



ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์
(Calibration)

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration Date	Next Calibration
1.	Ambient Air	TSP	ORIFICE TRANSFER STANDARD/Tisch	S/N 0068	27/03/2025	March 2026
			High Volume Air Sampler/TET	S/N TSP-09	03/06/2025	June 2026
			High Volume Air Sampler/TET	S/N TSP-17	03/06/2025	June 2026
			High Volume Air Sampler/TET	S/N TSP-40	02/06/2025	June 2026
			Electronic Balance/XP 205 DR	S/N 1129273885	13/03/2025	March 2026
	PM-10		ORIFICE TRANSFER STANDARD/Tisch	S/N 0068	27/03/2025	March 2026
			High Volume Air Sampler/TET	S/N PM10-02	02/06/2025	June 2026
			High Volume Air Sampler/Blue	S/N PM10-10	02/06/2025	June 2026
			High Volume Air Sampler/Blue	S/N PM10-15	02/06/2025	June 2026
			Electronic Balance/XP 205 DR	S/N 1129273885	13/03/2025	March 2026
	PM-2.5		CERTIFICATE OF CALIBRATION/Mesalab	S/N 172058	05/09/2024	September 2025
			PM2.5/200 Air Sample	S/N 200520803	27/03/2025	March 2026
			PM2.5/PQ200	S/N 724711	28/03/2025	March 2026
			PM2.5/CCZ-30	S/N 2024EN0242009	09/02/2025	February 2026
			Electronic Balance/XP 205 DR	S/N 1129273885	13/03/2025	March 2026
	NO ₂		CERTIFICATE OF ANALYSIS : Linde	S/N A00917SK	05/07/2023	July 2026
			NO _x Analyzer/API 200A	S/N 80	15/09/2025	March 2026
			NO _x Analyzer/API 200A	S/N 1978	15/09/2025	March 2026
			NO _x Analyzer/200A	S/N 542	03/10/2025	April 2026
			CERTIFICATE OF ANALYSIS : Linde	S/N D636157	18/09/2023	September 2027
	SO ₂		SO ₂ Analyzer/API 100A	S/N 856	03/10/2025	April 2026
			SO ₂ Analyzer/Teledyne 100E	S/N 110	02/10/2025	April 2026
			SO ₂ Analyzer/Teledyne 100E	S/N 064	08/09/2025	March 2026
			Wind speed and wind direction/Weather Wizard III	S/N WCS0206A21	08/01/2025	January 2026
			Wind speed and wind direction/Vantage VUE	S/N MT220822047	19/11/2025	November 2026
	WS & WD		Wind speed and wind direction/Weather Wizard III	S/N WC71006A11	08/01/2025	January 2026

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration Date	Next Calibration
2.	Sound Level	Leq 24 hr & เสียงรบกวน	Sound Level Calibrator/ST-120	S/N 5T120C1204E	20/04/2025	October 2026
			Integrated Sound Level/RION NL-21	S/N 00487676	28/11/2025	27 December 2025
			Integrated Sound Level/ACO TYPE 6226	S/N 130128	28/11/2025	27 December 2025
			Integrated Sound Level/ACO TYPE 6226	S/N 160203	28/11/2025	27 December 2025
			Integrated Sound Level/ACO TYPE 6236	S/N 222247	28/11/2025	27 December 2025
			Integrated Sound Level/SCARLET ST-11D	S/N 821295	28/11/2025	27 December 2025
			Integrated Sound Level/SCARLET ST-11D	S/N 821296	28/11/2025	27 December 2025



JIRANATEE ASSOCIATES CO.,LTD.

Jiranatee Associates Co.,Ltd
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Web site: www.jiranatee.com

Accredited calibration laboratory
ISO/IEC 17025:2017
NSC-TISI-TIS 17025
CALIBRATION 0367

Flow measurement laboratory
Calibration services department.



NSC – TISI – TIS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No. : COF-011-68

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 : 13 Mar 2025
MEASUREMENT DATE : 25 Mar 2025
ISSUE DATE : 27 Mar 2025

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 23.5 °C and 52.5 %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 NIMT (National Metrology Institute of Thailand) via Certificate number: MW-0016-25.

Uncertainty of Measurement:

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

Calibrated by:

- ☒ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol



Approved signatory:

Mr. Parinya Booncharoen
Calibration Department Manager



JIRANATEE ASSOCIATES CO.,LTD.

Continuation of Certificate of Calibration Number COF-011-68

Page 2 of 2 Pages

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	Δp_{meter} mmHg	$\Delta p_{Orifice}$ inH ₂ O	γ	Standard Flow [Q_s] m^3/min
1	0.703	759.322	23.42	22.45	51.046	1.702	1.307	0.661
2	1.001	759.331	23.49	22.67	55.418	3.404	1.849	0.935
3	1.114	759.331	23.57	22.78	38.121	4.443	2.112	1.065
4	1.173	759.310	23.63	22.98	28.285	5.063	2.254	1.136
5	1.420	759.288	23.82	23.19	27.879	7.473	2.738	1.375

Slope (m): 2.00326
Intercept (b): -0.02008
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	Δp_{meter} mmHg	$\Delta p_{Orifice}$ inH ₂ O	γ	Standard Flow [Q_s] m^3/min
1	0.703	759.322	23.42	22.45	51.046	1.702	0.815	0.658
2	1.001	759.331	23.49	22.67	55.418	3.404	1.153	0.931
3	1.114	759.331	23.57	22.78	38.121	4.443	1.318	1.061
4	1.173	759.310	23.63	22.98	28.285	5.063	1.407	1.132
5	1.420	759.288	23.82	23.19	27.879	7.473	1.710	1.371

Slope (m): 1.25471
Intercept (b): -0.01252
Correlation coefficient (r): 0.99980
Uncertainty ($k = 2$): 0.015 m^3/min

End of Certificate of Calibration





Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Tech

Site ID: Bangkok

Date: 3-Jun-25

ITEM: TSP

Serial No: (No. 9)

Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00
Temperature (°C) : 25.0
Average Press. (mm Hg) : 754.6
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 : 2.00326
Qstd Intercept : -0.02008
Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 29.6870 Intercept : 5.3486 Corr. Coeff : 0.9914 # of Observations: 5
1	12.60	1.782	60.0	57.00	
2	9.80	1.573	54.0	52.00	
3	7.40	1.368	50.0	48.00	
4	5.20	1.148	40.0	40.00	
5	3.00	0.875	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

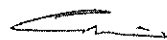
Pstd = 760 mm Hg

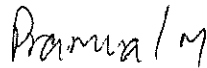
For subsequent calculation of sampler flow:

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

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 : 

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Tech

Site ID: Bangkok

Date: 3-Jun-25

ITEM: TSP

Serial No: (No. 17)

Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 754.6

Average Temp (°C) : 31.8

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 : 2.00326

Qstd Intercept : -0.02008

Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m ³ /min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 30.0289 Intercept : 5.4137 Corr. Coeff : 0.9868 # of Observations: 5
1	12.20	1.754	60.0	57.00	
2	9.80	1.573	54.0	52.00	
3	7.00	1.331	50.0	48.00	
4	5.00	1.126	40.0	40.00	
5	3.00	0.875	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

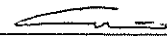
m = sampler slope

b = sampler intercept

l = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Tech

Site ID: Bangkok

Date: 2-Jun-25

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) : 754.6

Average Temp (°C) : 31.8

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 : 2.00326

Qstd Intercept : -0.02008

Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 30.5013 Intercept : 5.0377 Corr. Coeff : 0.9864 # of Observations: 5
1	12.30	1.761	60.0	57.00	
2	9.20	1.524	54.0	52.00	
3	7.00	1.331	50.0	48.00	
4	5.00	1.126	40.0	40.00	
5	3.00	0.875	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

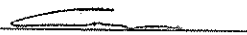
m = sampler slope

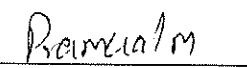
b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Tech
ITEM: PM10

Site ID: Bangkok
Serial No: (No. 2)

Date: 2-Jun-25
Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00
Temperature (°C) : 25.0
Average Press. (mm Hg) : 754.6
Average Temp (°C) : 32.5

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 : 2.00326
Qstd Intercept : -0.02008
Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 35.2425 Intercept : 0.2997 Corr. Coeff : 0.9923 # of Observations: 5
1	12.00	1.739	60.0	60.00	
2	9.00	1.508	54.0	54.00	
3	7.20	1.349	50.0	50.00	
4	5.00	1.126	40.0	40.00	
5	3.00	0.875	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 : 

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Tech

Site ID: Bangkok

Date: 2-Jun-25

ITEM: PM10

Serial No: (No. 10)

Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 754.5

Average Temp (°C) : 33.1

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 : 2.00326

Qstd Intercept : -0.02008

Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 34.7184 Intercept : 0.8915 Corr. Coeff : 0.9907 # of Observations: 5
1	12.20	1.754	60.0	60.00	
2	9.00	1.508	54.0	54.00	
3	7.20	1.349	50.0	50.00	
4	5.00	1.126	40.0	40.00	
5	3.00	0.875	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

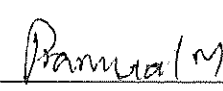
b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Tech

Site ID: Bangkok

Date: 2-Jun-25

ITEM: PM10

Serial No: (No. 15)

Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 754.6

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 : 2.00326

Qstd Intercept : -0.02008

Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 34.9281 Intercept : 0.7298 Corr. Coeff : 0.9897 # of Observations: 5
1	12.00	1.739	60.0	60.00	
2	9.20	1.524	54.0	54.00	
3	7.00	1.331	50.0	50.00	
4	5.00	1.126	40.0	40.00	
5	3.00	0.875	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

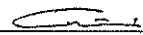
m = sampler slope

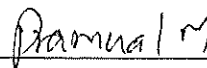
b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



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



สว 2/4/25

Certificate of Calibration

Cert.No.: 25MM27

Page.: 1 of 3

Equipment : Electronic Balance
Manufacturer : Mettler Toledo
Model : XP205DR
Serial No. : 1129273885
ID No. : -
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240
Location : Balance Room
Received order : 12 March 2025
Calibration Date : 13 March 2025
Ambient Temperature : 15 °C to 40 °C
Relative Humidity : 30 % to 90 %

Calibrated by : Tawatchai Pama

Approved by :

Approved Signatory

- () Chakrit Waewwanjua
(✓) Suwit Imjai
() Kunchit Promprat

Issue Date : 24 March 2025

The Uncertainties are for a confidence probability of approximately 95%

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



Equipment : Electronic Balance
 Condition As-Received : Used Item
 Reference : 2503-0227OC-15

Cert.No.: 25MM27
 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>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due date</u>
1) Standard Weight Set (E2)	G0602134	MM-0066-24	NIMT	25 Apr 2026
2) Standard Weight Set (E2)	-	MM-0067-24	NIMT	23 Apr 2026

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

Remark : NIMT : National Institute of Metrology Thailand

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

Range capacity : 0 g to 81 g **Resolution** 0.00001 g
 81 g to 220 g **Resolution** 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	0.30	2

After Adjustment :

1. Determination of the standard deviation of weighing machine

(n = 10)

<u>Applied Weight</u> (g)	<u>Standard Deviation of Reading (g)</u>
80	0.000007
200	0.00005



Equipment : Electronic Balance
 Condition As-Received : Used Item
 Reference : 2503-0227OC-15

Cert.No.: 25MM27

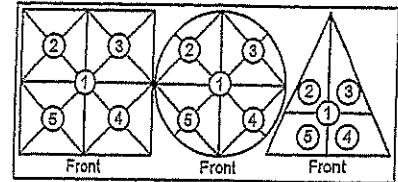
Page: 3 of 3

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)
0.00000	0.00000	-0.00010	-0.00010	+0.00010



Maximum difference between
 off-center and central loading
 (g)
 0.00010

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	0.015	2.13
0.01	0.00999	+0.00001	0.015	2.11
0.05	0.04999	+0.00001	0.015	2.11
1	1.00000	0.00000	0.018	2.04
2	2.00000	0.00000	0.019	2.03
5	4.99999	+0.00001	0.026	2
10	10.00000	0.00000	0.033	2
20	20.00000	0.00000	0.045	2
50	49.99999	+0.00001	0.080	2
80	79.99998	+0.00002	0.15	2
200	199.9999	+0.0001	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 %.



Mesa Labs 12100 W. 6th Ave
Lakewood, CO 80228
NIST Traceable Calibration Facility

CERTIFICATE OF CALIBRATION - NIST TRACEABILITY

Calibration Report #: 172508-05092024
DeltaCal Serial Number: 172508
Calibration Technician: Elsy Lasky
Date: 5-Sep-2024
Recommended Recal Date: 5-Sep-2025

Critical Venturi Flow Meter

Max Uncertainty = 0.346%

TE20004 6 - 30.00 LPM

Calibration Due: 25-Sep-2024

TE20006 1.40 - 6.0 LPM

Calibration Due: 25-Sep-2025

Room Temperature: $\pm 0.03^{\circ}\text{C}$ from -5°C - 70°C Room Temperature: 24.70°C

Brand: Eutechnics

TE Number: TE12306

Serial Number: 308304

Std Cal Date: 30-May-24

Std Cal Due Date: 30-May-25

Ambient Temperature (set): 24.6°C

Aux (filter) Temperature (set): 24.7°C

Barometric and Absolute Pressure

Vaisala Model PTB330 (50-1100) Digital Accuracy: 0.03371%

TE Number: TE20204

Serial Number: U1220935

Std Cal Date: 25-Apr-24

Std Cal Due Date: 25-Apr-25

DeltaCal:

Barometric pressure (set): 628.80 mmHg

Results of Venturi Calibration

Flow Rate (Q) vs. Pressure Drop (ΔP).

Where: Q=Lpm, ΔP = Cm of H₂O

Venturi

TE20004 Q= 3.89792 $\Delta P^{\wedge}$ 0.52069 Overall Uncertainty: 0.35%

TE20006 Q= 3.88061 $\Delta P^{\wedge}$ 0.52218 Overall Uncertainty: 0.35%



Mesa Labs 12100 W. 6th Ave Lakewood,
CO 80228

NIST Traceable Calibration Facility

As Shipped Calibration Data for DeltaCal

Unit Type: DC 1
Flow Range: 1.5-19.5 LPM
Serial No. : 172508
Firmware Version: 4.00P

Date	Technician
05Sep2024	Elsy Lasky

Ambient Pressure:	628.7	mmHg
Ambient Temperature:	24.7	°C

Range 1		Test #	Static Pressure mmHg	Barometric Pressure mmHg	Venturi Qa LPM	DUT Qa LPM	% error %
Venturi Type	TE20004 1A	1	135.18	628.8	6.506	6.536	0.461
Flow range	6 - 30.00 LPM	2	206.97	628.8	10.057	10.017	-0.398
		3	268.79	628.8	13.115	13.019	-0.732
		4	330.62	628.8	16.174	16.071	-0.637
		5	370.00	628.8	18.122	18.011	-0.613
		6	406.46	629.3	19.903	19.852	-0.256
Maximum allowable error at any flow rate is 0.75%.						Average	-0.362
						Result	PASS

Range 2		Test #	Static Pressure mmHg	Barometric Pressure mmHg	Venturi Qa LPM	DUT Qa LPM	% error %
Venturi Type	TE20006 2A	1	147.25	628.2	2.036	2.044	0.393
Flow range	1.40 - 6.0 LPM	2	216.49	628.2	3.021	3.020	-0.033
		3	269.34	628.2	3.772	3.766	-0.159
		4	319.65	628.2	4.487	4.512	0.557
		5	373.61	628.2	5.254	5.261	0.133
		6	424.81	628.2	5.982	5.967	-0.251
Maximum allowable error at any flow rate is 0.75%.						Average	0.107
						Result	PASS

Performed By: Elsy Lasky

Date: 5-Sep-2024

Approved By: Troy Thacker
QC Inspector

Date: 05SEP2024



Mesa Labs 12100 W. 6th Ave Lakewood,
CO 80228

NIST Traceable Calibration Facility

As-Found data for DeltaCal

Unit Type: DC 1
Flow Range: 1.5-19.5 LPM
Serial No. : 172508
Firmware Version: 4.00P

Date	Technician
05Sep2024	Elsy Lasky

Ambient Pressure:	628.7	mmHg
Ambient Temperature:	24.7	°C

As Received Temp. Press. Calibration					As Shipped Temp. Press. Calibration				
	DUT	Standard	Diff	+/- 1 mmHg	DUT	Standard	Diff	+/-1 mmHg	
Pres _{AMB} mmHg	628.8	628.2	0.6	Pass	628.2	628.7	-0.5	Pass	
	DUT	Standard	Diff	+/- 1 °C	DUT	Standard	Diff	+/- 1 °C	
Temp _{AMB} °C	25.1	24.4	0.7	Pass	24.6	24.7	-0.1	Pass	
Temp _{Filter} °C	24.4	24.4	0	Pass	24.7	24.7	0	Pass	
	Offset	New Offset							
Pres _{AMB}	0.84	0.24							
Temp _{AMB}	0.82	0.12							
Temp Filter	0.18	0.18							

Range 1		Test #	Static Pressure mmHg	Barometric Pressure mmHg	Venturi Qa LPM	DUT Qa LPM	% error %
Venturi	TE20004	1	135.18	628.8	6.506	6.536	0.461
Type	1A	2	206.97	628.8	10.057	10.017	-0.398
Flow range	6 - 30.00 LPM	3	268.79	628.8	13.115	13.019	-0.732
		4	330.62	628.8	16.174	16.071	-0.637
		5	370.00	628.8	18.122	18.011	-0.613
		6	406.46	629.3	19.903	19.852	-0.256
Maximum allowable error at any flow rate is 0.75%.						Average Result	-0.362
							PASS

Range 2		Test #	Static Pressure mmHg	Barometric Pressure mmHg	Venturi Qa LPM	DUT Qa LPM	% error %
Venturi	TE20006	1	126.62	628.8	1.743	2.050	17.613
Type	2A	2	208.01	628.8	2.900	3.028	4.414
Flow range	1.40 - 6.0 LPM	3	251.47	628.8	3.518	3.707	5.372
		4	310.97	628.8	4.364	4.523	3.643
		5	369.29	628.8	5.193	5.272	1.521
		6	420.51	628.8	5.921	5.979	0.980
Maximum allowable error at any flow rate is 0.75%.						Average Result	5.591
							FAIL



Thai Environmental Technic Limited
บริษัท เทคนิสิ่งแวดล้อมไทย จำกัด

PM-2.5 Calibration Report

Equipment Name	: PM 2.5	Ambient Temperature	: 31°C
Manufacturer	: Thermo Patisol	Relative Humidity	: 58.1%RH
Model	: 200 Air Sample	Barometric	: 758.75 mm Hg
Serial Number	: 200520803	Calibration Date	: 27-Mar-25
ID. Number	: 03	Dued Date of Calibrate	: 27-Mar-26

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Multi-Tube Automatic Gas Calibrator	Delta Cal DC1	172508	FM-00266 Rev E	25-Sep-25

System Flow Performance Test (Unit : l/min)

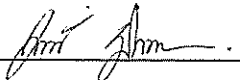
STD Setting	UUC Reading	Error	(±) Uncertainty
15.00	15.06	0.00	0.09
16.70	16.71	0.00	0.01
18.40	18.41	0.00	0.03

System Temperature Performance Test (Unit : °C)

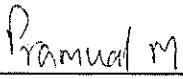
STD Setting	UUC Reading	Error	(±) Uncertainty
25	25.06	0.00	0.05
28	28.06	0.00	0.05
32	32.02	0.00	0.15

Barometric Pressure Test (Unit : mmHg)

STD Setting	UUC Reading	Error	(±) Uncertainty
758.8	758.79	0.00	0.02

Calibration by : 

Calibration Officer

Approved by : 

Authorized Signatory



Thai Environmental Technic Limited
บริษัท เทคนิสิ่งแวดล้อมไทย จำกัด

PM-2.5 Calibration Report

Equipment Name	: PM 2.5	Ambient Temperature	: 32 °C
Manufacturer	: BGI By Mesa Lab	Relative Humidity	: 56.0%RH
Model	: PQ200	Barometric	: 757.6 mm Hg
Serial Number	: 72477	Calibration Date	: 28-Mar-25
ID. Number	: 04	Dued Date of Calibrate	: 28-Mar-26

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Multi-Tube Automatic Gas Calibrator	Delta Cal DC1	172508	FM-00266 Rev E	25-Sep-25

System Flow Performance Test (Unit : l/min)

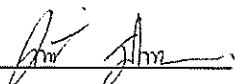
STD Setting	UUC Reading	Error	(±) Uncertainty
15.00	15.03	0.00	0.05
16.70	16.71	0.00	0.01
18.40	18.41	0.00	0.02

System Temperature Performance Test (Unit : °C)

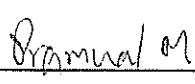
STD Setting	UUC Reading	Error	(±) Uncertainty
25	25.00	0.00	0.01
28	28.01	0.00	0.01
32	32.01	0.00	0.01

Barometric Pressure Test (Unit : mmHg)

STD Setting	UUC Reading	Error	(±) Uncertainty
758.9	758.90	0.00	0.03

Calibration by : 

Calibration Officer

Approved by : 

Authorized Signatory

CALIBRATION TEST REPORT FOR Partisol Air Sampler

Calibrated Date: 09 Feb 2025

Report No: PM-202411010

Calibrated Due on: 08 Feb 2026

Instruments Information

Description : Partisol FRM Air Sampler

for PM-2.5

Model : CCZ-30

Sample flow control and reporting : 3 - 30 L/min

Serial No. : 2024EN0242009

Instrument used for calibration [STD]

Description : Flow Meter

BIOS DryCal DC-Lite

Model : DCL-M REV. 1.08

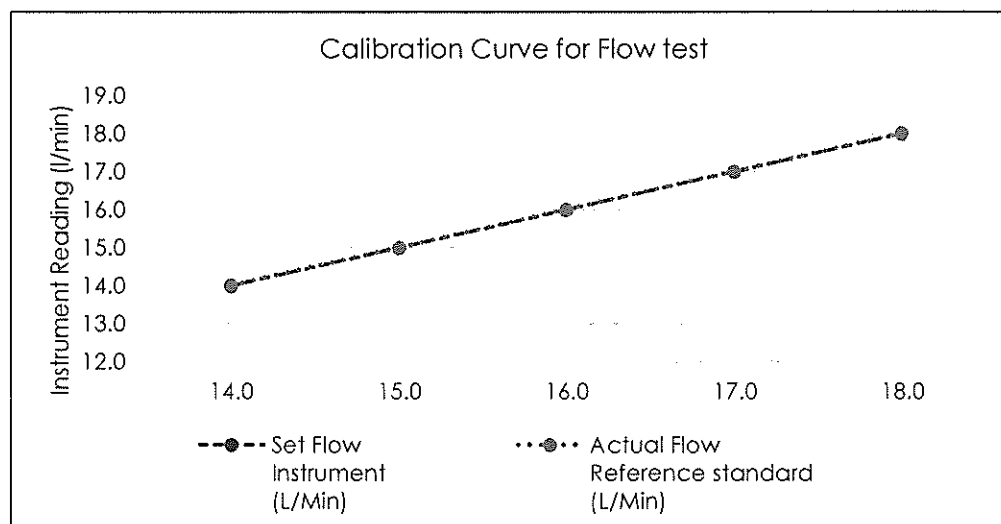
Range : 200 ml/min - 20 L/min

Serial No. : 5016

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

Filter	Set Flow Instrument (L/Min)	Current Flow Instrument reading (L/Min)	Actual Flow Reference standard (L/Min)	Error	Drift%
47 mm.	14.0	14.0	14.02	-0.02	-0.14
	15.0	15.0	15.01	0.01	-0.07
	16.0	16.0	16.01	0.01	-0.06
	17.0	17.0	17.01	0.01	-0.06
	18.0	18.0	18.01	0.01	-0.06



Calibrate By : กิตติศักดิ์ จันทรังษาวรรณ

MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL

MR. PASAGORN SAMOL

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 M³

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	Nominal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	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

Nitric Oxide
in Nitrogen

Cylinder number

2580135G

Concentration

25.32 ± 0.25 ppm

Expiry date:

13-Dec-2024

Analytical Instruments used in Assay

Instrument/Make/Model
FTIR Spectrometers Nicolet i550Analytical Principle
FTIR-NOLast Multipoint Calibration
28-Jun-2023

Recommend usage condition

Minimum utilization: 5% of actual content or before expiry 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 in accordance with the EPA Traceability Protocol EPA-600/R-12/531 for the Assay and Calibration 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%. Which is traceable to Swiss National Standard of Mass or
- (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Page 1 of 1

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

โทรสาร (66) 2338-6100

โทร 15 ชั้นตึกทาวเวอร์ A, 2/3 หมู่ 14, ถนนรามคำแหง กม. 6.5 แขวงคลองเตย

เขตคลองเตย กรุงเทพมหานคร 10540 โทร (66) 2338-6100 โทร (66) 2338-6333

โทรสาร (66) 2338-6100 โทร 105 หมู่ 5, ตำบลบางพลีใหญ่ อำเภอบางพลี จังหวัดสมุทรปราการ 10510

โทร (66) 38-570-479-93

โทร (66) 38-570-323

Sukanya Parinyasoonorn

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

Linde (Thailand) Public Company Limited

P.L.E. Registration No. 016731000785

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trd KM. 6.5 Road, Bangnaew

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

NOx Analyzer Calibration Report

Calibrate Date : 15-Sep-25
Analyzer Type : NOx
Brand : API
Model : 200 A
Serial Number : 80 (No.7)
Range : 500 ppb

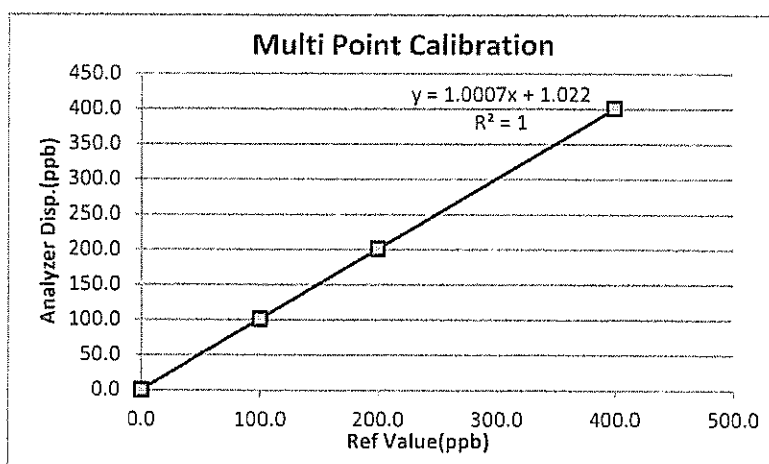
Temperature (°C) : 25°C
Barometer (mmHg) : 759.7
Humidity (50±15 %) : 56.1%RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : A00917 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	2.7	2.4	0.3	0.0	0.0	0.0	0.0
Span	400.0	384.4	383.7	-1.0	400.0	400.0	0.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO ₂	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.6	0.4	0.2	0.37	0.001	0.093
100.0	102.7	101.8	0.9	1.80	0.018	1.80
200.0	201.7	201.4	0.3	1.40	0.007	0.70
400.0	401.8	401.0	0.8	1.00	0.003	0.25
Average Diff (%)						0.71



Calibrate by: [Signature]

Approved by: [Signature]

NOx Analyzer Calibration Report

Calibrate Date : 15-Sep-25
Analyzer Type : NOx
Brand : API
Model : 200A
Serial Number : 1978 (No.15)
Range : 500 ppb

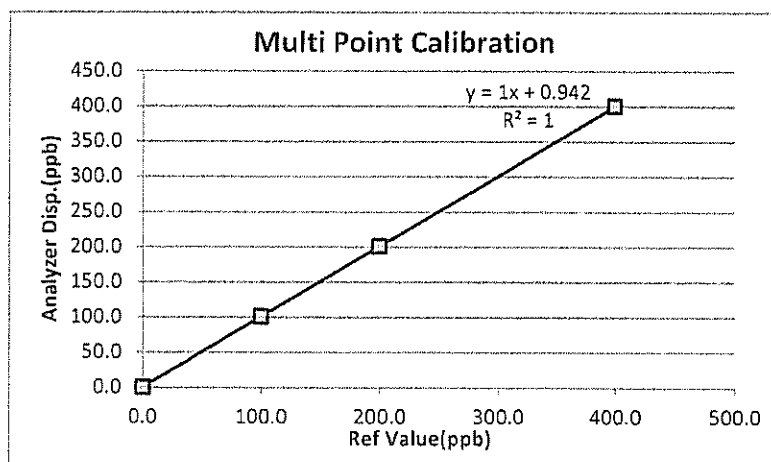
Temperature (°C) : 25°C
Barometer (mmHg) : 760.6
Humidity (50±15 %) : 56.4%RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : A00917 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	1.3	0.7	0.6	0.0	0.0	0.0	0.0
Span	400.0	384.0	383.4	0.6	400.0	400.0	0.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO ₂	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.7	0.5	0.2	0.47	0.001	0.12
100.0	102.1	101.4	0.7	1.40	0.014	1.40
200.0	201.7	201.2	0.5	1.20	0.006	0.60
400.0	401.0	400.7	0.3	0.70	0.002	0.17
Average Diff (%)						0.57



Calibrate by: *[Signature]*

Approved by: *[Signature]*

NOx Analyzer Calibration Report

Calibrate Date : 3-Oct-25
Analyzer Type : NOx
Brand : API
Model : 200 A
Serial Number : 542 (No. 29)
Range : 500 ppb

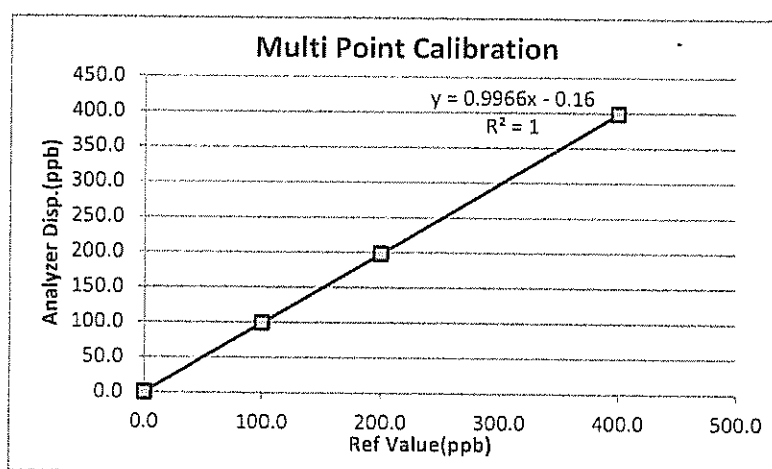
Temperature (°C) : 25°C
Barometer (mmHg) : 766.2
Humidity (50±15 %) : 51.7%RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : A00917 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	1.2	1.1	0.1	0.0	0.0	0.0	0.0
Span	400.0	405.0	402.0	3.0	400.0	400.0	0.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO ₂	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.6	0.4	0.2	0.40	0.001	0.10
100.0	99.8	99.4	0.4	-0.60	-0.006	0.60
200.0	198.7	198.2	0.5	-1.80	-0.009	0.90
400.0	399.4	399.0	0.4	-1.00	-0.003	0.25
Average Diff (%)						0.58



Calibrate by: Jim Jim

Approved by: Barua/M

Certificate Of Analysis

Special Gases Mixture

Customer Details

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

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 ³	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 ¹	Uncertainty ²	Method of Analysis ³	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	BOC150629SG	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 expiry date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

1. 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
2. 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.
3. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasoonporn

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

บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เบอร์โทรศัพท์ภายใน: 0107537/202785

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

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

PLC Registration no. 0107537000785

15th 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

Analyzer Calibration Report

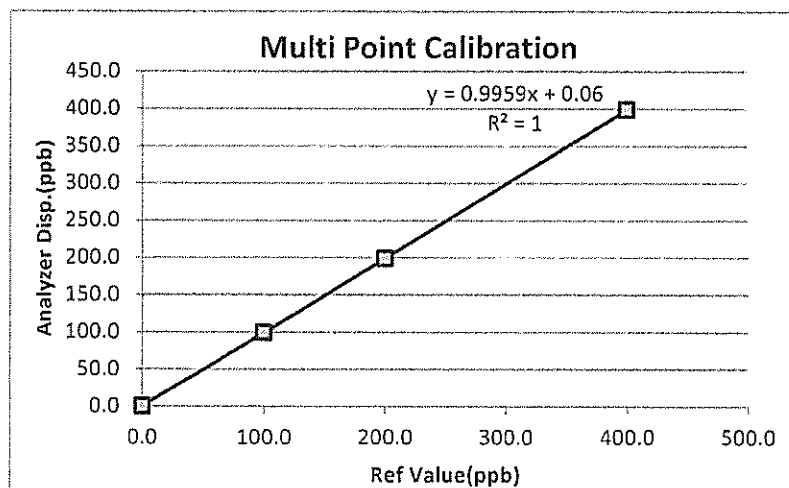
Calibrate Date	3-Oct-25	Temperature (°C)	: 25°C
Analyzer Type	SO ₂	Barometer (mmHg)	: 762.3
Brand	API	Humidity (50±15 %)	: 53.1 %RH
Model	100 A	Dilutor	: API M700 S/N 625
Serial Number	856 (No. 5)	Zero Air	: API M701 S/N 1926
Range	500 ppb	Standard gas	: D636157

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)	After of Span.(ppb)	Abs% diff of Span
Zero	0.0	0.9	0.0	0.0
Span	400.0	382.0	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	99.3	-0.7	-0.01	0.70
200.0	199.1	-0.9	0.00	0.45
400.0	398.6	-1.4	0.00	0.35
Average Diff (%)				0.40



Calibrate by: *[Signature]*

Approved by: *[Signature]*

Analyzer Calibration Report

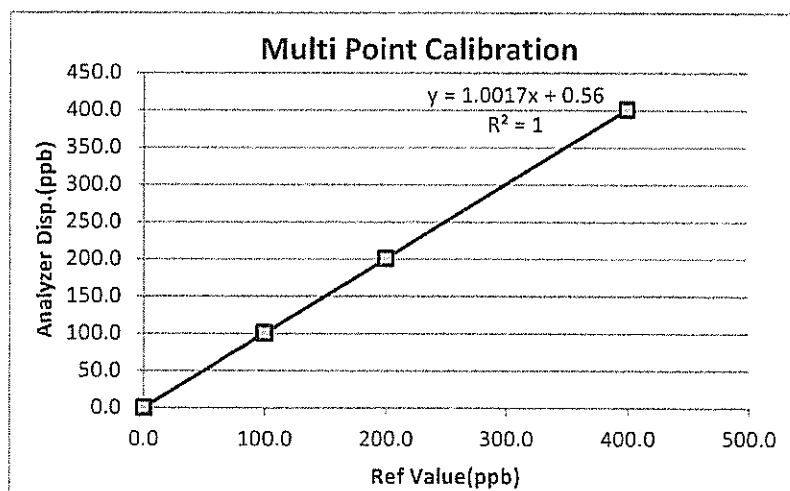
Calibrate Date	2-Oct-25	Temperature (°C)	: 25°C
Analyzer Type	SO ₂	Barometer (mmHg)	: 762.3
Brand	Teledyne	Humidity (50±15 %)	: 53.1 %RH
Model	100 E	Dilutor	: API M700 S/N 625
Serial Number	110 (No. 21)	Zero Air	: API M701 S/N 1926
Range	500 ppb	Standard gas	: D636157

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)	After of Span.(ppb)	Abs% diff of Span
Zero	0.0	2.0	0.0	0.0
Span	400.0	390.0	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	100.8	0.8	0.01	0.80
200.0	201.1	1.1	0.01	0.55
400.0	401.1	1.1	0.00	0.28
Average Diff (%)				0.43



Calibrate by:

Approved by:

Analyzer Calibration Report

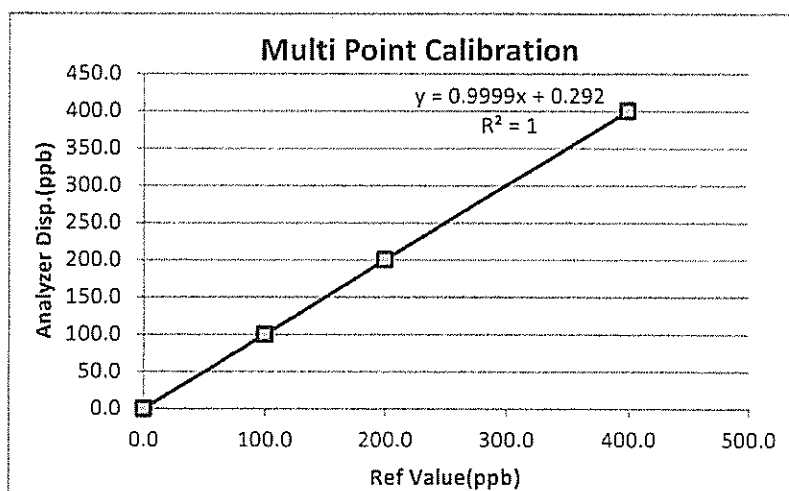
Calibrate Date	8-Sep-25	Temperature (°C)	: 25°C
Analyzer Type	SO ₂	Barometer (mmHg)	: 763.4
Brand	Teledyne	Humidity (50±15 %)	: 55.1 %RH
Model	100 E	Dilutor	: API M700 S/N 625
Serial Number	064 (No. 24)	Zero Air	: API M701 S/N 1926
Range	500 ppb	Standard gas	: D636157

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)	After of Span.(ppb)	Abs% diff of Span
Zero	0.0	1.1	0.0	0.0
Span	400.0	398.3	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference		
		Diff (ppb)	Percent Diff	Abs Percent Diff
0.0	0.1	0.1	0.00	0.03
100.0	100.3	0.3	0.00	0.30
200.0	200.6	0.6	0.00	0.30
400.0	400.1	0.1	0.00	0.03
Average Diff (%)				0.16



Calibrate by: *[Signature]*

Approved by: *[Signature]*



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 8 January, 2025

Certification No. 004/25

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III

Serial No. : WC50206A21 ID No. : No.22

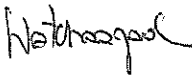
Customer : Thai Environmental Technic Limited.
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung, Bangkok 10240.

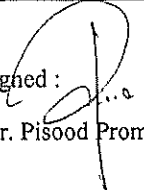
Calibration Condition : Temperature 25.1 °C Barometric Pressure 1012.9 hPa

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 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. Pisood Promsut

(Authorised Signatory)

for the Chief

Sub-Standard Instrument



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 004/25

8 January, 2025

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
	inches H ₂ O	inches H ₂ O	m/sec	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.00	-	-	-	6.7	0.30
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.9	0.11
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.9	0.12

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

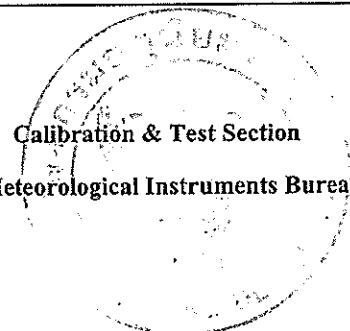
Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau





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 8 January, 2025

Certification No. 005/25

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 1013.0 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 :

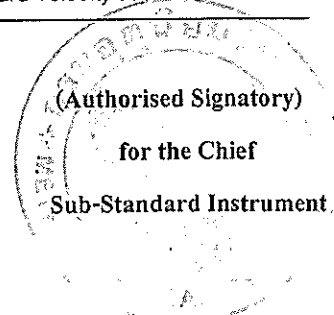
Watcharapol

Signed :

Pisood Promsut

Mr. Watcharapol Subwat
Mechanical Engineer

Mr. Pisood Promsut





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 005/25

8 January, 2025

Page : 2 of 2

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacuum	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	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

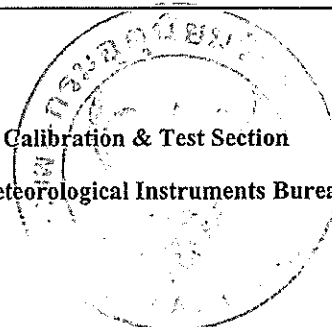
Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau





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 19 November, 2025

Certification No. 505/25

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Vantage VUE Model No. : #6251EU

ID No. : No.35

Serial No. : Display MT220822047 Transmitter MT231004046

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

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1013.7 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

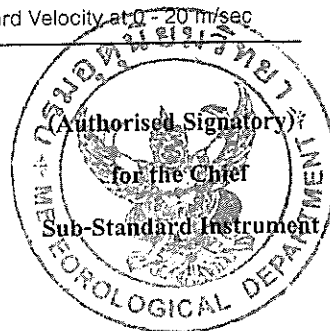
Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Signed :

Mr. Pisood Promsut





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 505/25

19 November, 2025

Page : 2 of 2

Standard Ultrasonic Anemometer	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacumm	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.00	-	-	-	6.8	0.20
9.02	-	-	-	9.0	0.02
11.01	-	-	-	10.8	0.21
13.01	-	-	-	13.0	0.01
15.01	-	-	-	15.1	-0.09
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.1	-0.08

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

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer





SCARLET | TECH

Certificate of Calibration

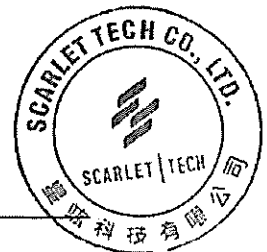
for ST-120 Sound Calibrator

No. **20250420J102**

Name of Product	Sound Calibrator
Model	ST-120
Serial Number	ST120C1204E
Specifications	Class 1
Date	2025/04/20

Tested by:

Chale



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Obtaining permission in writing from Scarlet Tech Ltd.
4F-3, No. 347, 2nd Sec., Heping E. Rd., Daan Dist. Taipei City 106, Taiwan

Certificate of ST-120 Sound Calibrator

No. 20250420J102

1. Preliminary Inspection

	Result
Visual Inspection	Pass

2. Sound Pressure Level

Measured Level (dB)	Actual Level (dB)	Tolerance (dB)	Measurement Uncertainty (dB)	Result
94.01	93.99	93.60-94.40	0.11	Pass
114.01	114.07	113.60-114.40	0.11	Pass

3. Frequency

Measured Frequency (Hz)	Actual Frequency (Hz)	Tolerance (Hz)	Measurement Uncertainty (Hz)	Result
999.0	1000	990.00-1010.00	0.10	Pass

4. Distortion

Measured Distortion (%)	Calibration Level (dB)	Tolerance (%)	Measurement Uncertainty (dB)	Result
0.9	94	<3.00	0.13	Pass
0.5	114	<3.00	0.13	Pass

Environment conditions

Air temperature : 24 °C

Relative humidity : 80 %

Static pressure : 1 kPa

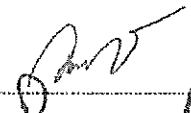
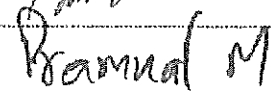
The standard generators used for calibration procedure are proofed once a year and can be traceable to the standard authorized by public organization

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : SCARLET ST-120
Standard : IEC 60942:2017 CLASS1
Accuracy : 94.0 ±0.3 dB and 114.0 ±0.5 dB
Frequency : at 1,000 Hz ±1%
Calibrator Serial NO. : ST120C1204E

Calibration Date : 28-Nov-2025
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 27-Dec-2025

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			
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			
28	ACO	6226	100101	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			
29	ACO	6226	100102	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			
30	ACO	6226	100106	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			
31	ACO	6226	110098	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			
32	ACO	6226	110105	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			
34	ACO	6226	110099	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			

Calibration By : 
Approve by : 

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : SCARLET ST-120
Standard : IEC 60942:2017 CLASS1
Accuracy : 94.0 ±0.3 dB and 114.0±0.5 dB
Frequency : at 1,000 Hz ±1%
Calibrator Serial NO. : ST120C1204E

Calibration Date : 28-Nov-2025
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 27-Dec-2025

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			
35	ACO	6226	110097	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			
36	ACO	6226	110102	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.0	114.0	114.0	114.0			
37	ACO	6226	110101	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			
38	ACO	6226	110106	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			
39	ACO	6226	110104	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.2	114.2	114.2	114.2			
40	ACO	6226	110100	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			
41	ACO	6226	130127	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			
42	ACO	6226	130128	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			
44	ACO	6226	130130	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			
45	ACO	6226	130131	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			

Calibration By :

Approve by :

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : SCARLET ST-120
Standard : IEC 60942:2017 CLASS1
Accuracy : 94.0 ±0.3 dB and 114.0±0.5 dB
Frequency : at 1,000 Hz ±1%
Calibrator Serial NO. : ST120C1204E

Calibration Date : 28-Nov-2025
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 27-Dec-2025

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			
57	ACO	6226	160099	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			
58	ACO	6226	160143	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			
59	ACO	6226	160203	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.0	114.0	114.0	114.0			
60	ACO	6226	160204	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			
61	ACO	6226	160205	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			
62	ACO	6226	160211	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			
63	ACO	6226	160212	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			
64	ACO	6226	160213	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			
66	ACO	6226	160215	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			
67	ACO	6226	160216	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			

Calibration By :

Approve by :

Bramual M.

Sound Level Meter Calibration Report

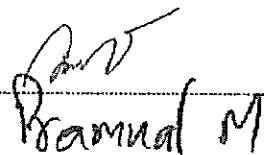
Equipment Type : Sound Level Meter
Calibrator : SCARLET ST-120
Standard : IEC 60942:2017 CLASS1
Accuracy : 94.0 ±0.3 dB and 114.0 ±0.5 dB
Frequency : at 1,000 Hz ±1%
Calibrator Serial NO. : ST120C1204E

Calibration Date : 28-Nov-2025
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 27-Dec-2025

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			
68	ACO	6236	222036	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			
69	ACO	6236	222037	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			
72	ACO	6236	222040	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			
75	ACO	6236	222246	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			
76	ACO	6236	222247	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			
78	SCARLET	ST-11D	820390	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			
79	SCARLET	ST-11D	820391	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			
80	SCARLET	ST-11D	820392	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			

Calibration By :

Approve by :


Pramual M.

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	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
81	SCARLET	ST-11D	820393	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			
82	SCARLET	ST-11D	820394	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			
83	SCARLET	ST-11D	820877	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			
84	SCARLET	ST-11D	820878	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			
85	SCARLET	ST-11D	820879	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			
86	SCARLET	ST-11D	821293	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			
87	SCARLET	ST-11D	821294	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			
88	SCARLET	ST-11D	821295	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			
89	SCARLET	ST-11D	821296	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			
90	SCARLET	ST-11D	821298	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			
91	SCARLET	ST-11D	821299	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			

Calibration By :

Approve by :