### 12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A : 37-139	UUC (dB)	(± dB)	(± dB)
STD Setting	142.1		
Positive one-half cycle	141.9		
Negative one-half cycle			
Deviated	0.2	0.2	1.5

#### 13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A : 37-139	UUC (dB)	(± dB)	(± dB)
STD Setting	138.0		
Initial	138.0		
Final			
Deviated	0.0	0.1	0.3

End of Certificate



#### 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 : 22-ACT-036  
Request No : Req-2022-0095

#### Unit Under Calibration Details

Measurement item : Sound Level Meter  
Manufacturer : LARSON DAVIS  
Model : LX12  
Serial Number : 0005400  
ID : UME-ETM-037-2564  
Resolution : 0.1 dB  
Microphone Class : 2  
Microphone Model : 375A04  
Microphone S/N : 328676  
Preamplifier Model : PRMLX12C  
Preamplifier S/N : 073803  
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 : 14 January 2022  
Calibrated Date : 21 January 2022

Calibration Procedure : In-house method (CP-SI-M-0) 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
Standard Microphone	GRAS	40AN	188273	15 September 2022	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EF6000234	14 June 2022	TSI
Audio Generator	Svante	Svante401	131	18 October 2022	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 Luangart  
Calibration Officer

Approved By :

Mr. Pasit Manthavorn  
Calibration Engineer Supervisor  
Issue Date : 21 January 2022

Certificate No : 22-ACT-436  
Request No : Req-2022-0095

1. Indication at the calibration check frequency

UUC Setting	Nominal Level (dB)	Before Adjust		Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
FAST / A / 37-139							
Calibrator Setting							
1000 Hz 114.00 dB	113.85	113.9	+0.05	113.9	0.05	0.20	0.3

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 (dB)	UNCERTAINTY (± dB)
FAST / 37-139		
UUC Weighting		
A	29.0	0.10

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

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 37-139		
UUC Weighting		
A	28.8	0.10
C	28.2	0.10
Z	32.9	0.10

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

UUC Setting	Deviation from various Frequency Weighting Response curve					UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A	C	Z	UUC (dB)	ERR (dB)		
FAST / 37-139							
STD Setting							
125 Hz	-0.1	0.1	0.0	0.50	0.0	2.0	2.0
1000 Hz	0.0	0.0	0.0	0.60	0.0	1.0	1.0
4000 Hz	0.5	0.5	0.6	0.60	0.0	3.0	3.0
8000 Hz	0.4	0.4	0.5	0.70	0.0	5.0	5.0

Certificate No : 22-ACT-436  
Request No : Req-2022-0095

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)	Acceptance Limit (± dB)
	A (dB)	C (dB)	Z (dB)	UUC (dB)		
FAST / 37-139						
STD Setting						
63 Hz	-0.2	-0.1	0.0	0.0	0.0	2.0
125 Hz	-0.1	0.0	0.0	0.0	0.0	1.5
250 Hz	-0.1	0.0	0.0	0.0	0.0	1.5
500 Hz	-0.1	0.0	0.0	0.0	0.0	1.5
1000 Hz	0.0	0.0	0.0	0.0	0.2	1.0
2000 Hz	0.0	0.0	0.0	0.0	0.0	2.0
4000 Hz	0.0	0.0	0.0	0.0	0.0	3.0
8000 Hz	-0.1	0.0	0.0	0.0	0.0	5
16000 Hz	-0.1	-0.1	0.0	0.0	0.0	+5,-INF

6. Frequency and time weightings at 1kHz

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
FAST / 37-139					
UUC Weighting					
A	114.00	114.0	0.0	0.0	0.2
C	114.00	114.0	0.0	0.0	0.2
Z	114.00	114.0	0.0	0.0	0.2

UUC Setting	STD REF (dB)	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)		
37-139 / A					
UUC Time Response					
Fast	114.00	114.0	0.0	0.0	0.1
Slow	114.00	114.0	0.0	0.0	0.1
Leq	114.00	114.0	0.0	0.0	0.1

Certificate No : 22-ACT-036  
Request No : Req-2022-0095

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 37-139	UUC (dB)		
STD Setting			
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.3

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A / 37-139	REF (dB)	UUC (dB)	ERR (dB)	
STD dB				
139.00	139	139.0	0.0	1.1
134.00	134	134.0	0.0	1.1
129.00	129	129.0	0.0	1.1
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	0.0	1.1
94.00	94	93.9	-0.1	1.1
89.00	89	88.9	-0.1	1.1
84.00	84	83.9	-0.1	1.1
79.00	79	78.9	-0.1	1.1
74.00	74	73.9	-0.1	1.1
69.00	69	69.0	0.0	1.1
64.00	64	63.9	-0.1	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	0.8
39.00	39	39.3	0.3	1.1
34.00	34	34.3	0.3	1.1
29.00	29	29.5	0.5	1.1

Certificate No : 22-ACT-036  
Request No : Req-2022-0095

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / A	REF (dB)	UUC (dB)	ERR (dB)	
UUC Range				
	42.9	43.2	0.3	1.1
37-139	114	114.0	0.0	1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
A / 37-139	Toneburst (ms)	Ref (dB)	UUC (dB)	ERR (dB)	
UUC Time Response					
Fast	200	135.0	135.0	0.0	1
	2	118.0	117.8	-0.2	+1.0, -2.5
	0.25	109.0	108.8	-0.2	+1.5, -5.0
Slow	200	128.6	128.5	-0.1	1
	2	109.0	108.8	-0.2	+1.0, -5.0
	200	129.0	129.0	0.0	1
SFL	2	109.0	109.0	0.0	+1.0, -2.5
	0.25	100.0	99.9	-0.1	+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY ( $\pm$ dB)	Acceptance Limit ( $\pm$ dB)
FAST / C / 85-142	REF (dB)	UUC (dB)	ERR (dB)	
STD Setting				
Complete cycle	137.4	136.9	-0.50	3.0
Positive half cycle	136.4	136.2	-0.20	2.0
Negative half cycle	136.4	136.2	-0.20	2.0



Certificate No : 22-ACT-036  
Request No : Req-2022-0095

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A : 37-139	UUC	(± dB)	(± dB)
STD Setting	(dB)		
Positive one-half cycle	142.1		
Negative one-half cycle	141.9		
Deviated	0.2	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A : 37-139	UUC	(± dB)	(± dB)
STD Setting	(dB)		
Initial	138.0		
Final	138.0		
Deviated	0.0	0.1	0.3

End of Certificate

รายงานผลการปฏิบัติงานตามการรับรองการสอบเทียบและผลการสอบเทียบเครื่องมือวัด และผลการวัดตามการสอบเทียบเครื่องมือวัด  
โครงการประเมินผลเชิงเทคนิคการตรวจวัดผลิตภัณฑ์ บริการผลิตภัณฑ์ 2881/15999 (คำขอฯ ที่ 3/2551)  
บริษัท ผู้ให้บริการการสอบเทียบเครื่องมือวัด จำกัด (มหาชน) เลขที่ 158 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10230

Certificate of Instrument for Environment Quality Analysis.

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
Instrument for Air Quality Analysis:									
1	Analytical Balance	ความแม่นยำของมวล (mg)	Mettler-Toledo	AB204 S / 1128312528	Mettler-Toledo (Thailand) Ltd	23MM331	7 Apr 23	5 Apr 24	-
2	Analytical Balance	ความแม่นยำของมวล (mg)	Mettler-Toledo	AB204 S / 1128312528	Mettler-Toledo (Thailand) Ltd	23MM332	7 Apr 23	5 Apr 24	-
Instrument for Water Quality Analysis:									
3	pH Meter	ความแม่นยำของค่า pH (pH at 25 °C)	Mettler-Toledo	Seven Easy 520 / 1231155210	Ministry of Industry, Thailand	2301846-001-01	24 Feb 23	23 Feb 24	-
4	pH Meter	Temperature	Mettler-Toledo	SevenCompact 5220 / C113432421	Ministry of Industry, Thailand	2203527-001-01	5 Jul 22	4 Jul 23	-
5	Turbidity Meter	ความขุ่น (Turbidity)	Oakton	T100IR / 1120501017	Technology Promotion Association (Thailand-Japan)	22CH1184	5 Sep 22	4 Sep 23	-
6	Analytical Balance	ความแม่นยำของมวล (mg)	Mettler-Toledo	XS205DU / C009071872	Technology Promotion Association (Thailand-Japan)	23MM112	26 Apr 23	24 Apr 24	-
7	Hot Air Oven	ความแม่นยำของอุณหภูมิ (°C)	Memmert	UF55 / B216 1666	Technology Promotion Association (Thailand-Japan)	22TM1490	19 Oct 22	18 Oct 23	-
8	UV-VIS Spectrophotometer	ความแม่นยำของค่าการดูดกลืนแสง (Absorbance)	Agilent	Cary60 G6860A / MY15410099	DCE Services Co. Ltd	SP22-016	31 May 22	30 May 23	-
9	UV-VIS Spectrophotometer	ความแม่นยำของค่าการดูดกลืนแสง (Absorbance)	Hitachi	U-1900 / 2021-064	DCE Services Co. Ltd	SP22-007	20 Jan 22	19 Jan 23	-

Certificate of Instrument for Environment Quality Analysis.

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
10	Atomic Absorption Spectrophotometer (AAS)	Lead (Pb), Arsenic (As), Cadmium (Cd)	Agilent Technologies	System ID: G8432A AA240FS / MV13160001	Thailand Institute of Scientific and Technological Research (TISTR)	MTC.ACL. No. 486/65	7 Mar 22	6 Mar 23	-
11	Inductively Coupled Plasma Atomic Emission Spectrometer (ICP-AES)	Lead (Pb)	Agilent Technologies	System ID: G8015A / MV18030001	Agilent Technologies (Thailand) Co., Ltd.	Preventive Maintenance Checklist	30 Nov 22	29 Nov 23	-

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



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



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 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
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 :  Approved Signatory

( / ) Pornthippa Tameyakul  
( / ) Malee Butkruea

Issue Date : 10 April 2023

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 & Equipment Calibration and Testing Services.

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Equipment : Electronic Balance  
Condition As-Received : Used Item  
Reference : 2304-0015OC-1  
Cert.No.: 23MM331  
Page: 2 of 3

Procedure used :-

Calibration were conducted using in-house calibration procedure CP-OB01 according to direct measurement method against standard weight.

Condition of this result of calibration

1. Reference standard instruments:-
  - 1) Standard Weight Set (E2) 15884
  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 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 ( $\pm$ 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 : 2304-0015OC-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	-0.0006	0.0005

3. Departure from nominal value

Applied Weight ( g )	Balance Reading ( g )	Correction ( g )	Measurement Uncertainty ( $\pm$ 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	0.18	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 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



REC-TS-11577925  
CALIBRATION 0008

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

## Certificate of Calibration

**Equipment :** Electronic Balance  
**Manufacturer :** Mettler Toledo  
**Model :** AB204-S I/FACT  
**Serial No. :** B108115858  
**ID No. :** UAE.AIR.016/2555

**Submitted by :** United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
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 :**   
Approved Signatory

( ) Ponthippa 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-2  
**Procedure used :-**

Calibration were conducted using in-house calibration procedure CP-OB01 according to direct measurement method against standard weight.

**Condition of this result of calibration**

1. Reference standard instruments:-

- 1) Standard Weight Set (E2) 15884
- 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 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	100.0002	-0.0002	0.21	2.06
200	200.0003	-0.0003	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	0.00009
200	0.00007

Cert.No.: 23MM332  
Page: 2 of 3

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## 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

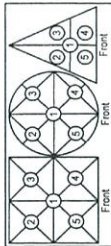
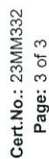
Position 1	Position 2	Position 3	Position 4	Position 5
(g)	(g)	(g)	(g)	(g)
+0.0001	-0.0003	+0.0003	+0.0006	+0.0002

### 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	2.17
0.1	0.0999	+0.0001	0.18	2.17	2.17
1	0.9998	+0.0002	0.18	2.17	2.17
5	5.0000	0.0000	0.18	2.17	2.17
10	10.0000	0.0000	0.18	2.17	2.17
20	20.0000	0.0000	0.18	2.15	2.15
50	50.0001	-0.0001	0.19	2.11	2.11
70	70.0001	-0.0001	0.20	2.07	2.07
100	100.0002	-0.0002	0.21	2.06	2.06
150	150.0004	-0.0004	0.29	2.00	2.00
200	200.0005	-0.0005	0.29	2.00	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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Maximum difference between off-center and central loading

0.0005 (g)



**nf**  
NATIONAL FOUNDATION  
FOR INFANT DEVELOPMENT

အာရှအာဖရိကဒေသတွင်း  
ကလေးတို့၏ဖွံ့ဖြိုးတိုးတက်မှု  
အခြေခံအုတ်မြစ်များ  
အတွက် အထောက်အကူပြု  
အဖွဲ့အစည်း

Foundation for Infants Development National Food Institute  
Food Institute Laboratory Service Center



# Calibration Certificate

Certificate No.: 2301846-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
Address: 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 5

Equipment:	pH Meter
Manufacturer:	Mettler Toledo
Model:	SevenEasy TM S20 pH
Serial No.:	1231155210
ID No.:	UAE.WAT.010/2553
Order No.:	2301846
Operation No.:	2301846-001
Date of Receipt:	17 February 2023
Date of Calibration:	24 February 2023

Calibrated by

Mr. Worapob Sooktong

Scientist

Approved by

( Mr.Nuttapol Nivomchart )

Specialist, Division of Calibration Laboratory

24 February 2023

24 February 2023

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 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.

CS-009 Revision: 01 Date: 20-04-65



2008 ๒๕๔9 กุญแจรุ่น 36 รุ่นแรกในเครือเมืองหลวง กรุงเทพฯ 10700  
2008 Sol 36, Anin Aneer Road, Bang Yi Khan Subdistr., Bang Phat Dist., Bangkok  
Tel. +66(0) 2422 8598 Fax. +66(0) 2422 8545





## Calibration Report

**Certificate No.:** 2301846-001-01  
**Equipment:** Digital Thermometer with RTD  
**Resolution:** 0.1 °C  
**Model:** SevenEasy TM S20 pH  
**Serial No.:** 1231155210  
**ID No.:** UAE.WAT.010/2553  
**Manufacturer:** Mettler Toledo  
**Date of Calibration:** 24 February 2023

Page 4 of 5

**Location:** Chemical Calibration Laboratory, National Food Institute  
**Environment Condition:**  
Ambient Temperature 25 °C ± 1 °C  
Relative Humidity 48 % ± 3 %

**Condition of this results of Calibration:**

- Calibration Method : - In house method: W-TE-025 by comparison with standard thermometer.  
- The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.  
- The temperature scale in use at this laboratory is the International Temperature scale of 1990 ( ITS-90 ).
- Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER	1523	2118154	PSL-T 0673/65	07-Jun-23	TISTR
Platinum Resistance Thermometer (PRT)	5627A	877332			

Support Equipment : - Low Temperature Bath (Micro Bath), Model: 7103, S/N: A39538,AN65 A85181.

- 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
- Result of Calibration : ☒ Without adjustment ☐ After adjustment

FCS-012 Revision: 01 Date: 20-04-65

N. Nijmabadi



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## Calibration Report

**Certificate No.:** 2301846-001-01  
**Equipment:** Digital Thermometer with RTD  
**Resolution:** 0.1 °C  
**Model:** SevenEasy TM S20 pH  
**Serial No.:** 1231155210  
**ID No.:** UAE.WAT.010/2553  
**Manufacturer:** Mettler Toledo  
**Date of Calibration:** 24 February 2023

Page 5 of 5

**Calibration point:** 15.0, 25.0 and 35.0 °C  
**Calibration result:**  
- The probe was immersed in liquid bath or dry bath to a minimum depth of 120 mm.  
- Description of probe, model : - S/N : -  
Dimension of probe : Diameter 9 mm, Length 120 mm,  
Sheath material : Stainless Steel

UUC* Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.1	15.015	- 0.1	0.11
25.0	25.014	0.0	0.11
35.1	35.016	- 0.1	0.11

Note

- UUC\* : Unit Under Calibration

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 -----

FCS-012 Revision: 01 Date: 20-04-65

N. Nijmabadi



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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CALIBRATION AND TESTING EQUIPMENT SERVICES

53/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-24 FAX. 0-2719-9484

Cert.No.: 22CH1184  
Page.: 1 of 2

## Certificate of Calibration

Equipment : Turbidity Meter  
Manufacturer : Oakton  
Model : T100IR  
Serial No. : 1120501017  
ID. No. : UAE.WAT.056/2563  
Condition As-Received:  
Received Date : 31 August 2022  
Calibration Date : 05 September 2022  
Reference : 2208-1106WSC-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 ± 20) %  
Calibration Procedure : In - house method : CP-CH11  
based on direct measurement by  
using Formazin standard solution

Calibrated by : Walalak Sirithean

Approved by :   
Approved Signatory

(✓) Malee Butkuea  
( ) Saithip Meangmai  
( ) Warakorn Lemgagtrakul

Issue Date : 6 September 2022

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 Calibration and Testing Equipment Services.

เอกสารไม่ควบคุม

A 0009588



Cert.No.: 22CH1184  
Page.: 2 of 2

### Condition of this calibration result

1. Reference Standard Instruments :  
This certification is traceable to the International System of unit (SI unit) through  
Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due date
1) Thermo-Hygraph	1103328	130EC010	22H1313	12 June 2023
2) Electronic Balance	N03679	140RC001	21MM429	21 Sep 2022

2. Standard Material : The Formazin suspension has been prepared gravimetric from

Material	Manufacturer	Lot No.	Assay
1) Hexamethylenetetramine	HIMEDIA	0000493947	99.65%
2) Hydrazinium Sulfate	HIMEDIA	0000522014	99.40%

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

### Calibration result

Performing five - Formazin suspension standard curve by using 0.20,100,400,800 NTU  
Turbidity Meter Serial Number : 1120501017

Standard Formazine suspension ( NTU )	UUC* Reading ( NTU )	Uncertainty of Measurement ( ± NTU )	Coverage Factor k
0	0.00	0.0062	2.00
20	20.1	0.39	2.00
100	102	0.74	2.00
400	403	1.5	2.13
800	804	2.1	2.20

Remark : - UUC\* = Unit Under Calibration  
- NTU = Nephelometric Turbidity Units

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 %.

-oOo-

เอกสารไม่ควบคุม

A 1124976



## CERTIFICATE OF CALIBRATION

Certificate No. : SP22-016

Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong,

Bangkok 10260

Location of calibration : Laboratory 315

Equipment : UV-Vis Spectrophotometer

Manufacturer : Agilent Technologies

Model : Cary 60

Serial No. : MY15410009

ID No. : N/A

Received Date : 23 May 2022

Calibration Date : 23 May 2022

Issue Date : 26 May 2022

Condition Instrument : Good

Calibrated by :

(Mr. Tanawat Ritidach )

Approved by :

(Ms. Chonthicha Sangngern )

Technical Manager

Quality Manager

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

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the DQE Services Co., Ltd.

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FM-708-02 R01 1/11/2021



## REPORT OF CALIBRATION

Certificate No. : SP22-016

Page 2 of 5

Environment Condition : Ambient Temperature  $25 \pm 5$  °CRelative humidity  $55 \pm 20$  %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

### Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	95935	22 October 2023
Absorbance Standard set	25757	95929	22 October 2023
Wavelength Standard set	25806	95916	22 October 2023
Wavelength Standard set	25758	95915	22 October 2023

Traceability This certification is traceable to the International System of Unit maintained at National -

Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 90 nm/min

Scan Interval of UUC : 0.15 nm.

Resolution of UUC : Photometric 0.0001 Abs.

Wavelength 0.1 nm.

Uncontrolled Document  
FM-708-02 R01 1/11/2021





## REPORT OF CALIBRATION

Certificate No. : SP22-016

Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.0000	0.0000	0.0028	2.00
	0.5787	0.5755	0.0032	0.0031	2.00
	1.0490	1.0436	0.0054	0.0029	2.00
440	2.1900	2.1847	0.0053	0.0075	2.00
	0.0000	0.0000	0.0000	0.0028	2.00
	0.5607	0.5588	0.0019	0.0034	2.00
465	1.0247	1.0232	0.0015	0.0035	2.00
	2.1229	2.1211	0.0018	0.0082	2.00
	0.0000	0.0000	0.0000	0.0028	2.00
546.1	0.5236	0.5197	0.0039	0.0029	2.00
	0.9634	0.9625	0.0009	0.0028	2.00
	1.9763	1.9752	0.0011	0.0070	2.00
590	0.0000	-0.0001	0.0001	0.0028	2.00
	0.5191	0.5171	0.0020	0.0031	2.00
	1.0003	0.9984	0.0019	0.0033	2.00
635	1.9987	1.9946	0.0041	0.0084	2.00
	0.0000	0.0000	0.0000	0.0028	2.00
	0.5523	0.5509	0.0014	0.0030	2.00
	1.0809	1.0799	0.0010	0.0029	2.00
	2.0391	2.0329	0.0062	0.0080	2.00
	0.0000	0.0000	0.0000	0.0028	2.00
	0.5601	0.5584	0.0017	0.0031	2.00
	1.0512	1.0498	0.0014	0.0029	2.00
	1.9294	1.9265	0.0029	0.0082	2.00



## REPORT OF CALIBRATION

Certificate No. : SP22-016

Page 4 of 5

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.0001	-0.0001	0.0050	2.00
	0.7478	0.7421	0.0057	0.0056	2.00
257	0.0000	0.0000	0.0000	0.0050	2.00
	0.8686	0.8619	0.0067	0.0059	2.00
313	0.0000	0.0000	0.0000	0.0050	2.00
	0.2912	0.2896	0.0016	0.0051	2.00
350	0.0000	0.0000	0.0000	0.0050	2.00
	0.6448	0.6403	0.0045	0.0055	2.00

REPORT OF CALIBRATION

Certificate No. :SP22-016

Page 5 of 5

Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor <i>k</i>
241.72	242.0	-0.28	0.18	2.00
279.45	279.5	-0.05	0.18	2.00
287.81	287.5	0.31	0.18	2.00
334.06	333.5	0.56	0.18	2.00
360.93	360.5	0.43	0.18	2.00
418.59	418.0	0.59	0.18	2.00
445.94	445.4	0.54	0.18	2.00
453.66	453.2	0.46	0.18	2.00
460.02	459.7	0.32	0.18	2.00
536.59	536.2	0.39	0.18	2.00
637.98	638.3	-0.32	0.18	2.00
431.38	431.0	0.38	0.18	2.00
472.50	472.5	0.00	0.18	2.00
513.47	513.5	-0.03	0.18	2.00
528.88	528.5	0.38	0.18	2.00
573.17	573.0	0.17	0.18	2.00
585.35	585.0	0.35	0.20	2.00
684.40	684.7	-0.30	0.18	2.00
740.72	740.8	-0.08	0.20	2.00
748.55	748.5	0.05	0.18	2.00
807.03	807.3	-0.27	0.18	2.00
879.28	879.0	0.28	0.18	2.00

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor *k* ,

which for a normal distribution corresponds to a coverage probability of approximately 95%

- \* Indicates non TISI accredited