ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	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-37	03/06/2025	June 2026
			High Volume Air Sampler/TET	S/N TSP-32	03/06/2025	June 2026
			High Volume Air Sampler/TET	S/N TSP-20	03/06/2025	June 2026
			High Volume Air Sampler/TET	S/N TSP-40	02/06/2025	June 2026
			High Volume Air Sampler/TET	S/N TSP-30	03/06/2025	June 2026
			High Volume Air Sampler/TET	S/N TSP-23	02/06/2025	June 2026
			High Volume Air Sampler/TET	S/N TSP-39	03/06/2025	June 2026
			Electronic Balance/METTLER TOLEDO	S/N C531025159	03/09/2025	September 2026
		PM-10	ORIFICE TRANSFER STANDARD/Tisch	S/N 0068	27/03/2025	March 2026
			High Volume Air Sampler/TET	S/N PM10-9	02/06/2025	June 2026
			High Volume Air Sampler/TET	S/N PM10-10	02/06/2025	June 2026
			High Volume Air Sampler/TET	S/N PM10-32	04/06/2025	June 2026
			High Volume Air Sampler/TET	S/N PM10-4	01/06/2025	June 2026
			High Volume Air Sampler/TET	S/N PM10-17	02/06/2025	June 2026
			High Volume Air Sampler/TET	S/N PM10-30	03/06/2025	June 2026
			High Volume Air Sampler/TET	S/N PM10-2	02/06/2025	June 2026
			Electronic Balance/METTLER TOLEDO	S/N C531025159	03/09/2025	September 2026
2.	Water	pH	pH Meter/Horiba F-71G	S/N V3B1F8H3	28/10/2025	October 2026
		TDS	Electronic Balance/METTLER TOLEDO	S/N C531025159	03/09/2025	September 2026
		SS	Electronic Balance/METTLER TOLEDO	S/N C531025159	03/09/2025	September 2026
		Sulfate	Spectrophotometer/Perkin Elmer	S/N 365K9042909	07/11/2025	November 2026
		Fe	ICP394/PerkinElmer/OPTIMA8000	S/N 078S1310024C	17/03/2026	September 2026
		Turbidiry	Turbidity Meter/EUTECH TN-100	S/N 2655003	18/09/2025	September 2026

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์ (ต่อ)

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
3.	Sound Level	Leq 24 hr	Sound Level Calibrator/ST-120	S/N ST120C1204E	20/04/2025	April 2026
			Sound Level Meter/SCARLET ST-11D	S/N 820392	23/02/2026	22/03/2026
			Sound Level Meter/SCARLET ST-11D	S/N 820393	23/02/2026	22/03/2026
			Sound Level Meter/SCARLET ST-11D	S/N 821294	23/02/2026	22/03/2026
			Sound Level Meter/SCARLET ST-11D	S/N 821296	23/02/2026	22/03/2026
4.	Vibration	Vibration	Vibration Meter/Micromate	S/N BE17502	23/03/2026	March 2027
			Vibration Meter/Micromate Pluse	S/N UM10831	08/10/2025	October 2026

JIRANATEE ASSOCIATES CO.,LTD.

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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

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

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'

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.

Calibrated by:
☑ Mr. Sorawit Thachalad
☐ Miss Jittraporn Lertsomphol

JIRANATEE ASSOCIATES CO.,LTD.

Approved signatory: .....
Mr. Parinya Booncharoen
Calibration Department Manager

Jiranatee Associates Co.,Ltd.

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

JIRANATEE ASSOCIATES CO.,LTD.

Continuation of Certificate of Calibration Number COF-011-68

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	Δp_Orifice inH_2O	Y	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	Δp_Orifice inH_2O	Y	Standard Flow [Q_a] 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

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Jiranatee Associates Co.,Ltd.

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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal Tech Site ID : Bangkok Date : 3-Jun-25

ITEM : TSP Serial No : (No.39) Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) :	760.00	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.6	Corrected Average (mm Hg) :	-
Average Temp (°C) :	30.8	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)
1	12.40	1.768	60.0	57.00
2	9.80	1.573	54.0	52.00
3	7.20	1.349	50.0	48.00
4	5.00	1.126	40.0	40.00
5	3.00	0.875	30.0	30.00

Linear Regression
Slope : 29.7165
Intercept : 5.6338
Corr. Coeff : 0.9888
# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : Bamrung

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

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal Tech Site ID : Bangkok Date : 3-Jun-25

ITEM : TSP Serial No : (No.37) Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) :	760.00	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.6	Corrected Average (mm Hg) :	-
Average Temp (°C) :	30.8	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)
1	12.30	1.761	60.0	57.00
2	9.40	1.540	54.0	52.00
3	7.20	1.349	50.0	48.00
4	5.00	1.126	40.0	40.00
5	3.00	0.875	30.0	30.00

Linear Regression
Slope : 30.3684
Intercept : 5.0004
Corr. Coeff : 0.9896
# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : Bamrung

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

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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal Tech Site ID : Bangkok Date : 3-Jun-25

ITEM : TSP Serial No : (No.32) Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) :	760.00	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.6	Corrected Average (mm Hg) :	-
Average Temp (°C) :	31.6	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)
1	12.30	1.761	60.0	57.00
2	9.40	1.540	54.0	52.00
3	7.20	1.349	50.0	48.00
4	5.00	1.126	40.0	40.00
5	3.00	0.875	30.0	30.00

Linear Regression
Slope : 30.3684
Intercept : 5.0004
Corr. Coeff : 0.9896
# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

For subsequent calculation of sampler flow:
1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

Calibrate By : _____

Approve By : Ramnalm

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

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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal Tech Site ID : Bangkok Date : 3-Jun-25

ITEM : TSP Serial No : (No.30) Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) :	760.00	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.6	Corrected Average (mm Hg) :	-
Average Temp (°C) :	31.8	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)
1	12.30	1.761	60.0	57.00
2	9.40	1.540	54.0	52.00
3	7.40	1.368	50.0	48.00
4	5.00	1.126	40.0	40.00
5	3.00	0.875	30.0	30.00

Linear Regression
Slope : 30.4064
Intercept : 4.8375
Corr. Coeff : 0.9918
# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : Ramrat M

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

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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal Tech Site ID : Bangkok Date : 3-Jun-25

ITEM : TSP Serial No : (No.20) Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) :	760.00	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.6	Corrected Average (mm Hg) :	-
Average Temp (°C) :	30.2	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)
1	12.30	1.761	60.0	57.00
2	9.60	1.557	54.0	52.00
3	7.20	1.349	50.0	48.00
4	5.00	1.126	40.0	40.00
5	3.00	0.875	30.0	30.00

Linear Regression
Slope : 30.1498
Intercept : 5.1934
Corr. Coeff : 0.9896
# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : Ramma/M

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

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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal Tech Site ID : Bangkok Date : 2-Jun-25

ITEM : TSP Serial No : (No.23) Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) :	760.00	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.6	Corrected Average (mm Hg) :	-
Average Temp (°C) :	29.8	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)
1	12.30	1.761	60.0	57.00
2	9.60	1.557	54.0	52.00
3	7.20	1.349	50.0	48.00
4	5.00	1.126	40.0	40.00
5	3.00	0.875	30.0	30.00

Linear Regression
Slope : 30.1498
Intercept : 5.1934
Corr. Coeff : 0.9896
# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : Pramual/M

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

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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal 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	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.6	Corrected Average (mm Hg) :	-
Average Temp (°C) :	31.8	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression
1	12.30	1.761	60.0	57.00	Slope : 30.5013
2	9.20	1.524	54.0	52.00	Intercept : 5.0377
3	7.00	1.331	50.0	48.00	Corr. Coeff : 0.9864
4	5.00	1.126	40.0	40.00	
5	3.00	0.875	30.0	30.00	# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : Ramua/m

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

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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal Tech Site ID : Bangkok Date : 2-Jun-25

ITEM : PM10 Serial No : (No. 17) Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) :	760.00	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.5	Corrected Average (mm Hg) :	-
Average Temp (°C) :	31.2	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)
1	12.00	1.739	60.0	60.00
2	9.20	1.524	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

Linear Regression
Slope : 35.0046
Intercept : 0.4977
Corr. Coeff : 0.9926
# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : Pramual M

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

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal Tech Site ID : Bangkok Date : 2-Jun-25

ITEM : PM10 Serial No : (No. 9) Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) :	760.00	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.6	Corrected Average (mm Hg) :	-
Average Temp (°C) :	32.8	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)
1	12.30	1.761	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

Linear Regression
Slope : 34.1652
Intercept : 1.5893
Corr. Coeff : 0.9875
# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : Pramual M

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

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal 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	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.5	Corrected Average (mm Hg) :	-
Average Temp (°C) :	33.1	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression
1	12.20	1.754	60.0	60.00	Slope : 34.7184
2	9.00	1.508	54.0	54.00	Intercept : 0.8915
3	7.20	1.349	50.0	50.00	Corr. Coeff : 0.9907
4	5.00	1.126	40.0	40.00	
5	3.00	0.875	30.0	30.00	# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : _____

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

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal Tech Site ID : Bangkok Date : 2-Jun-25

ITEM : PM10 Serial No : (No. 2) Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) :	760.00	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.6	Corrected Average (mm Hg) :	-
Average Temp (°C) :	32.5	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)
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

Linear Regression
Slope : 35.2425
Intercept : 0.2997
Corr. Coeff : 0.9923
# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : Pramin M

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

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal Tech Site ID : Bangkok Date : 4-Jun-25

ITEM : PM10 Serial No : (No. 32) Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) :	760.00	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.4	Corrected Average (mm Hg) :	-
Average Temp (°C) :	32.6	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)
1	12.20	1.754	60.0	60.00
2	9.40	1.540	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

Linear Regression
Slope : 34.1693
Intercept : 1.5207
Corr. Coeff : 0.9883
# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : _____

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

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal Tech Site ID : Bangkok Date : 1-Jun-25

ITEM : PM10 Serial No : (No. 4) Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) :	760.00	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.6	Corrected Average (mm Hg) :	-
Average Temp (°C) :	31.8	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)
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

Linear Regression
Slope : 34.7184
Intercept : 0.8915
Corr. Coeff : 0.9907
# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : _____

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

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location : Thai Environmemtal Tech Site ID : Bangkok Date : 3-Jun-25

ITEM : PM10 Serial No : (No. 30) Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) :	760.00	Corrected Pressure (mm Hg) :	760.0
Temperature (°C) :	25.0	Temperature (deg K) :	298.0
Average Press. (mm Hg) :	754.5	Corrected Average (mm Hg) :	-
Average Temp (°C) :	31.8	Average Temp: (Deg K) :	-

Calibration Orifice

Make : Tisch	Qstd Slope : 2.00326
Model : TE-5025A	Qstd Intercept : -0.02008
Serial# : 0068	Calibration Due Date : 26-Mar-26

Calibration Information

Plate or Test #	ORIFICE (in H_2O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)
1	12.30	1.761	62.0	62.00
2	10.00	1.589	56.0	56.00
3	7.40	1.368	52.0	52.00
4	5.20	1.148	42.0	42.00
5	3.20	0.903	32.0	32.00

Linear Regression
Slope : 34.4753
Intercept : 2.1299
Corr. Coeff : 0.9907
# of Observations: 5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC =I[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)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By : _____

Approve By : Ramma/M.

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

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

NSC-TISI-TIS17025
CALIBRATION 0008

Certificate of Calibration

Cert.No.: 25CHO572

Equipment :	pH Meter
Manufacturer :	Horiba
Model :	F-71G
Serial No. :	V3B1F8H3
ID No. :	Ins-LAB-025
Condition As-Received:	Used Item
Received Date :	28 October 2025
Calibration Date :	28 October 2025
Reference :	2510-0662OC-1
Submitted by :	Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung, Bangkok 10240
Calibration Place :	Laboratory (Thai Environmental Technic Limited)
Ambient Temperature :	(27.1 to 26.2) °C (On-Site)
Relative Humidity :	(56 to 59) % (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 :	Uthen Kankawi
Approved by :	Saithip Approved Signatory

( ) Chakrit Waewwanjua
( ) Ponpan Paipim
(✓) Saithip Meangmai

Issue Date : 30 October 2025

The Uncertainties are for a confidence probability of approximately 95%

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Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	58440003	130RC120	24E3731	14 Nov 2025
2) Digital Thermometer	-	130RC017	25T625	23 Apr 2026

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

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

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.007	CPA chem	1114384	12 Jun 2027
pH 6.876	CPA chem	1005301	15 Jun 2026
pH 9.180	CPA chem	1135356	16 Aug 2026

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

Calibration Results

Function : mV Measurement

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

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor *k*
	pH	mV	mV	pH		
pH Meter	4.000	177.48	177.5	4.000	0.058	2.00
S/N.: V3B1F8H3	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

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,9)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor *k*
pH Electrode	4.007	4.007	168.7	0.0048	2.00
S/N.: 9X2E0223	6.876	6.875	1.2	0.0086	2.00
	9.180	9.176	-134.4	0.014	2.00

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

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL.0-2717-3000-29 FAX.0-2719-9484

NSC-TISI-TIS17025
CALIBRATION 0008

Certificate of Calibration

Cert.No.: 25MM381

Equipment :	Electronic Balance
Manufacturer :	Mettler Toledo
Model :	MR204
Serial No. :	C531025159
ID No. :	-
Submitted by :	Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung, Bangkok 10240
Location :	Balance Room
Received order :	03 September 2025
Calibration Date :	03 September 2025
Ambient Temperature :	15 °C to 40 °C
Relative Humidity :	30 % to 90 %
Calibrated by :	Tawatchai Pama
Approved by :	Kunchit Approved Signatory

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

Issue Date : 04 September 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 : New Item
Reference : 2509-0005OC-2

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:-

Instruments	Serial No.	Cert. No.	Traceable	Due date
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

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

Remark : NIMT : National Institute of Metrology Thailand

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

Range capacity : 0 g to 220 g **Resolution** 0.0001 g

Before Adjustment :

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (*k*)
100	99.9999	+0.0001	0.18	2
200	199.9996	+0.0004	0.31	2

After Adjustment :

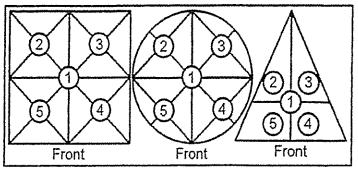
1. **Determination of the standard deviation of weighing machine** (n = 10)

Applied Weight (g)	Standard Deviation of Reading (g)
100	0.00005
200	0.00008

Equipment : Electronic Balance
Condition As-Received : New Item
Reference : 2509-0005OC-2

Cert.No.: 25MM381

Result of calibration



2. Effect of off center loading

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

Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)	Maximum difference between off-center and central loading (g)
-0.0003	-0.0003	-0.0004	-0.0004	-0.0002	0.0001

3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (*k*)
Unload	0.0000	0.0000	0.12	2.06
0.01	0.0100	0.0000	0.12	2.06
0.1	0.1000	0.0000	0.12	2.06
0.5	0.5000	0.0000	0.12	2.06
1	1.0000	0.0000	0.12	2.06
5	5.0000	0.0000	0.12	2.06
10	10.0000	0.0000	0.12	2.06
25	24.9999	+0.0001	0.13	2.04
50	49.9999	+0.0001	0.14	2.03
100	99.9998	+0.0002	0.18	2
200	199.9997	+0.0003	0.31	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 %.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL.0-2717-3000-29 FAX.0-2719-9484

NSC-TISI-TIS17025
CALIBRATION 0008

Certificate of Calibration

Cert.No.: 25CHO582

Equipment :	Spectrophotometer
Manufacturer :	Perkin Elmer
Model :	Lambda 365
Serial No. :	365K9042909
ID No. :	-
Condition As-Received:	Used Item
Received Date :	07 November 2025
Calibration Date :	07 November 2025
Reference :	2511-0009OC-1
Submitted by :	Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung, Bangkok 10240
Calibration Place :	Laboratory (Thai Environmental Technic Limited)
Ambient Temperature :	(26.4 to 26.5) °C (On-Site)
Relative Humidity :	(64.1 to 62.9) % (On-Site)
Calibration Procedure :	In - house method : CP-OCH4 based on ASTM E 275-08
Calibrated by :	Uthen Kankawi
Approved by :	Saithip Approved Signatory

( ) Chakrit Waewwanjua
( ) Ponpan Paipim
(✓) Saithip Meangmai

Issue Date : 07 November 2025

The Uncertainties are for a confidence probability of approximately 95%

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Condition of calibration result

1. Reference Standard Material :

Material	Serial No.	Certificate No.	Due date
1. Absorbance Standard set	44487	122584	31 May 2026
2. Wavelength Standard set	29829	135831	06 Oct 2027
3. Wavelength Standard set	29829	135832	06 Oct 2027
4. Stray Light Standard set	45507	126055	04 Oct 2026

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certificate is traceable to the International System of Unit maintained through :
   - Starna Scientific Ltd.
4. Spectral BandWidth : 1 nm
   Scan Speed : 30 nm/min

Calibration Results : without adjustment

Wavelength Accuracy

Certified Values of Reference Material (nm)	UUC Reading (nm)	Uncertainty of Measurement (± nm)	Coverage Factor *k*
418.53	418.35	0.12	2.00
536.52	536.15	0.13	2.00
638.00	637.90	0.13	2.00
684.50	684.49	0.12	2.00
879.41	879.18	0.12	2.00

Calibration Results : without adjustment

Photometric Accuracy

Wavelength (nm)	Certified Values of Reference Material (Abs)	UUC Reading (Abs)	Uncertainty of Measurement (±Abs)	Coverage Factor *k*
420.0	Zero	0.0000	0.0028	2.00
	0.5750	0.5726	0.0028	2.00
	0.7156	0.7138	0.0028	2.00
	1.0176	1.0140	0.0028	2.00
546.1	Zero	0.0000	0.0028	2.00
	0.5234	0.5217	0.0028	2.00
	0.7007	0.6985	0.0028	2.00
	0.9992	0.9957	0.0028	2.00
635.0	Zero	0.0000	0.0028	2.00
	0.5648	0.5638	0.0028	2.00
	0.7654	0.7651	0.0028	2.00
	1.0961	1.0939	0.0028	2.00

Stray Light

* Straylight at 260.57 ± 0.11 nm	Reading at 260.57 ± 0.11 nm
Abs	1.7208
%T	0.7459

Remark

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer
- The Potassium Dichromate filled cells are measured against a Perchloric acid blank.
- Cut-off wavelength of stray light reference material (Potassium Iodide) at Wavelength 260.57 ± 0.11 nm
- Result = Pass, If Absorbance > 2.00 Abs and Transmission < 1.0 %T at Wavelength 260.57 ± 0.11 nm
- * : Not NSC-ONSC Accredited
- UUC = Unit Under Calibration

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

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MAINTENANCE REPORT

OPTIMA 8000

Customer :	บริษัท เทคนิกสิ่งแวดล้อมไทย จำกัด	Date Tested:	March 17, 2026
		Recommendation Recertification Period	6 Months
Address :	1/6 ซอยรามคำแหง 145, แขวงสะพานสูง, เขตสะพานสูง, กรุงเทพฯ 10240 TH	Recertification Due:	September 17, 2026
		Date Last Certified:	September 19, 2025
User Name:	คุณ ณัฐพงศ์ โคตะมา	Visit Number:	ONE
Phone:	02-3737799, 081-1303495	TH ONE SOURCE Phone:	081-7316733
E-mail:	Ketsarin.Chuayphan@eurofinsasia.com Phorntip.phethshee@eurofinsasia.com	E-mail :	thonesource@gmail.com

CONFIGURATION TESTED		ACCESSORIES/COMPONENT NOT INCLUDED
MODEL	SERIAL NUMBER	
OPTIMA 8000	078S1310024C	WinLab32 Version 5.5.0
N0772045	1F1380368	PN:6150T21E4Q1E
TESTED EQUIPMENT		
IPV Methods		
TEST STANDARD USED	PE NUMBER	
Mixed standard 1/10	N0691579	
Mixed standard 1/100	N9300221	
CUSTOMER SUPPLIED	COMMENTS	
2 % HNO3		
10 % HNO3		

MAINTENANCE REPORT

OPTIMA 8000

SERIAL NUMBER 078S1310024C DATE TESTED March 17, 2026

1. MECHANICAL CHECKS

A. Inspect and clean all fans and filters.	OK
B. Inspect and replace as necessary, all torch components including the RF Flat coil	OK
C. Inspect all tubing for sign of clacking or leaking.	OK
D. Adjust water and gas pressure regulator settings.	OK
E. Inspect and leak check pneumatics drawers.	OK
F. Clean the exterior of the instrument.	OK

2. OPTICAL CHECKS

A. Inspect and clean all optical components.	OK
B. As reqiured, check and replace all purge filters.	OK
C. Recheck optical alignment.	OK

3. COOLING SYSTEM CHECKS

A. Perform preventive maintenance on chiller.	OK
B. Flush out water the chiller and replace with coolant mix30plus every twelve months	OK

4. PERFORMANCE CHECKS

A. Torch View Alignment.	OK
B. Wavelength Calibration.	OK

MAINTENANCE REPORT

OPTIMA 8000

SERIAL NUMBER 078S1310024C		DATE TESTED	March 17, 2026
PARAMETER		**SPECIFICATION**	**FINAL VAULE**
Precision			
Zn 213.856		% RSD ≤ 1.0	0.79
Mg 280.260		% RSD ≤ 1.0	0.68
Mg 285.207		% RSD ≤ 1.0	0.38
Ba 455.403		% RSD ≤ 1.0	0.43
Detection Limits: Axial			
		As 193 nm, 3(sd) ≤ 10.0 ppb	0.81
		Se 196 nm, 3(sd) ≤ 5.0 ppb	5.0
		Tl 190 nm, 3(sd) ≤ 10.0 ppb	0.48
		Pb 220 nm, 3(sd) ≤ 3.0 ppb	0.40
BEC: Axial		Mn 257 nm, ≤ 30 ppb	2.61
Detection Limits: Radial			
		As 193 nm, 3(sd) ≤ 60.0 ppb	4.95
		Zn 213 nm, 3(sd) ≤ 2.0 ppb	0.12
		Mn 257 nm, 3(sd) ≤ 1.0 ppb	0.03
		La 379 nm, 3(sd) ≤ 3.0 ppb	0.27
		Ba 455 nm, 3(sd) ≤ 0.3 ppb	0.02
		Ba 493 nm, 3(sd) ≤ 0.6 ppb	0.02
BEC: Radial		Mn 257 nm, ≤ 30 ppb	7.13
Spectral Resolution: UV			
		As 193 nm, ≤ 0.009	0.00759
		Ni 231 nm, ≤ 0.011	0.00841
		Ni 341 nm, ≤ 0.015	0.01266
Spectral Resolution: VIS			
		Ba 455 nm, ≤ 0.020	0.01585

MAINTENANCE REPORT

OPTIMA 8000

SERIAL NUMBER 078S1310024C **DATE TESTED** March 17, 2026

Remarks :

Commissioning follow as commissioning performance sheets.

Calculate MnBEC = IB * STD Conc / IS-IB , where standard conc = 1000 ug/L

IB = Intensity of blank

IS = Intensity of Standard

Used Mira Mist Nebulizer

This is to certify that the above tests have been perfomed and the configuration tested

[✔] meets

[ ] does not meet

This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.

Service Department TH One Source Co., Ltd.

Krungchai T.

(**Krungchai Treevichien**)

Customer Support Engineer

TH One Source Co.,Ltd. 33/119 Moo 10, Ladsawai, Lam Luk Ka, Pathum Thani 12150, Thailand

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.: 25CH1095

Equipment :	Turbidity Meter
Manufacturer :	Thermo Scientific
Model :	EUTECH TN-100
Serial No. :	2655003
ID. No. :	-
Condition As-Received:	Used Item
Received Date :	05 September 2025
Calibration Date :	18 September 2025
Reference :	2509-0224DSC-13
Submitted by :	Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung, Bangkok 10240
Ambient Temperature :	(23 ± 3.0) °C
Relative Humidity :	(50 ± 20) %
Calibration Procedure :	In - house method : CP-CH11 Direct measurement by using Formazin standard solution
Calibrated by :	Walalak Sirithean
Approved by :	Approved Signatory

(✓) Chakrit Waewwanjua
( ) Ponpan Paipim
( ) Saithip Meangmai

Issue Date : 19 September 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 Calibration and Testing Equipment Services.

Condition of this calibration result

1. Reference Standard Instruments :

Instruments	ID No.	Certificate No.	Due date
1) Data Logger	130EC012	24H2043	23 Sep 2025
2) Liquid-in Glass Thermometer	130RC003	25I440	16 Apr 2026

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

2. Certified Reference Materials : Turbidity Standard solution (Formzin)
   - The measurement results are traceable to SI through CPA chem Ltd.,

Turbidity Solution	Manufacturer	Lot No.	Exp. date
20.0 NTU	CPA Chem	1088008	18 Mar 2026
100.0 NTU	CPA Chem	1088007	18 Mar 2026
800 NTU	CPA Chem	1088017	18 Mar 2026

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

Calibration result

Performing three - Formazin suspension standard curve by using 20, 100, 800 NTU
Tubidity Meter serial number : 2655003

Standard Formazine suspension (NTU)	UUC* Reading (NTU)	Uncertainty of Measurement (± NTU)	Coverage Factor *k*
0.1	0.23	0.027	2.00
20.0	20.1	0.21	2.00
100.0	101	1.3	2.05
800	800	4.3	2.00

Remark
- **UUC* = Unit Under Calibration**
- **NTU = Nephelometric Turbidity Units**
- **0.1 NTU has been prepared dilution from 20.0 NTU**

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

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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: Charley

SCARLET TECH CO., LTD. SCARLET | TECH 聲佳科技有限公司

This certificate may not be published or reproduced, except in full, unless
Obtaining permission in writing from Scarlet Tech Ltd.
4F-3, No. 347, 2nd Sec., Heping E. Rd., Daan Dist. Taipai 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

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

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 : 23-Feb-2026
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 22-Mar-2026

Item	Instrument Calibrated			Reference	Before Adjust				After Adjust	Deviation	Result
	Brand	Model	Serial NO.	Acoustic dB	ครั้งที่1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย	± dB	± dB	Calibrate
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	114.0	114.0	114.0	114.0			
29	ACO	6226	100102	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			
30	ACO	6226	100106	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			
31	ACO	6226	110098	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			
32	ACO	6226	110105	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			
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 : Ramnad M.

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	**Calibration Date**	: 23-Feb-2026
Calibrator	: SCARLET ST-120	**Barometric pressure (mmHg)**	: 759.0 mmHg
Standard	: IEC 60942:2017 CLASS1	**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**	: 22-Mar-2026
Calibrator Serial NO.	: ST120C1204E		

Item	Instrument Calibrated			Reference	Before Adjust				After Adjust	Deviation	Result
	Brand	Model	Serial NO.	Acoustic dB	ครั้งที่1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย	± dB	± dB	Calibrate
35	ACO	6226	110097	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			
36	ACO	6226	110102	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			
37	ACO	6226	110101	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			
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	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
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	93.7	93.7	93.7	93.7	94.0	0.3	PASS
				114.0	113.7	113.7	113.7	113.7			
42	ACO	6226	130128	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			
44	ACO	6226	130130	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			
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 : Pramual M.

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

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 : 23-Feb-2026
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 22-Mar-2026

Item	Instrument Calibrated			Reference	Before Adjust				After Adjust	Deviation	Result
	Brand	Model	Serial NO.	Acoustic dB	ครั้งที่1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย	± dB	± dB	Calibrate
46	ACO	6236	112029	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
49	ACO	6236	152075	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			
50	ACO	6236	152076	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			
51	ACO	6236	152077	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			
52	ACO	6226	150142	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			
53	ACO	6226	160095	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			
54	ACO	6226	160096	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			
55	ACO	6226	160097	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			
56	ACO	6226	160098	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 : Pramual M.

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

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 : 23-Feb-2026
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 22-Mar-2026

Item	Instrument Calibrated			Reference	Before Adjust				After Adjust	Deviation	Result
	Brand	Model	Serial NO.	Acoustic dB	ครั้งที่1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย	± dB	± dB	Calibrate
57	ACO	6226	160099	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			
58	ACO	6226	160143	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			
59	ACO	6226	160203	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			
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	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
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	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.2	114.2	114.2	114.2			
64	ACO	6226	160213	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			
66	ACO	6226	160215	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			
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 : Ramnad M.

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

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 : 23-Feb-2026
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 22-Mar-2026

Item	Instrument Calibrated			Reference	Before Adjust				After Adjust	Deviation	Result
	Brand	Model	Serial NO.	Acoustic dB	ครั้งที่1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย	± dB	± dB	Calibrate
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	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
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	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
76	ACO	6236	222247	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			
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	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
80	SCARLET	ST-11D	820392	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 : Ramual M.

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	**Calibration Date**	: 23-Feb-2026
Calibrator	: SCARLET ST-120	**Barometric pressure (mmHg)**	: 759.0 mmHg
Standard	: IEC 60942:2017 CLASS1	**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**	: 22-Mar-2026
Calibrator Serial NO.	: ST120C1204E		

Item	Instrument Calibrated			Reference	Before Adjust				After Adjust	Deviation	Result
	Brand	Model	Serial NO.	Acoustic dB	ครั้งที่1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย	± dB	± dB	Calibrate
81	SCARLET	ST-11D	820393	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			
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	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.1	114.1	114.1	114.1			
84	SCARLET	ST-11D	820878	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			
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	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
88	SCARLET	ST-11D	821295	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			
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	94.0	94.0	94.0	94.0	94.0	0.0	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 : Pramual M.

Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand
81 Moo 11 Bangkruai - Sainoi Rd., Sainoi, Nonthaburi 11150 Tel. (662) 436-8789 Ext. 6155

NSC-TISI-TIS 17025
CALIBRATION 0318

Certificate of Calibration

Issued by : Vibration Laboratory

Certificate No. : 25V0123
Reference No. : CTECN01V006
Received Date : 01 October 2025
Calibrated Date : 08 October 2025

Client	:	บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด
Address	:	1/6 ซ.รามคำแหง 145 ถ.รามคำแหง เขต สะพานสูง กทม. 10240
Equipment	:	Vibration Meter
Manufacture /Brand	:	Instantel
Model	:	Micromate
Serial No./ ID No.	:	UM10831

(Mr. Apichart Palatornpariruk)
Authorized Signatory
Issue Date 9 October 2025

This certificate is issued in accordance with the conditions of accreditation granted by The National Accreditation Council of Thailand which has assessed the measurement capability of the laboratory and its traceability to recognised national standards and to the units of measurement realised at the corresponding national standards laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration services department. This reported measurement result relates only the measurand and applies only at the time of measurement.

e-mail : MCC@egat.co.th

Referance Standard Used

Description	Manufacture/Model	Serial No.	Traceable No.	Due Date
Accelerometer Type 8305	Bruel & Kjaer	1262817	AV-0018-25	20 April 2027
Conditioning Amplifier Type 2626	Bruel & Kjaer	1242376	AV-0004-25	06 March 2027
Digital Multimeter /8846A	FLUKE	4330020	25E0551	22 September 2026

Traceability

This certificate provides traceability of measurement to the International System of Units (SI) through

- National Institute of Metrology (Thailand) (NIMT)
- Metrology and Calibration Department (EGAT)

Environmental Conditions

The calibration was performed in an environment of (23±2)°C and (50±10)%RH

Measurement Method

The unit under calibration was calibrated by comparison with standard accelerometer. The calibration method is based on WI-MCC-E-301.

Uncertainty of Measurement

The measurement uncertainty are labeled on the following pages completed the expaned uncertainty that calculated in accordance with the method to describe in M3003, using coverage factor k=2, The value of the measured lies within the assigned ranges the measured lies within the assigned ranges of values to a coverage probability of approximately 95%.

Tabulation of Results

The measurement results, labeled in the following pages give the calibration results and associated measurement uncertainties.

Measurement Results

DESCRIPTION Frequency (Hz)	STD Applied Value (mm/s_p)	UUC Reading (mm/s_p)	Uncertainty ($\pm mm/s_p$)	Direction
40	5.00	5.12	0.072	Vertical (V)
	10.00	10.22	0.15	
	20.00	20.34	0.29	
	30.00	30.56	0.43	
40	5.00	5.14	0.073	Transverse (T)
	10.00	10.27	0.15	
	20.00	20.52	0.29	
	30.00	30.72	0.44	
40	5.00	5.12	0.072	Longitudinal (L)
	10.00	10.20	0.15	
	20.00	20.40	0.29	
	30.00	30.53	0.43	

Note

Transducer Part : 721A2901

Serial No. : UM10831

Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand
81 Moo 11 Bangkruai - Sainoi Rd., Sainoi, Nonthaburi 11150 Tel. (662) 626-9459

NSC-TISI-TIS 17025
CALIBRATION 0318

Certificate of Calibration

Issued by : Vibration Laboratory

Certificate No. : 26V0031
Reference No. : CTECN01V001
Received Date : 18 March 2026
Calibrated Date : 23 March 2026

Client	:	บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด
Address	:	1/6 ซ.รามคำแหง 145 แขวงสะพานสูง, เขตสะพานสูง, กรุงเทพฯ 10240
Equipment	:	Vibration Meter
Manufacture /Brand	:	Instantel
Model	:	Minimate Pluse
Serial No./ ID No.	:	BE17502

(Mr. Apichart Palatornpariruk)
Authorized Signatory
Issue Date 26 March 2026

This certificate is issued in accordance with the conditions of accreditation granted by The National Accreditation Council of Thailand which has assessed the measurement capability of the laboratory and its traceability to recognised national standards and to the units of measurement realised at the corresponding national standards laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration services department. This reported measurement result relates only the measurand and applies only at the time of measurement.

e-mail : MCC@egat.co.th

Referance Standard Used

Description	Manufacture/Model	Serial No.	Traceable No.	Due Date
Accelerometer Type 8305	Bruel & Kjaer	1262817	AV-0018-25	20 April 2027
Conditioning Amplifier Type 2626	Bruel & Kjaer	1242376	AV-0004-25	06 March 2027
Digital Multimeter /8846A	FLUKE	4330020	25E0551	22 September 2026

Traceability

This certificate provides traceability of measurement to the International System of Units (SI) through

- National Institute of Metrology (Thailand) (NIMT)
- Metrology and Calibration Department (EGAT)

Environmental Conditions

The calibration was performed in an environment of (23±2)°C and (50±10)%RH

Measurement Method

The unit under calibration was calibrated by comparison with standard accelerometer. The calibration method is based on WI-MCC-E-301 .

Uncertainty of Measurement

The measurement uncertainty are labeled on the following pages completed the expaned uncertainty that calculated in accordance with the method to describe in M3003, using coverage factor k=2, The value of the measured lies within the assigned ranges the measured lies within the assigned ranges of values to a coverage probability of approximately 95%.

Tabulation of Results

The measurement results, labeled in the following pages give the calibration results and associated measurement uncertainties.

Measurement Results

Frequency (Hz)	STD Applied Value (mm/s_p)	UUC Reading (mm/s_p)	Uncertainty ($\pm$ mm/s_p)	Direction
40	5.00	5.08	0.072	Vertical (V)
	10.00	10.20	0.15	
	20.00	20.10	0.29	
	30.00	30.10	0.43	
40	5.00	5.08	0.072	Transverse (T)
	10.00	10.00	0.14	
	20.00	20.10	0.29	
	30.00	30.10	0.43	
40	5.00	5.08	0.072	Longitudinal (L)
	10.00	9.95	0.14	
	20.00	19.70	0.28	
	30.00	29.50	0.42	

Note

Transducer Part : 718A3301

Serial No. : BT2463