

# ภาคผนวก ง

เอกสารการสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์



ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
1.	Stack Air	Particulate	Dry Gas Meter/SK25EX	S/N 1317	07/02/2024	February 2025
			Digital Barometer/PHB-318	S/N B011407	03/05/2024	May 2025
			Digital Thermometer/DP-52	S/N L411635	04-10/04/2024	April 2025
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
			Gas Analyzer (E-instruments)/E6000-5DS	S/N 1339	03/01/2024	January 2025
2.	Ambient Air	SO <sub>2</sub>	Gas Analyzer (E-instruments)/E6000-5DS	S/N 1339	03/01/2024	January 2025
			Gas Analyzer (E-instruments)/E6000-5DS	S/N 1339	03/01/2024	January 2025
			Gas Analyzer (E-instruments)/E6000-5DS	S/N 1339	03/01/2024	January 2025
		CO	ORIFICE TRANSFER STANDARD/Tisch TE-5025A	S/N 0068	17/08/2023	August 2024
			High Volume Air Sampler/TET	S/N TSP-30	01/07/2024	July 2025
			High Volume Air Sampler/TET	S/N TSP-36	03/07/2024	July 2025
		NO <sub>x</sub> as NO <sub>2</sub>	High Volume Air Sampler/TET	S/N TSP-40	02/07/2024	July 2025
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
			ORIFICE TRANSFER STANDARD/Tisch TE-5025A	S/N 0068	17/08/2023	August 2024
		PM-10	High Volume Air Sampler/TET	S/N PM10-23	03/07/2024	July 2025
			High Volume Air Sampler/TET	S/N PM10-25	04/07/2024	July 2025
			High Volume Air Sampler/TET	S/N PM10-32	05/07/2024	July 2025
		NO <sub>2</sub>	Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
			CERTIFICATE OF ANALYSIS : Linde	S/N A00917SK	05/07/2023	July 2026
			NO <sub>x</sub> Analyzer/API 200E	S/N 381	22/04/2024	October 2024
		SO <sub>2</sub>	NO <sub>x</sub> Analyzer/Teldyne 200E	S/N 974	19/04/2024	October 2024
			NO <sub>x</sub> Analyzer/Teldyne 200E	S/N 1173	23/04/2024	October 2024
			CERTIFICATE OF ANALYSIS : Linde	S/N D636157	18/09/2023	September 2027
		WS & WD	SO <sub>2</sub> Analyzer/API 100E	S/N 383	24/04/2024	October 2024
			SO <sub>2</sub> Analyzer/Teledyne 100E	S/N 110	23/04/2024	October 2024
			SO <sub>2</sub> Analyzer/Teledyne 100E	S/N 064	22/04/2024	October 2024
			Wind speed and wind direction/6351EU	S/N Display F111207B053	18/03/2024	March 2025
			Wind speed and wind direction/Weather Wizard III	S/N WC41020A38	29/08/2024	August 2025
			Wind speed and wind direction/Weather Wizard III	S/N WC71006A11	17/01/2024	January 2025



ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์ (ต่อ)

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
3.	Working Air	Total Dust	Personal Air Sampler/Gilian	S/N 20120103064	16/07/2024	August 2024
			Personal Air Sampler/Gilian	S/N 20140605018	16/07/2024	August 2024
	Respirable Dust		Electronic Balance/XP 205	S/N 1129273885	10/04/2024	April 2025
			Personal Air Sampler/Gilian	S/N 20140705053	16/07/2024	August 2024
			Personal Air Sampler/Gilian	S/N 20140705057	16/07/2024	August 2024
			Electronic Balance/XP 205	S/N 1129273885	10/04/2024	April 2025
4.	Wastewater	pH	pH Meter/Horiba	S/N B06D0012	01/11/2023	November 2024
			pH Meter/Horiba (Temperature)	S/N B06D0012	01/11/2023	November 2024
		Temperature	BOD Incubator/Model i250	S/N 0408-0115-0008	09/04/2024	April 2025
		BOD	Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
5.	Sound Level	TDS	Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
		Oil & Grease	Sound Level Calibrator/Digicon Tenmars	S/N 180501628	16/08/2023	August 2024
		Leq 24 hr	Integrated Sound Level/ACO TYPE 6226	S/N 110105	01/07/2024	31/07/2024
			Integrated Sound Level/ACO TYPE 6226	S/N 150142	01/07/2024	31/07/2024
		Leq 8 hr	Sound Level Calibrator/TENMARS	S/N 180501628	16/08/2023	August 2024
			Sound Level Calibrator/Digicon Tenmars	S/N 110105	01/07/2024	31/07/2024
6.	Occupational Health and Safety	Heat	Integrated Sound Level/ACO TYPE 6236	S/N 150142	01/07/2024	31/07/2024
			Integrated Sound Level/ACO TYPE 6226	S/N 100099	01/11/2024	30/11/2024
			Integrated Sound Level/ACO TYPE 6226	S/N 160216	01/11/2024	30/11/2024
			Thermal Environment Monitor/JANTYTECH/JT2011-E2A	S/N 3522210143	18/03/2024	March 2025
			Thermal Environment Monitor/JANTYTECH/JT2011-E2A			
			Thermal Environment Monitor/JANTYTECH/JT2011-E2A	S/N 3522210147	19/03/2024	March 2025



THAI ENVIRONMENTAL TECHNIC LIMITED  
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

## CONTROL UNIT CALIBRATION

( Metric units , mm )

Date **7-Feb-24**

	Initial	Final	Average	
Barometric press, Pb	759.2	759.5	759.4	mmHg

### Dry Gas Meter Data

Console No. **M50-07**

Metering System ID

DGM Number **1317**

DGM Model **SK25EX**

### Reference Dry Gas Meter Data

Serial No. **913428**

Model. **S-110**

Correction factor(Yr) **1.0209**

Last Calibration Data **26-May-23**

Orifice manometer setting ΔH mm H2O	Ref .	DGM	Temperature ( ° C )				Time min	DGM Correction factor (Y)	ΔH@ mm H2O
	DMG	Volume	Ref	Dry Gas Meter					
	Volume	V <sub>m</sub>	DGM	Inlet T <sub>i</sub>	Outlet T <sub>o</sub>	Avg T <sub>m</sub>			
	V <sub>r</sub> Liters	Liters	T <sub>r</sub>						
15.00	100.00	99.80	29.00	29.10	29.30	29.20	8.36	1.0221	46.2103
25.00	100.00	99.20	29.00	29.10	29.30	29.20	6.49	1.0273	46.4605
50.00	100.00	99.50	29.00	29.10	29.30	29.20	4.58	1.0218	46.3877
80.00	100.00	99.10	29.00	29.10	29.30	29.20	3.59	1.0229	45.7335
100.00	100.00	99.30	29.00	29.10	29.30	29.20	3.23	1.0189	46.3655

Average **1.0226** **46.2315**

Dued Date of Calibrate **8-Feb-25**

Calibrated by : *Jalus.*

Approved : *Pramual M.*

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is  $\pm 0.02$ .

Note: For  $\Delta H@$ , Orifice pressure differential that equates to 0.75cfm (0.0212m<sup>3</sup>/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is  $\pm 0.2$  inches (5.1mm)H<sub>2</sub>O.



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250  
TEL. 0-2717-3000-24 FAX. 0-2719-9484



## Certificate of Calibration

Certificate No. : 24P1476

Page : 1 of 2

Equipment : Digital Barometer

Manufacturer: Lutron

Model : PHB-318

Serial No.: B011407

ID No.: NO.1

Condition As-Received: Used Item

Received Date: 30 April 2024

Calibration Date: 03 May 2024

Reference: 2404-0751DSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: ( 23 ± 2 ) °C

Relative Humidity: ( 50 ± 15 ) %

Atmospheric Pressure: 1006 mbar

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.

1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung,  
Bangkok 10240

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

### Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Digital Manometer	767367	91R724799	MP-0114-23	31 May 2024

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

3.Scale and conversion factor is 1 kPa = 7.50062 mmHg

4.This result of calibration instrument was in absolute pressure.

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

6.This instrument was installed in vertical orientation and center of the device 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 Aussarree

Issue Date : 07 May 2024

Approved Signatory :

*Attapol P.*

[ ] Phalinee Prabpaipal

[ ] Sura Suwannasri

[✓] Attapol Panurach



Cert.No.: 24P1476

Page: 2 of 2

Result of calibration:- Without adjustment

Range : 730 mmHg to 770 mmHg

Function:- Absolute Pressure Measurement

Resolution : 0.1 mmHg

Increasing Pressure

Applied Pressure (mmHg)	731.02	741.02	751.02	761.02	771.02
UUC* Indication (mmHg)	731.2	741.2	751.1	761.1	771.1
Error (mmHg)	0.18	0.18	0.08	0.08	0.08

Decreasing Pressure

Applied Pressure (mmHg)	771.02	761.02	751.02	741.02	731.02
UUC* Indication (mmHg)	771.1	761.1	751.1	741.2	731.2
Error (mmHg)	0.08	0.08	0.08	0.18	0.18

The uncertainty of measurement was  $\pm 0.13$  mmHg

\* 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 %.

-o0o-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250  
TEL. 0-2717-3000-24 FAX. 0-2719-9484



## Certificate of Calibration

Certificate No. : 24T625

Page : 1 of 2

Equipment : Digital Thermometer With Sensor  
Manufacturer: Digicon  
Model : DP-52  
Serial No.: I.411635  
ID No.: No.10

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.

Condition As-Received: Used Item

Received Date: 12 March 2024

Calibration Date: 04 April 2024  
to 10 April 2024

Reference: 2403-0381DSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: ( 25  $\pm$  3 ) °C

Relative Humidity: ( 50  $\pm$  20 ) %

1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung,  
Bangkok 10240

Procedure used: Calibration were conducted using in-house calibration procedure CP-T01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into liquid bath temperature controller and comparison with Standard Thermocouple (Type R/S) into high temperature furnace.  
The temperature scale used was based on ITS-90.

### Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Digital Thermometer	1529	A4B760	23I1123	21 Sep 2024
2) Industrial Platinum Resistance Thermometer	5627	824302	23I1123	21 Sep 2024
3) Digital Multimeter	2700	4016315	23EH24	06 Oct 2024
4) Standard Thermocouple Probe (Type S)	TCS	TCS-001	TT-0004-24	09 Jan 2025

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:-

- Technology Promotion Association (Thailand-Japan), NSC-ONSC Accredited No. Calibration 0008
- National Institute of Metrology Thailand (NIMT)

Calibrated by : Anuchit Pangchata  
Issue Date : 19 April 2024

Approved Signatory :

[ ] Phalinee Prabpaipal  
[ ] Chatchawan Khunpiluek  
[ ✓ ] Wanlop Larpkern

B 0339236



Cert. No.: 24T625

Page.: 2 of 2

**Result of Calibration:-**

Without Adjustment

**Function:** Temperature measurement for Channel T1

This equipment was connected with Thermocouple Type K S/N. 11005001 ID No. NO.10

Dimension of probe : Diameter 8 mm., Length 1030 mm. Sheath material : Stainless Steel

<u>Immersion</u>	<u>Standard</u>	<u>UUC*</u>		<u>Uncertainty</u>
<u>Depth</u>	<u>Temperature</u>	<u>Reading</u>	<u>Error</u>	<u>of Measurement</u>
( mm.)	( °C )	( °C )	( °C )	( ±°C )
180	200.0012	200.0	-0.0012	0.74
180	400.0019	399.9	-0.1019	1.4
180	599.98	601.9	1.9200	3.1

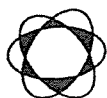
**UUC\*** : Unit Under Calibration

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

-o0o-

a 1210754





Thai Environmental Technic Limited  
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

## Portable Gas Calibration Report

Manufacturer : E-instruments  
Instrument Model : E6000-5DS  
Instrument serial no. : 1339  
Instrument ID : 11

Date of Calibration: 3-Jan-24  
Ambient Condition  
Temperature (23±5 °C) : 25.0 ° C  
Humidity (55±15 % RH) : 50.0 % RH  
Barometer (mmHg) : 758.4 mmHg

### Standard gas References

Standard gas	Cylinder No.	Traceability	Due date
Oxygen (O <sub>2</sub> )	36232	Linde	June 26, 2031
Nitric Oxide(NO)	D824463	Linde	June 5, 2026
	D824524	Linde	August 22, 2025
Nitrogen Dioxide(NO <sub>2</sub> )	CC518873	Airgas	August 17, 2024
	CC518878	Airgas	August 18, 2024
Sulfur Dioxide (SO <sub>2</sub> )	D824500	Linde	October 11, 2024
	D271305	Linde	October 11, 2024
Carbon Monoxide(CO)	D824500	Linde	October 11, 2024
	D271305	Linde	October 11, 2024

### Calibration Results

Parameter	Standard gas	Reading	Actual Error	Test Limit	Results
O <sub>2</sub> (%vol)	0.0	0.0	0.0	±0.2 % vol	PASS
	14.0	13.9	-0.1		
NO (ppm)	0.0	0.0	0.0	±5.0 ppm 0...100 ppm ±5% measured Value 101....5000 ppm	PASS
	198.0	197.0	-1.0		
NO <sub>2</sub> (ppm)	392.0	394.0	2.0		PASS
	0.0	0.0	0.0		
	40.1	40.0	-0.1		
SO <sub>2</sub> (ppm)	82.2	83.0	0.8		PASS
	0.0	0.0	0.0		
	406.0	405.0	-1.0		
CO (ppm)	804.0	802.0	-2.0		PASS
	0.0	0.0	0.0		
	404.0	403.0	-1.0		
	793.0	792.0	-1.0		

Calibrate by:

Approved by :

## CERTIFICATE OF CALIBRATION

Certificate No. : COF-008-66

Page 1 of 2 Pages

**MEASUREMENT ITEM** : Top Load Orifice  
**MANUFACTURER** : TISCH  
**MODEL/TYPE** : TE-5025A  
**SERIAL NUMBER** : 0068  
**ID NUMBER** : -  
**CONDITION AS-RECEIVED** : Used item  
**CUSTOMER** : Thai Environmental Technic Limited.  
1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung,  
Bangkok 10240

**RECEIVED DATE** : 08 Aug 2023  
**MEASUREMENT DATE** : 17 Aug 2023  
**ISSUE DATE** : 17 Aug 2023

### ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature	: 23.0 ± 3.0	°C
Relative Humidity	: 55.0 ± 15.0	%RH
Atmospheric Pressure	: 1010 ± 10	hPa

### CALIBRATION CONDITION:

Preconditioning : 24 hours at ambient conditions.  
Measurement Condition : The average values during measurement are 23.8 °C and 54.3 %RH.

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

### TABULATION OF RESULTS:

The table on next page give the measured values.

### Calibration procedure:

The Orifice gas flow device was calibrated against Standard Rotary Displacement Meter (Roots Meter) Model G65/IMC/W2-dp. The WI-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: G2211901

### 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. Sorawit Thachalad  
☐ Miss Jitraporn Lertsomphol



Approved signatory: .....

Mr. Parinya Booncharoen  
Calibration Department Manager

### MEASUREMENT RESULTS:

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

Table 1: The results of  $Q$  Standard calibration data

Plate	Flow rate $m^3/min$	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	$\Delta p_{meter}$ mmHg	$\Delta p_{Orifice}$ inH <sub>2</sub> O	$Y$	Standard Flow [ $Q_s$ ] $m^3/min$
1	0.700	754.191	23.89	23.40	50.276	1.674	1.291	0.651
2	1.005	754.148	23.80	23.70	54.969	3.395	1.839	0.929
3	1.118	754.084	23.88	23.81	37.664	4.407	2.095	1.058
4	1.175	754.076	23.87	23.79	27.625	5.018	2.236	1.127
5	1.420	754.047	23.89	23.81	27.348	7.362	2.708	1.363

Slope ( $m$ ): 1.99045  
 Intercept ( $b$ ): -0.00789  
 Correlation coefficient ( $r$ ): 0.99979  
 Uncertainty ( $k=2$ ): 0.015  $m^3/min$

Table 2: The results of  $Q$  actual calibration data

Plate	Flow rate $m^3/min$	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	$\Delta p_{meter}$ mmHg	$\Delta p_{Orifice}$ inH <sub>2</sub> O	$Y$	Standard Flow [ $Q_a$ ] $m^3/min$
1	0.700	754.191	23.89	23.40	50.276	1.674	0.812	0.654
2	1.005	754.148	23.80	23.70	54.969	3.395	1.156	0.932
3	1.118	754.084	23.88	23.81	37.664	4.407	1.318	1.062
4	1.175	754.076	23.87	23.79	27.625	5.018	1.406	1.132
5	1.420	754.047	23.89	23.81	27.348	7.362	1.703	1.368

Slope ( $m$ ): 1.24671  
 Intercept ( $b$ ): -0.00497  
 Correlation coefficient ( $r$ ): 0.99979  
 Uncertainty ( $k=2$ ): 0.015  $m^3/min$

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





Thai Environmental Technic Limited

บริษัท เทคนิกล้างแวล้อมไทย จำกัด

## High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Technic

Site ID : Bangkok

Date : 3-Jul-24

ITEM : PM10

Serial No : (No. 23 )

Calibrate By : Pipat

### Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 754.4

Average Temp (°C) : 31.2

Corrected Pressure (mm Hg) : 760.0

Temperature (deg K) : 298.0

Corrected Average (mm Hg) : -

Average Temp: (Deg K) : -

### Calibration Orifice

Make : Tisch

Qstd Slope : 1.99045

Model : TE-5025A

Qstd Intercept : -0.00789

Serial# : 0068

Calibration Due Date : 16-Aug-24

### Calibration Information

Plate or Test #	ORIFICE (in H <sub>2</sub> O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 33.8829 Intercept : 2.0423 Corr. Coeff : 0.9794 # of Observations: 5
1	12.30	1.766	60.0	60.00	
2	9.40	1.544	54.0	54.00	
3	7.20	1.352	52.0	52.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

### Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd)(Tstd/Ta)) - b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m((I)[\text{Sqrt}(298/Tav)(Pav/760)] - b)$$

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

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



Thai Environmental Technic Limited

บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

## High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Technic

Site ID : Bangkok

Date : 4-Jul-24

ITEM : PM10

Serial No : (No. 25 )

Calibrate By : Pipat

### Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 754.4

Average Temp (°C) : 31.4

Corrected Pressure (mm Hg) : 760.0

Temperature (deg K) : 298.0

Corrected Average (mm Hg) : -

Average Temp: (Deg K) : -

### Calibration Orifice

Make : Tisch

Qstd Slope : 1.99045

Model : TE-5025A

Qstd Intercept : -0.00789

Serial# : 0068

Calibration Due Date : 16-Aug-24

### Calibration Information

Plate or Test #	ORIFICE (in H <sub>2</sub> O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 34.1977 Intercept : 1.5135 Corr. Coeff : 0.9883 # of Observations: 5
1	12.20	1.759	60.0	60.00	
2	9.20	1.528	54.0	54.00	
3	7.00	1.333	50.0	50.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

### Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd)(Tstd/Ta)) - b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m((I) [\text{Sqrt}(298/Tav)(Pav/760)] - b)$$

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

m = sampler slope

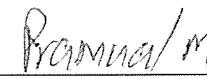
b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



Thai Environmental Technic Limited

บริษัท เทคนิกล้างแวลด้อมไทย จํากัด

## High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Technic

Site ID : Bangkok

Date : 5-Jul-24

ITEM : PM10

Serial No : (No. 32)

Calibrate By : Pipat

### Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 754.4

Average Temp (°C) : 32.6

Corrected Pressure (mm Hg) : 760.0

Temperature (deg K) : 298.0

Corrected Average (mm Hg) : -

Average Temp: (Deg K) : -

### Calibration Orifice

Make : Tisch

Model : TE-5025A

Serial# : 0068

Qstd Slope : 1.99045

Qstd Intercept : -0.00789

Calibration Due Date : 16-Aug-24

### Calibration Information

Plate or Test #	ORIFICE (in H <sub>2</sub> O)	Qstd (m <sup>3</sup> /min)	Indicate (CFM)	IC (corrected)	Linear Regression
1	12.00	1.744	60.0	60.00	Slope : 34.4367
2	9.40	1.544	54.0	54.00	Intercept : 1.1831
3	7.00	1.333	50.0	50.00	Corr. Coeff : 0.9895
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	# of Observations: 5

### Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m((I)[\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

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

m = sampler slope

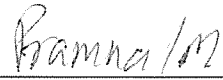
b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



Thai Environmental Technic Limited  
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

## High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Technic

Site ID : Bangkok

Date : 2-Jul-24

ITEM : TSP

Serial No : (No. 40 )

Calibrate By : Pipat

### Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 754.5

Average Temp (°C) : 31.5

Corrected Pressure (mm Hg) : 760.0

Temperature (deg K) : 298.0

Corrected Average (mm Hg) : -

Average Temp: (Deg K) : -

### Calibration Orifice

Make : Tisch

Model : TE-5025A

Serial# : 0068

Qstd Slope : 1.99045

Qstd Intercept : -0.00789

Calibration Due Date : 16-Aug-24

### Calibration Information

Plate or Test #	ORIFICE (in H <sub>2</sub> O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 29.6359 Intercept : 5.9854 Corr. Coeff : 0.9837 # of Observations: 5
1	12.60	1.787	60.0	57.00	
2	9.20	1.528	54.0	52.00	
3	7.00	1.333	50.0	48.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

### Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m([I][\text{Sqrt}(298/Tav)(Pav/760))]-b)$$

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

m = sampler slope

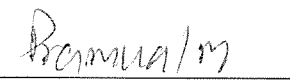
b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



Thai Environmental Technic Limited  
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

## High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Technic

Site ID : Bangkok

Date : 3-Jul-24

ITEM : TSP

Serial No : (No. 36 )

Calibrate By : Pipat

### Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 754.4

Average Temp (°C) : 29.8

Corrected Pressure (mm Hg) : 760.0

Temperature (deg K) : 298.0

Corrected Average (mm Hg) : -

Average Temp: (Deg K) : -

### Calibration Orifice

Make : Tisch

Model : TE-5025A

Serial# : 0068

Qstd Slope : 1.99045

Qstd Intercept : -0.00789

Calibration Due Date : 16-Aug-24

### Calibration Information

Plate or Test #	ORIFICE (in H <sub>2</sub> O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 29.9909 Intercept : 5.4935 Corr. Coeff : 0.9867 # of Observations: 5
1	12.30	1.766	60.0	57.00	
2	9.50	1.552	54.0	52.00	
3	7.00	1.333	50.0	48.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

### Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m((I)[\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

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


m = sampler slope

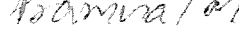
b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 





Thai Environmental Technic Limited  
บริษัท เทคนิกล้างแวล้อมไทย จำกัด

## High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Technic

Site ID: Bangkok

Date: 1-Jul-24

ITEM: TSP

Serial No: (No. 30 )

Calibrate By: Pipat

### Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 754.4

Average Temp (°C) : 29.8

Corrected Pressure (mm Hg) : 760.0

Temperature (deg K) : 298.0

Corrected Average (mm Hg) : -

Average Temp: (Deg K) : -

### Calibration Orifice

Make: Tisch

Model: TE-5025A

Serial#: 0068

Qstd Slope : 1.99045

Qstd Intercept : -0.00789

Calibration Due Date : 16-Aug-24

### Calibration Information

Plate or Test #	ORIFICE (in H <sub>2</sub> O)	Qstd (m <sup>3</sup> /min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 29.6691 Intercept : 5.6700 Corr. Coeff : 0.9893 # of Observations: 5
1	12.60	1.787	60.0	57.00	
2	9.30	1.536	54.0	52.00	
3	7.40	1.371	50.0	48.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

### Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd)(Tstd/Ta)) - b]$$

$$IC = l[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

l = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m(l[\text{Sqrt}(298/Tav)(Pav/760)] - b)$$

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

m = sampler slope

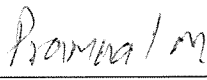
b = sampler intercept

l = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 

Certificate Of Analysis  
Special Gases Mixture

## Customer Details

Name:

Thai Environmental Technic Limited

Address:

1/6 Soi Ramkhamhaeng 45, Sapansoong,  
Khet Saphan Sung, Bangkok 10240

Customer Tag No.:

## Certificate Details

Number:	1734/23	Date of Issue:	5-Jul-2023	Expiry date:	5-Jul-2026
Material Details					
Production Order:	90178560	Material Code:	640300-SK-44	Cylinder No.:	A00917SK
Gas content:	5.520 M <sup>3</sup>	Filling pressure:	145.0 bar	Valve:	CGA 660 SS
Cylinder Owner:	LINDE	Cylinder Material:	Spectra seal	Cylinder Size:	40 L

## Laboratory Report

## Analytical Result

Component	Normal Concentration	Analysis Result <sup>1</sup>	Uncertainty <sup>2</sup>	Method of Analysis <sup>3</sup>	Assay Date
Nitric Oxide	40.0 ppm	40.5 ppm	± 1% relative	(6) I-PB-352	28-Jun & 5-Jul-2023
Other NOx impurity In Nitrogen		Less than 2.0 ppm			

## Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Nitric Oxide In Nitrogen	2580135G	25.32 ± 0.25 ppm	13-Dec-2024

## Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-NO	28-Jun-2023

## Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.  
Storage condition: Keep in well ventilation and secure area.

## Comments

When reordering, please quote the material number

## Note:

- All results expressed in this report are on mole/mole basis, unless otherwise specified. An Assay of this Standard has been performed in accordance with the EPA Traceability Protocol EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1.
- The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard, which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
- (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasoonorn

Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Linde (Thailand) Public Company Limited

PIC Registration no. 0107537000783

15<sup>th</sup> Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkaew  
Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333Wellgrow Plant: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180  
Thailand, Tel (66) 38.570-479-93 Fax (66) 38.570-323



Thai Environmental Technic Limited  
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

## NOx Analyzer Calibration Report

Calibrate Date : 22-Apr-24  
Analyzer Type : NOx  
Brand : API  
Model : 200 E  
Serial Number : 381 (No. 21)  
Range : 500 ppb

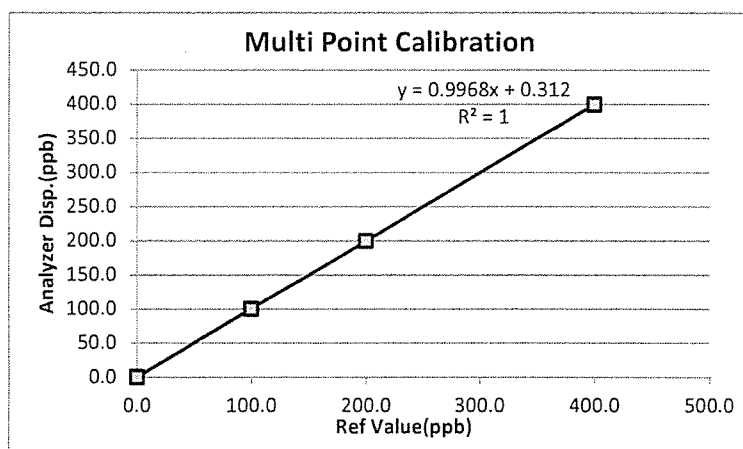
Temperature (°C) : 25°C  
Barometer (mmHg) : 759.9  
Humidity (50±15 %) : 50.0%RH  
Dilutor : API M700 S/N 625  
Zero Air : API M701 S/N 1926  
Standard gas : A00917 SK

### Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO <sub>2</sub>	NOx	NO	NO <sub>2</sub>	
Zero	0.0	3.1	2.9	0.2	0.0	0.0	0.0	0.0
Span	400.0	396.0	392.0	4.0	400.0	400.0	0.0	0.0

### Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO <sub>2</sub>	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.4	0.3	0.1	0.32	0.001	0.08
100.0	101.1	100.3	0.8	0.30	0.003	0.30
200.0	199.5	199.2	0.3	-0.80	-0.004	0.40
400.0	399.4	399.2	0.2	-0.80	-0.002	0.20
Average Diff (%)						0.25



Calibrate by: [Signature]

Approved by: [Signature]



Thai Environmental Technic Limited  
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

## NOx Analyzer Calibration Report

Calibrate Date : 19-Apr-24  
Analyzer Type : NOx  
Brand : Teledyne  
Model : 200 E  
Serial Number : 974 (No. 34)  
Range : 500 ppb

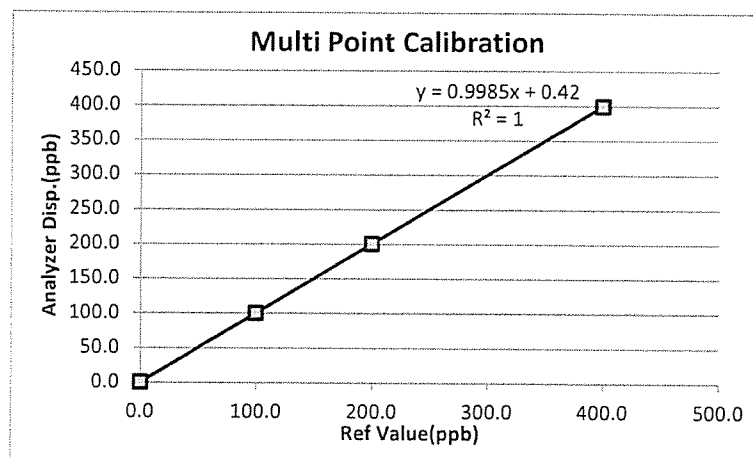
Temperature (°C) : 25 °C  
Barometer (mmHg) : 760.0  
Humidity (50±15 %) : 50.0%RH  
Dilutor : API M700 S/N 625  
Zero Air : API M701 S/N 1926  
Standard gas : A00917 SK

### Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO <sub>2</sub>	NOx	NO	NO <sub>2</sub>	
Zero	0.0	3.2	2.8	0.4	0.0	0.0	0.0	0.0
Span	400.0	413.0	408.0	5.0	400.0	400.0	0.0	0.0

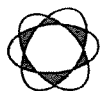
### Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO <sub>2</sub>	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.5	0.3	0.2	0.30	0.001	0.08
100.0	100.9	100.3	0.6	0.30	0.003	0.30
200.0	201.1	200.3	0.8	0.30	0.002	0.15
400.0	400.9	399.7	1.2	-0.30	-0.001	0.08
Average Diff (%)						0.15



Calibrate by:

Approved by:



Thai Environmental Technic Limited  
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

## NOx Analyzer Calibration Report

Calibrate Date : 23-Apr-24  
Analyzer Type : NOx  
Brand : Teledyne  
Model : 200 E  
Serial Number : 1173 (No.35)  
Range : 500 ppb

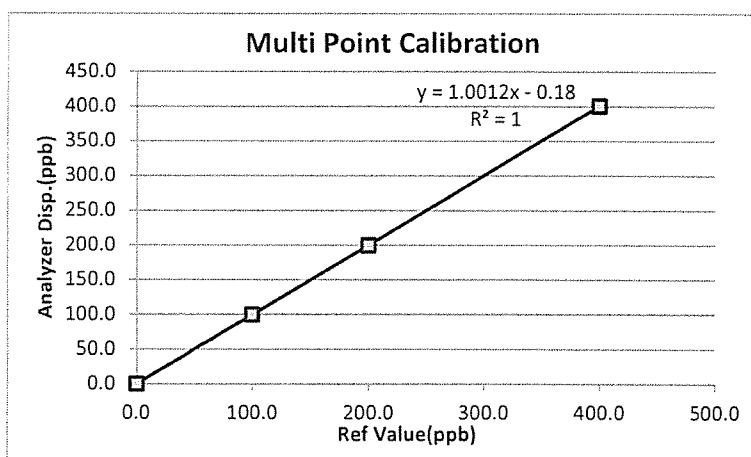
Temperature (°C) : 25°C  
Barometer (mmHg) : 759.1  
Humidity (50±15 %) : 50.0%RH  
Dilutor : API M700 S/N 625  
Zero Air : API M701 S/N 1926  
Standard gas : A00917 SK

### Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO <sub>2</sub>	NOx	NO	NO <sub>2</sub>	
Zero	0.0	1.5	1.1	0.4	0.0	0.0	0.0	0.0
Span	400.0	409.0	408.0	1.0	400.0	400.0	0.0	0.0

### Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO <sub>2</sub>	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.3	0.1	0.2	0.10	0.000	0.03
100.0	101.3	99.8	1.5	-0.20	-0.002	0.20
200.0	200.4	199.7	0.7	-0.30	-0.002	0.15
400.0	401.0	400.5	0.5	0.50	0.001	0.13
Average Diff (%)						0.13



Calibrate by:

*[Signature]*

Approved by:

*[Signature]*

Certificate Of Analysis  
Special Gases Mixture

## Customer Details

Name: Thai Environmental Technic Limited. Address: 1/6 Soi Ramkhamhaeng 45, Sapansoong, Khet Saphan Sung, Bangkok 10240 Customer Tag No.: -

## Certificate Details

Number:	2500/23	Date of Issue:	18-Sep-2023	Expiry date:	18-Sep-2027
Material Details					
Production Order:	90179846	Material Code:	608400-SK-44	Cylinder No.:	D636157
Gas content:	5.520 M <sup>3</sup>	Filling pressure:	145 bar	Valve:	CGA 660 SS
Cylinder Owner:	LINDE	Cylinder Material:	Spectra seal	Cylinder Size:	40 L

## Laboratory Report

## Analytical Result

Component	Nominal Concentration	Analysis Result <sup>1</sup>	Uncertainty <sup>2</sup>	Method of Analysis <sup>3</sup>	Assay Date
Sulphur Dioxide In Nitrogen	40.0 ppm	41.1 ppm	± 1% relative	(6) I-PB-352	8-Sep & 18-Sep-23

## Reference Standard used in Assay

Reference Standard	Cylinder number	Concentration	Expiry date:
Sulphur Dioxide In Nitrogen	BOC1506295G	25.35 ± 0.25 ppm	9-Jun-2024

## Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-SO2	6-Sep-2023

## Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.  
Storage condition: Keep in well ventilation and secure area.

## Comments

When reordering, please quote the material number

## Note:

- All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPA Traceability Protocol EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1
- The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
- (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasoonorn

Signatory for and on behalf of Linde (Thailand) Co., Ltd.

PB-002/F006

Iss: L/2, 01 August 2023

## บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เบอร์โทรศัพท์: 0107537000785

ชั้น 15 อาคารทาวเวอร์ เอ 2/3 หมู่ 14 ถนนบางนา-ตราด กม. 6.5 ต.บางพลี

อ.บางพลี จ.สมุทรปราการ 10540 โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานเวลโกรว์: 105 หมู่ 5 ต.บางพลี อ.บางพลี จ.สมุทรปราการ 24180

โทรศัพท์ (66) 38.570-479-93

โทรสาร (66) 38.570-323

## Linde (Thailand) Public Company Limited

P.L.C. Registration no 0107537000785

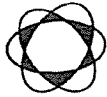
15<sup>th</sup> Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangkaew

Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333

Wellgrow Plant: 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180

Thailand, Tel (66) 38.570-479-93

Fax (66) 38.570-323



Thai Environmental Technic Limited  
บริษัท เทคนิกล้างแวล้อมไทย จำกัด

## Analyzer Calibration Report

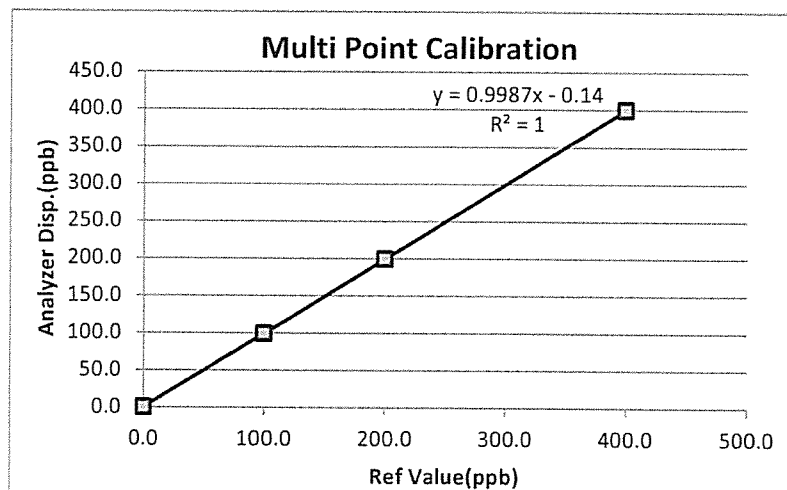
Calibrate Date	24-Apr-24	Temperature (°C)	: 25°C
Analyzer Type	SO <sub>2</sub>	Barometer (mmHg)	: 760.0
Brand	API	Humidity (50±15 %)	: 50.0 %RH
Model	100E	Dilutor	: API M700 S/N 625
Serial Number	383 (No. 12)	Zero Air	: API M701 S/N 1926
Range	500 ppb	Standard gas	: D636157

### Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)	After of Span.(ppb)	Abs% diff of Span
Zero	0.0	3.2	0.0	0.0
Span	400.0	411.0	400.0	0.0

### Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference		
		Diff (ppb)	Percent Diff	Abs Percent Diff
0.0	0.4	0.4	0.00	0.10
100.0	99.2	-0.8	-0.01	0.80
200.0	199.3	-0.7	0.00	0.35
400.0	399.6	-0.4	0.00	0.10
Average Diff (%)				0.34



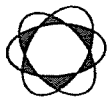
Calibrate by:

Approved by:

แก้ไขครั้งที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QP16-06



Thai Environmental Technic Limited  
บริษัท เทคนิสิ่งแวดล้อมไทย จำกัด

## Analyzer Calibration Report

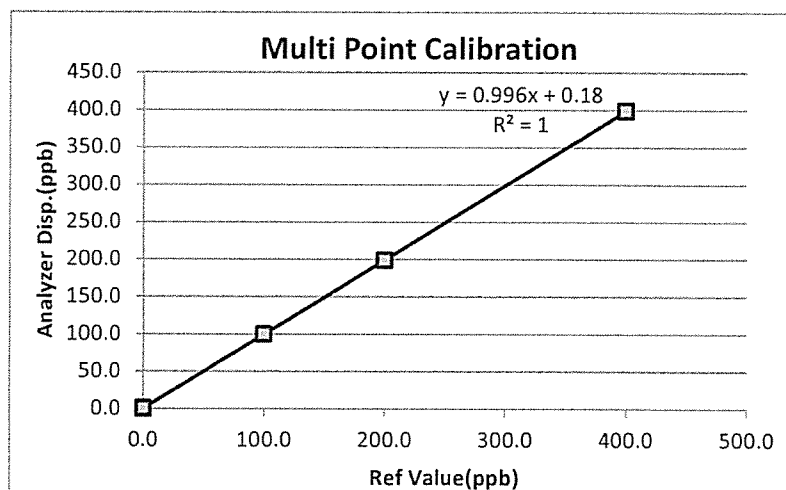
Calibrate Date	23-Apr-24	Temperature (°C)	: 25°C
Analyzer Type	SO <sub>2</sub>	Barometer (mmHg)	: 760.0
Brand	Teledyne	Humidity (50±15 %)	: 50.0 %RH
Model	100 E	Dilutor	: API M700 S/N 625
Serial Number	110 (No. 21)	Zero Air	: API M701 S/N 1926
Range	500 ppb	Standard gas	: D636157

### Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)	After of Span.(ppb)	Abs% diff of Span
Zero	0.0	1.7	0.0	0.0
Span	400.0	393.0	400.0	0.0

### Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference		
		Diff (ppb)	Percent Diff	Abs Percent Diff
0.0	0.3	0.3	0.00	0.08
100.0	99.8	-0.2	0.00	0.20
200.0	199.1	-0.9	0.00	0.45
400.0	398.7	-1.3	0.00	0.33
Average Diff (%)				0.26



Calibrate by:

*[Signature]*

Approved by:

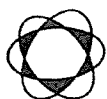
*[Signature]*

แก้ไขครั้งที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QP16-06





Thai Environmental Technic Limited  
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

## Analyzer Calibration Report

Calibrate Date : 22-Apr-24  
Analyzer Type : SO<sub>2</sub>  
Brand : Teledyne  
Model : 100 E  
Serial Number : 064 (No. 24)  
Range : 500 ppb

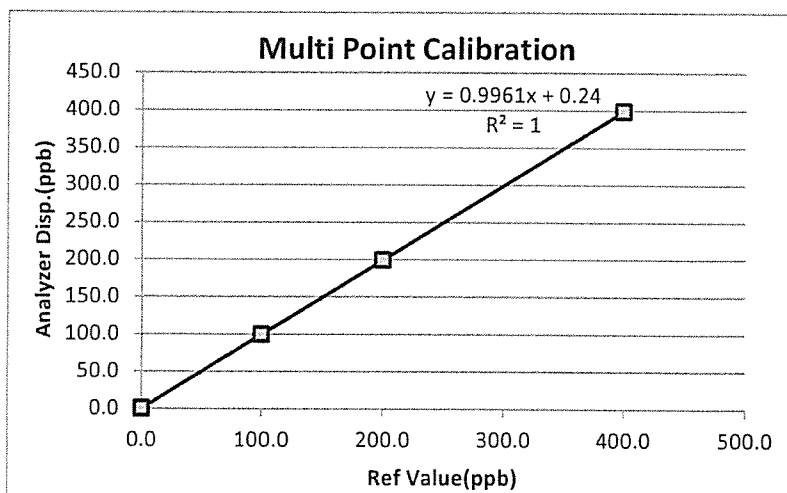
Temperature (°C) : 25°C  
Barometer (mmHg) : 758.2  
Humidity (50±15 %) : 52.0 %RH  
Dilutor : API M700 S/N 625  
Zero Air : API M701 S/N 1926  
Standard gas : D636157

### Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)	After of Span.(ppb)	Abs% diff of Span
Zero	0.0	1.6	0.0	0.0
Span	400.0	384.0	400.0	0.0

### Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference		
		Diff (ppb)	Percent Diff	Abs Percent Diff
0.0	0.3	0.3	0.00	0.08
100.0	99.8	-0.2	0.00	0.20
200.0	199.4	-0.6	0.00	0.30
400.0	398.7	-1.3	0.00	0.33
Average Diff (%)				0.23



Calibrate by:

Approved by:

แก้ไขครั้งที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QP16-06



# THAI METEOROLOGICAL DEPARTMENT

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

## Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 18 March, 2024

Certification No. 132/24

Page : 1 of 2

Object : Vantage VUE Wireless Weather Station

Manufacturer : Davis Instruments

Type : 6351EU ID No. : No.15

Serial No. : Display F111207B053 Transmitter F111207B053

Customer : Thai Environmental Technic Limited.  
1/6 Soi Ramkhamhaeng 145,  
Khwaeng/Khet Saphan Sung, Bangkok 10240.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1011.9 hPa

### NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 0 - 30 m/sec

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

Serial Number 110730029 (sensor 120629586)

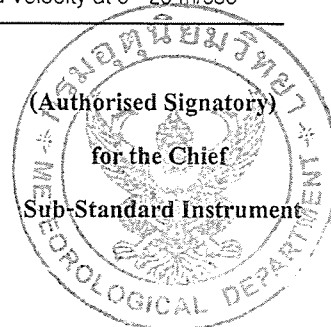
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by :

Mr. Watcharapol Subwat  
Mechanical Engineer

Signed :

Mr. Piseed Promsut





## THAI METEOROLOGICAL DEPARTMENT

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

### The Result of Calibration

Certification No. 132/24

18 March, 2024

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacumm inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.5	0.50
7.00	-	-	-	6.7	0.30
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.7	0.31
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.3	0.71
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.3	0.72

Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	91
180	180
270	270

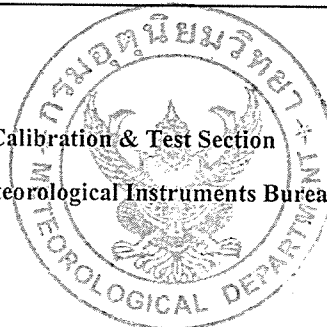
Calibrated by :

*Watchapol*

Mr. Watchapol Subwat

Mechanical Engineer

Calibration & Test Section  
Meteorological Instruments Bureau





# THAI METEOROLOGICAL DEPARTMENT

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

## Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 29 August, 2024

Certification No. 297/24

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III

Serial No. : WC41020A38 ID No. : No.20

Customer : Thai Environmental Technic Limited.  
1/6 Soi Ramkhamhaeng 145,  
Khwaeng/Khet Saphan Sung, Bangkok 10240.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1006.1 hPa

### NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023

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

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

Serial Number 110730029 (sensor 120629586)

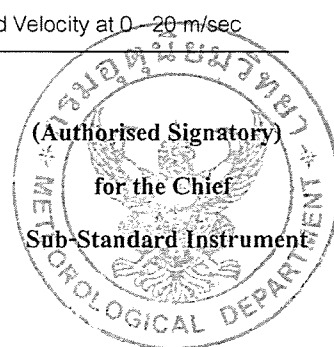
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by :

Mr. Watcharapol Subwat  
Mechanical Engineer

Signed :

Mr. Pisod Promsut





# THAI METEOROLOGICAL DEPARTMENT

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

## The Result of Calibration

Certification No. 297/24

29 August, 2024

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H <sub>2</sub> O	Vacumm inches H <sub>2</sub> O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.5	0.50
7.00	-	-	-	6.8	0.20
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.9	0.11
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.9	0.11
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.9	0.12

Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

*Watchapol*

Mr. Watchapol Subwat

Mechanical Engineer





# THAI METEOROLOGICAL DEPARTMENT

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

## Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 17 January, 2024

Certification No. 048/24

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III

Serial No. : WC71006A11 ID No. : No.26

Customer : Thai Environmental Technic Limited.  
1/6 Soi Ramkhamhaeng 145,  
Khwaeng/Khet Saphan Sung, Bangkok 10240.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1013.8 hPa

### NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 0 - 30 m/sec

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

Serial Number 110730029 (sensor 120629586)

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

Calibrated by : 

Mr. Watcharapol Subwat

Mechanical Engineer

Signed : 

Mr. Pisood Promsut





# THAI METEOROLOGICAL DEPARTMENT

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

## The Result of Calibration

Certification No. 048/24

17 January, 2024

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacumm inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.5	0.50
7.00	-	-	-	6.7	0.30
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.7	0.31
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.7	0.31
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.7	0.32

Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

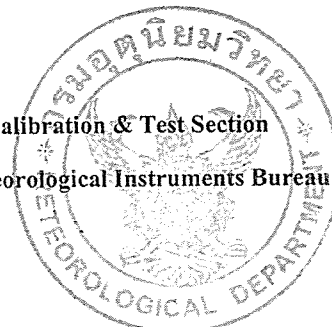
Watcharapol

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau





**บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด**

# Personal Pump Calibration Report

*Equipment Type* : Personal Pump/Parameter

*Equipment Range* : 0.1-7.0 l/min

Calibration Range : 0.1-4.0 l/min

Calibration Type : Drycal

Calibration S/N : 4491

[illegible]

Calibration Date 16 / 07 / 67

Calibration By ASG

Remark : Uncertainty Type A =  $\sigma$  = SD

 $\sqrt{n}$ 

: SD = Standard deviation

:  $\bar{X}$  Mean





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



## Certificate of Calibration

Cert.No.: 24MM273

Page.: 1 of 3

**Equipment :** Electronic Balance

**Manufacturer :** Mettler Toledo

**Model :** XP205DR

**Serial No. :** 1129273885

**ID No. :** Ins-LAB-035

**Submitted by :** Thai Environmental Technic Limited  
1/6 Soi Ramkhamhaeng 145,  
Khwaeng/Khet Saphan Sung,  
Bangkok 10240

**Location :** Balance Room

**Received order :** 09 April 2024  
**Calibration Date :** 10 April 2024  
**Ambient Temperature :** 15 °C to 40 °C  
**Relative Humidity :** 30 % to 90 %

**Calibrated by :** Khit Ruttanaprapachai

**Approved by :**

Kunchit

Approved Signatory

- ( ) Ponpan Paipim  
( ) Suwit Imjai  
(✓) Kunchit Promprat

**Issue Date :**

12 April 2024

**The Uncertainties are for a confidence probability of approximately 95%**

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



**Equipment :** Electronic Balance

**Condition As-Received :** Used Item

**Reference :** 2404-0113OC-15

**Cert.No.:** 24MM273

**Page:** 2 of 3

**Procedure used :-**

Calibration were conducted using in-house calibration procedure CP-OB01 based on UKAS LAB 14 according to direct measurement method against standard weight.

**Condition of this result of calibration**

**1. Reference standard instruments:-**

<u>Instruments</u>	<u>Model</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Test report No.</u>	<u>Due date</u>
1) Standard Weight Set (E2)	15884	-	70RC138	MM-0020-23	30 Jan 2025

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

<b>Range capacity :</b>	0 g to 81 g	<b>Resolution</b>	0.00001 g
	81 g to 220 g	<b>Resolution</b>	0.0001 g

**Before Adjustment :**

<u>Applied Weight</u> ( g )	<u>Balance Reading</u> ( g )	<u>Correction</u> ( g )	<u>Measurement Uncertainty</u> ( ± mg )	<u>Coverage Factor</u> ( k )
80	79.99997	+0.00003	0.15	2
200	199.9998	+0.0002	0.29	2

**After Adjustment :**

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

<u>Applied Weight</u> ( g )	<u>Standard Deviation of Reading</u> ( g )
80	0.000016
200	0.00005



**Equipment :** Electronic Balance  
**Condition As-Received :** Used Item  
**Reference :** 2404-0113OC-15

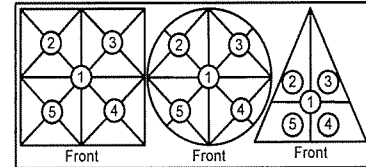
**Cert.No.:** 24MM273

**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



**Maximum difference between  
off-center and central loading**

Position 1 ( g )	Position 2 ( g )	Position 3 ( g )	Position 4 ( g )	Position 5 ( g )	( g )
+0.0001	+0.0001	0.0000	0.0000	+0.0002	0.0001

### 3. Departure from nominal value

Applied Weight ( g )	Balance Reading ( g )	Correction ( g )	Measurement Uncertainty ( $\pm$ mg )	Coverage Factor ( $k$ )
Unload	0.00000	0.00000	0.028	2.28
0.01	0.00999	+0.00001	0.029	2.28
0.05	0.04999	+0.00001	0.029	2.23
1	0.99999	+0.00001	0.030	2.17
2	1.99999	+0.00001	0.030	2.15
5	4.99999	+0.00001	0.034	2.09
10	10.00000	0.00000	0.036	2.06
20	19.99999	+0.00001	0.045	2
50	49.99999	+0.00001	0.080	2
80	79.99999	+0.00001	0.15	2
200	199.9998	+0.0002	0.29	2

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 %.

-o0o-




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



## Certificate of Calibration

Cert.No.: 24CHO574

Page.: 1 of 2

Equipment :	pH Meter
Manufacturer :	Horiba
Model :	LAQUA-PH1300
Serial No. :	B06D0012
ID No. :	Ins-LAB-026
Condition As-Received:	Used Item
Received Date :	30 October 2024
Calibration Date :	30 October 2024
Reference :	2410-0784OC-6
Submitted by :	Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung, Bangkok 10240
Calibration Place :	Laboratory (Thai Environmental Technic Limitec
Ambient Temperature :	( 25.3 to 24.8 ) °C (On-Site)
Relative Humidity :	( 71.7 to 77.5 ) % (On-Site)
Calibration Procedure :	In - house method : - CP-OCH2 by direct measurement with DC voltage standard and direct measurement with certified reference material (CRM)
Calibrated by :	Saithip Meangmai
Approved by :	 Approved Signatory
( ) Unnopphol Harachai	
(✓) Ponpan Paipim	
( ) Saithip Meangmai	
Issue Date :	2 November 2024

**The Uncertainties are for a confidence probability of approximately 95%**

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



Cert.No.: 24CHO574

Page.: 2 of 2

**Condition of this calibration result**

## 1. Reference Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	46530031	130RC098	24E3004	12 Sep 2025
2) Digital Thermometer	307901	70RC137	24I973	01 Sep 2025

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,  
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835  
: The measurement results are traceable to SI through Hach Lenge GmbH Ltd.,  
The measurement results are traceable to SI through Hach Lenge GmbH Ltd.,

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 1.685	CPA chem	1005300	15 June 2026
pH 4.008	CPA chem	1034203	27 Sep 2026
pH 6.876	CPA chem	1005301	15 June 2026
pH 9.174	CPA chem	1005302	15 June 2025
*pH 12.42	Hach Lenge GmbH	C03178	07 June 2026

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

**Calibration Results****Function : mV Measurement**

Performing standard curve by Document Process Calibrator at pH (1.7,4,7,10,12)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement ( $\pm$ mV)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter S/N.: V3B1F8H3	1.680	314.73	314.7	1.680	0.058	2.00
	4.000	177.48	177.4	4.000	0.058	2.00
	6.860	8.28	8.3	6.860	0.058	2.00
	7.000	0.00	0.0	7.000	0.058	2.00
	9.180	-128.97	-128.9	9.180	0.058	2.00
	10.000	-177.48	-177.4	10.000	0.058	2.00
	12.000	-295.80	-295.8	12.000	0.058	2.00

**Function : pH Measurement**

Performing five buffers standard curve by using buffer nominal pH (1.68,4.01,6.86,9.18,12.42)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement ( $\pm$ )	Coverage factor <i>k</i>
pH Electrode S/N.: 9X3D0537	1.685	1.679	293.0	0.0074	2.18
	4.008	3.981	154.7	0.0057	2.09
	6.876	6.842	-13.2	0.0075	2.05
	9.174	9.151	-148.8	0.013	2.07
	*12.42	12.423	-337.1	0.059	2.05

**Remark** - \* = Not NSC-ONSC Accredited.

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 %.



**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



## Certificate of Calibration

Cert. No.: 24TM702

Page : 1 of 3

**Equipment :** BOD Incubator

**Manufacturer :** Accuplus

**Model :** i250

**Serial No. :** 0408-0115-0008

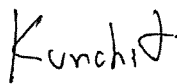
**ID No. :** Ins-LAB-046

**Submitted by :** Thai Environmental Technic Limited  
1/6 Soi Ramkhamhaeng 145,  
Khwaeng/Khet Saphan Sung,  
Bangkok 10240

**Location :** Laboratory (Thai Environmental Technic Limited)

**Received Order :** 09 April 2024  
**Calibration Date :** 09 April 2024  
**Ambient Temperature :** ( 26 ± 10 ) °C  
**Relative Humidity :** ( 50 ± 30 ) %

**Calibrated by :** Khit Ruttanaprapachai

**Approved by :**   
Approved Signatory

( ) Ponpan Paipim  
( ) Suwit Imjai  
(✓) Kunchit Promprat

**Issue Date :** 26 April 2024

**The Uncertainties are for a confidence probability of approximately 95%**

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



**Equipment :** BOD Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2404-0113OC-11  
**Procedure Used :-**

**Cert. No.:** 24TM702  
**Page :** 2 of 3

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

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

<u>Instrument</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due Date</u>
1 ) Data Acquisition	MY49001451	24LM44	TPA	17 Mar 2025

2. This 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.

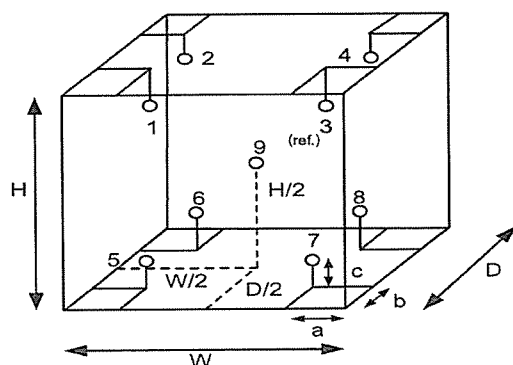
**Remark :** TPA : Technology Promotion Association ( Thailand - Japan )

**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Not Available

<b>Environment during calibration</b>		
	<b>Beginning</b>	<b>Finished</b>
Temp. ( °C )	24	25
REL.Humid. ( % )	50	52
AC Supply ( Volt )	221	220



<b>Position :</b>	<b>Ref. Std. ID No.:</b>
1	19RTD-2/1
2	19RTD-2/2
3	19RTD-2/3
4	19RTD-2/4
5	19RTD-2/5
6	24-19RTD-2/6
7	19RTD-2/7
8	19RTD-2/8
9 (ref.)	19RTD-2/9

**Probe Installation Details :**

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

**Dimension of Chamber :**

D = 0.48 m  
 W = 0.50 m  
 H = 1.1 m  
 Capacity = 0.26 m<sup>3</sup>



**Equipment :** BOD Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2404-0113OC-11  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source  
**Fresh air setting :** Not Available

**Cert. No.:** 24TM702

**Page :** 3 of 3

Calibration Point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Temperature stability ( ± °C )	Temperature uniformity ( °C )	Overall Variation ( °C )	Coverage Factor <i>k</i>
20.0	20.0	20.0	0.30	0.27	0.77	2

Calibration Point ( °C )	Measured Temperature ( °C )									Uncertainty
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	( ±°C )
20.0	20.232	20.184	20.129	20.214	20.126	20.102	19.987	20.053	20.128	0.49

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

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

**Temperature uniformity :** The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

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

**UUC\* :** Unit Under Calibration

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

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

-o0o-





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



## Certificate of Calibration

Cert.No.: 24MM272

Page.: 1 of 3

**Equipment :** Electronic Balance

**Manufacturer :** Mettler Toledo

**Model :** AB204

**Serial No. :** 1116392227

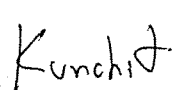
**ID No. :** Ins-LAB-033

**Submitted by :** Thai Environmental Technic Limited  
1/6 Soi Ramkhamhaeng 145,  
Khwaeng/Khet Saphan Sung,  
Bangkok 10240

**Location :** Balance Room

**Received order :** 09 April 2024  
**Calibration Date :** 10 April 2024  
**Ambient Temperature :** 15 °C to 40 °C  
**Relative Humidity :** 30 % to 90 %

**Calibrated by :** Khit Ruttanaprapachai

**Approved by :**   
( ) Ponpan Paipim  
( ) Suwit Imjai  
(✓) Kunchit Promprat

Approved Signatory

**Issue Date :**

12 April 2024

**The Uncertainties are for a confidence probability of approximately 95%**

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



**Equipment :** Electronic Balance

**Condition As-Received :** Used Item

**Reference :** 2404-0113OC-14

**Cert.No.:** 24MM272

**Page:** 2 of 3

**Procedure used :-**

Calibration were conducted using in-house calibration procedure CP-OB01 based on UKAS LAB 14 according to direct measurement method against standard weight.

**Condition of this result of calibration**

**1. Reference standard instruments:-**

<u>Instruments</u>	<u>Model</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Test report No.</u>	<u>Due date</u>
1) Standard Weight Set (E2)	15884	-	70RC138	MM-0020-23	30 Jan 2025

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 External Calibration

**Range capacity :** 0 g to 210 g **Resolution** 0.0001 g

**Before Adjustment :**

<u>Applied Weight</u>	<u>Balance Reading</u>	<u>Correction</u>	<u>Measurement Uncertainty</u>	<u>Coverage Factor</u>
( g )	( g )	( g )	( ± mg )	( k )
100	100.0000	0.0000	0.19	2
200	200.0001	-0.0001	0.30	2

**After Adjustment :**

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

<u>Applied Weight</u>	<u>Standard Deviation</u>
( g )	<u>of Reading ( g )</u>
100	0.00007
200	0.00008



**Equipment :** Electronic Balance  
**Condition As-Received :** Used Item  
**Reference :** 2404-0113OC-14

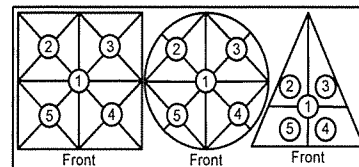
**Cert.No.:** 24MM272

**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



**Maximum difference between  
off-center and central loading**

Position 1 ( g )	Position 2 ( g )	Position 3 ( g )	Position 4 ( g )	Position 5 ( g )	( g )
0.0000	+0.0001	0.0000	+0.0001	+0.0003	0.0003

#### **3. Departure from nominal value**

<u>Applied Weight</u> ( g )	<u>Balance Reading</u> ( g )	<u>Correction</u> ( g )	<u>Measurement Uncertainty</u> ( ± mg )	<u>Coverage Factor</u> ( k )
Unload	0.0000	0.0000	0.14	2.11
0.01	0.0101	-0.0001	0.14	2.11
0.1	0.1001	-0.0001	0.14	2.11
0.5	0.5002	-0.0002	0.14	2.11
1	1.0002	-0.0002	0.14	2.11
5	5.0000	0.0000	0.14	2.11
10	10.0001	-0.0001	0.14	2.11
25	25.0000	0.0000	0.15	2.07
50	49.9999	+0.0001	0.15	2.06
100	100.0002	-0.0002	0.19	2
200	200.0002	-0.0002	0.30	2

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-



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

**Request No.** 21-66/0632

**MTC No.** EEL. BP. 28/0866

## CALIBRATION CERTIFICATE

**Submitted by** : THAI ENVIRONMENTAL TECHNIC LIMITED.

**Address** : 1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphansung, Bangkok, 10240, Thailand.

**Calibrated at** : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.  
: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

**Instrument Calibrated :**

**Ambient Environment**

Description : Sound Calibrator

Temperature :  $(23 \pm 3) ^\circ\text{C}$

Manufacturer : Digicon

Relative Humidity :  $(50 \pm 15) \%$

Model : Tenmars

Ambient Pressure :  $(101.325 \pm 1.500) \text{ kPa}$

Serial No. : 180501628

**Standards used :**

1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.
7. Condenser Microphone B&K 4180 S/N 2633526.

**Calibration Procedure:** CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

**Date of Receipt** : 10 Aug. 2023

**Date of Calibration** : 16 Aug. 2023

1 / 3

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BL.MTC.002 Rev.4

**Head Office**

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,  
Changwat Pathumthani 12120, Thailand  
Tel. (66) 0 2577 9000  
Fax. (66) 0 2577 9009  
E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

**Office/Laboratory**

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,  
Amphoe Muang, Changwat Samutprakan 10280, Thailand  
Tel. (66) 0 2323 1672-80 ext. 115, 116  
Fax. (66) 0 2323 9165  
E-mail : mtc@tistr.or.th

**Office**

196 Phahonyothin Road, Chatuchak, Bangkok 10900,  
Thailand  
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217  
Fax. (66) 0 2579 8592  
E-mail : sumalee@tistr.or.th



## THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0632

MTC No. EEL. BP. 28/0866

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

Nominal Output of Unit Under Test = 94 dB re 20 $\mu$ Pa at 1000 HzAcoustic Output in dB re 20 $\mu$ Pa , Corrected to Reference Conditions : 101.325 kPa , 23.0°C and 50 %RH

## 1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	94.45	0.45	$\pm 0.10$	$\pm 0.75$ dB

## 2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	991.4	-8.6	$\pm 1.5$	$\pm 1.0\%$

## 3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1.40	$\pm 0.50$	$\pm 3.0\%$

**Note :** 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Date of Calibration : 16 Aug. 2023

2 / 3 ✓

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BL.MTC.002 Rev.4

## Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,  
Changwat Pathumthani 12120, Thailand  
Tel. (66) 0 2577 9000  
Fax. (66) 0 2577 9009  
E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

## Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,  
Amphoe Muang, Changwat Samutprakan 10280, Thailand  
Tel. (66) 0 2323 1672-80 ext. 115, 116  
Fax. (66) 0 2323 9165  
E-mail : mtc@tistr.or.th

## Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,  
Thailand  
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217  
Fax. (66) 0 2579 8592  
E-mail : sumalee@tistr.or.th

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0632

MTC No. EEL. BP. 28/0866

Nominal Output of Unit Under Test = 114 dB re 20 $\mu$ Pa at 1000 Hz

Acoustic Output in dB re 20 $\mu$ Pa , Corrected to Reference Conditions : 101.325 kPa , 23.0 °C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	114.28	0.28	$\pm 0.10$	$\pm 0.75$ dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	986.9	-13.1	$\pm 1.5$	$\pm 2.0\%$

3. Total Distortion

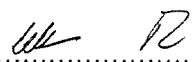
Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	3.14	$\pm 0.70$	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :



(Mr. Weerachai Deechaiyae)

Approved by :



(Mr. Prawate Kluaypa)

Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 16 Aug. 2023

Date of Issue : 21 Aug. 2023

Ref : 2011266081003103001

End of Certificate

3 / 3

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,  
Changwat Pathumthani 12120, Thailand

Tel. (66) 0 2577 9000

Fax. (66) 0 2577 9009

E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,  
Amphoe Muang, Changwat Samutprakan 10280, Thailand

Tel. (66) 0 2323 1672-80 ext. 115, 116

Fax. (66) 0 2323 9165

E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,  
Thailand

Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217

Fax. (66) 0 2579 8592

E-mail : sumalee@tistr.or.th



Thai Environmental Technic Limited  
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

## Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	Calibration Date	: 1-July-2024
Calibrator	: TENMARS Sound Calibrator TM-100	Barometric pressure (mmHg)	: 759.0 mmHg
Standard	: IEC 60942	Temperature (23±3)°C	: 25.00 °C
Accuracy	: 94.0 ±0.3 dB and 114.0±0.5 dB	Relative Humidity(50±15 %)	: 50.0 % RH
Frequency	: at 1,000 Hz ±1%	Dued Date of Calibrate	: 31-July-2024
Calibrator Serial NO.	: 180501628		

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
21	ACO	6226	070049	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
23	RION	NL-21	00487676	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
25	ACO	6226	100098	94.0	93.8	93.8	93.8	93.8	94.0	0.2	PASS
				114.0	113.8	113.8	113.8	113.8			
26	ACO	6226	100099	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
28	ACO	6226	100101	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
29	ACO	6226	100102	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.2	114.2	114.2	114.2			
30	ACO	6226	100106	94.0	93.7	93.7	93.7	93.7	94.0	0.3	PASS
				114.0	113.8	113.8	113.8	113.8			
31	ACO	6226	110098	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
32	ACO	6226	110105	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
34	ACO	6226	110099	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.1	114.1	114.1	114.1			

Calibration By : 

Approve by : 



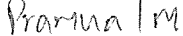
Thai Environmental Technic Limited  
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

## Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	Calibration Date	: 1-July-2024
Calibrator	: TENMARS Sound Calibrator TM-100	Barometric pressure (mmHg)	: 759.0 mmHg
Standard	: IEC 60942	Temperature (23±3)°C	: 25.00 °C
Accuracy	: 94.0 ±0.3 dB and 114.0±0.5 dB	Relative Humidity(50±15 %)	: 50.0 % RH
Frequency	: at 1,000 Hz ±1%	Dued Date of Calibrate	: 31-July-2024
Calibrator Serial NO.	: 180501628		

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
46	ACO	6236	112029	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	113.9	113.9	113.9	113.9			
48	ACO	6236	152074	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
49	ACO	6236	152075	94.0	93.8	93.8	93.8	93.8	94.0	0.2	PASS
				114.0	113.9	113.9	113.9	113.9			
50	ACO	6236	152076	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
51	ACO	6236	152077	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.1	114.1	114.1	114.1			
52	ACO	6226	150142	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
53	ACO	6226	160095	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
54	ACO	6226	160096	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
55	ACO	6226	160097	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.1	114.1	114.1	114.1			
56	ACO	6226	160098	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			

Calibration By : 

Approve by : 





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250  
TEL. 0-2717-3000-24 FAX. 0-2719-9484



## Certificate of Calibration

Certificate No. : 24H560

Page : 1 of 2

Equipment : Thermal Environment Monitor

Manufacturer: JANTYTECH

Model : JT2011-E2A

Serial No.: 3522210143

ID No.: HD 5

Condition As-Received: Used Item

Received Date: 12 March 2024

Calibration Date: 18 March 2024

Reference: 2403-0381DSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: ( 25  $\pm$  3 ) °C

Relative Humidity: ( 50  $\pm$  20 ) %

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.

1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung,  
Bangkok 10240

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with  
standard temperature probe for temperature measurement function into humidity / temperature chamber.

### Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Handheld Thermometer With Sensor	1521	A5A339	23I1238	16 Oct 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:-

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

Calibrated by : Somchai Dumwor  
Issue Date : 25 March 2024

Approved Signatory :

- ☒ Chakrit Waewwanjua  
☐ Pornthippa Tameyakul  
☐ Unnopphol Harachai

B 0336873



Cert. No.: 24H560

Page.: 2 of 2

**Result of Calibration:-** Without Adjustment

**Function:** Temperature Measurement for T<sub>n</sub>

<u>Standard</u> <u>Temperature</u> (°C)	<u>UUC*</u> <u>Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty</u> <u>of Measurement</u> (±°C)
20.019	19.8	-0.219	0.42
30.028	29.9	-0.128	0.42
39.998	40.0	0.002	0.42

**Result of Calibration:-** Without Adjustment

**Function:** Temperature Measurement for T<sub>nw</sub>

<u>Standard</u> <u>Temperature</u> (°C)	<u>UUC*</u> <u>Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty</u> <u>of Measurement</u> (±°C)
20.019	19.9	-0.119	0.42
30.028	29.9	-0.128	0.42
39.998	39.8	-0.198	0.42

**Result of Calibration:-** Without Adjustment

**Function:** Temperature Measurement for T<sub>g</sub>

<u>Standard</u> <u>Temperature</u> (°C)	<u>UUC*</u> <u>Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty</u> <u>of Measurement</u> (±°C)
20.019	19.9	-0.119	0.42
30.028	30.0	-0.028	0.42
39.998	39.9	-0.098	0.42

**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%.

-o0o-

a 1208147



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250  
TEL. 0-2717-3000-24 FAX. 0-2719-9484



## Certificate of Calibration

Certificate No. : 24H564

Page : 1 of 2

Equipment : Thermal Environment Monitor

Manufacturer: JANTYTECH

Model : JT2011-E2A

Serial No.: 3522210147

ID No.: HD 9

Condition As-Received: Used Item

Received Date: 12 March 2024

Calibration Date: 19 March 2024

Reference: 2403-0381DSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: ( 25  $\pm$  3 ) °C

Relative Humidity: ( 50  $\pm$  20 ) %

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.

1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung,  
Bangkok 10240

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with  
standard temperature probe for temperature measurement function into humidity / temperature chamber.

### Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Handheld Thermometer With Sensor	1521	A5A339	23I1238	16 Oct 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:-

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

Calibrated by : Somchai Dumwor  
Issue Date : 25 March 2024

Approved Signatory :

- [ ☒ ] Chakrit Waewwanjua  
[ ☐ ] Pornthippa Tameyakul  
[ ☐ ] Unnopphol Harachai

B 0336877



Cert. No.: 24H564

Page.: 2 of 2

**Result of Calibration:-**

Without Adjustment

Function: Temperature Measurement for T<sub>n</sub>

<u>Standard Temperature</u> (°C)	<u>UUC* Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty of Measurement</u> (±°C)
19.970	19.8	-0.170	0.42
29.975	29.9	-0.075	0.42
40.004	39.9	-0.104	0.42

**Result of Calibration:-**

Without Adjustment

Function: Temperature Measurement for T<sub>nw</sub>

<u>Standard Temperature</u> (°C)	<u>UUC* Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty of Measurement</u> (±°C)
19.970	19.9	-0.070	0.42
29.975	29.7	-0.275	0.42
40.004	39.7	-0.304	0.42

**Result of Calibration:-**

Without Adjustment

Function: Temperature Measurement for T<sub>g</sub>

<u>Standard Temperature</u> (°C)	<u>UUC* Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty of Measurement</u> (±°C)
19.970	19.9	-0.070	0.42
29.975	29.9	-0.075	0.42
40.004	39.8	-0.204	0.42

**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%.

-o0o-

a 1208151