



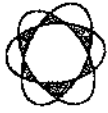
ภาคผนวก จ
เอกสารสอบเทียบเครื่องมือที่ใช้วิเคราะห์



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
1.	Stack Air	Particulate	Dry Gas Method/SK 25	S/N 8005333	07/02/2024	February 2025
			Digital Barometer/PHB-318	S/N B011414	03/05/2024	May 2025
			Digital Thermometer/DP-52	S/N L392059	31/08-13/09/2023	September 2024
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
			Gas Analyzer (E-Instrument)/Model E6000-5DS	S/N 1339	07/07/2023	July 2024
2.	Ambient Air	NO _x as NO ₂	Gas Analyzer (E-Instrument)/Model E6000-5DS	S/N 1339	07/07/2023	July 2024
			Gas Analyzer (E-Instrument)/Model E6000-5DS	S/N 1339	07/07/2023	July 2024
		TSP	ORIFICE TRANSFER STANDARD/Tisch	S/N 0068	21/09/2022	September 2023
			High Volume Air Sampler/TET	S/N TSP-29	13/07/2023	July 2024
			High Volume Air Sampler/TET	S/N TSP-38	11/07/2023	July 2024
			High Volume Air Sampler/TET	S/N TSP-40	05/07/2023	July 2024
			High Volume Air Sampler/TET	S/N TSP-41	13/07/2023	July 2024
		PM-10	Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
			ORIFICE TRANSFER STANDARD/Tisch	S/N 0068	21/09/2022	September 2023
			High Volume Air Sampler/TET	S/N PM10-17	05/07/2023	July 2024
			High Volume Air Sampler/TET	S/N PM10-18	05/07/2023	July 2024
			High Volume Air Sampler/TET	S/N PM10-23	05/07/2023	July 2024
			High Volume Air Sampler/TET	S/N PM10-31	13/07/2023	July 2024
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
		SO ₂	CERTIFICATE OF ANALYSIS : Linde	S/N D636157	18/09/2023	18/09/2027
			SO ₂ Analyzer/API 100E	S/N 2658	06/11/2023	May 2024
			SO ₂ Analyzer/Teledyne TML-50	S/N 502870	08/11/2023	May 2024
			SO ₂ Analyzer/Teledyne 100E	S/N 110	08/11/2023	May 2024
			SO ₂ Analyzer/Teledyne 100E	S/N 1412	07/11/2023	May 2024



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ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์ (ต่อ)

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
2.	Ambient Air (Cont.)	NO ₂	CERTIFICATE OF ACCURACY : EPA Protocol Gas	S/N A00917SK	05/07/2023	05/07/2026
			NO ₂ Analyzer/Teledyne T200	S/N 5154	09/11/2023	May 2024
			NO ₂ Analyzer/Teledyne T200	S/N 5158	10/11/2023	May 2024
			NO ₂ Analyzer/Teledyne T200	S/N 5159	01/11/2023	May 2024
			NO ₂ Analyzer/Teledyne T200	S/N 5160	01/11/2023	May 2024
			Wind speed and wind direction/Weather Wizard II	S/N W21110A55	17/01/2024	January 2025
3.	Working Air	WS & WD	Wind speed and wind direction/Weather Wizard III	S/N WC21014A92	17/01/2024	January 2025
			Wind speed and wind direction/Weather Wizard III	S/N WE61121A25A	13/09/2023	September 2024
			Wind speed and wind direction/Vantage VUE	S/N MT220822047	20/11/2023	November 2024
			Personal Air Sampler/Gilian	S/N 20120103064	15/05/2024	June 2024
			Personal Air Sampler/Gilian	S/N 20080703009	15/05/2024	June 2024
			Personal Air Sampler/Gilian	S/N 20110605104	15/05/2024	June 2024
			Personal Air Sampler/Gilian	S/N 20110605104	17/05/2024	June 2024
			Personal Air Sampler/Gilian	S/N 20120202045	17/05/2024	June 2024
			Personal Air Sampler/Gilian	S/N 20080703009	17/05/2024	June 2024
			Electronic Balance/XP 205	S/N 1129273885	10/04/2024	April 2025
4.	Sound Level	Leq 24 hr	Sound Level Calibrator/ST-120	S/N ST120C0263E	21/12/2023	December 2024
			Integrated Sound Level/ST-11D	S/N 820393	14/12/2023	13/12/2024
			Integrated Sound Level/ST-11D	S/N 820390	14/12/2023	13/12/2024
			Integrated Sound Level/ST-11D	S/N 820394	14/12/2023	13/12/2024
			Integrated Sound Level/ST-11D	S/N 820877	01/02/2023	31/01/2024



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Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
5.	Water	pH	pH Meter/Horiba	S/N 806D0012	01/11/2023	November 2024
		TDS	Electronic Balance/METTLER TOLEDO	S/N 1116392227	11/04/2023	April 2024
		BOD	BOD Incubator/Model i250-DS	S/N 2059-1017-0029	29/06/2023	June 2024
		Oil & Grease	Electronic Balance/METTLER TOLEDO	S/N 1116392227	11/04/2023	April 2024
		TSS	Electronic Balance/METTLER TOLEDO	S/N 1116392227	11/04/2023	April 2024
		Hg	Atomic Absorption Spectrophotometer Model/AAAnalyst 100	S/N 04050110503	29/09/2023	28/03/2024
		Cu	ICP394/PerkinElmer/OPTIMA8000	S/N 078N1310024C	29/09/2023	28/03/2024
		Cr	ICP394/PerkinElmer/OPTIMA8000	S/N 078N1310024C	29/09/2023	28/03/2024
		Sn	ICP394/PerkinElmer/OPTIMA8000	S/N 078N1310024C	29/09/2023	28/03/2024
		Ag	ICP394/PerkinElmer/OPTIMA8000	S/N 078N1310024C	29/09/2023	28/03/2024
		Nitrate	Spectrophotometer/PerkinElmer	S/N 365K9042909	18/08/2023	August 2024
		PO ₄	Spectrophotometer/PerkinElmer	S/N 365K9042909	18/08/2023	August 2024
		DO	DO Meter/HORIBA	S/N D75J0012	09/02/2024	February 2025
		Fe	ICP394/PerkinElmer/OPTIMA8000	S/N 078N1310024C	29/09/2023	28/03/2024
		Mn	ICP394/PerkinElmer/OPTIMA8000	S/N 078N1310024C	29/09/2023	28/03/2024
		Total Coliform Bacteria	Incubator Model INE 500	S/N E.505.0595	10/04/2023	April 2024



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Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
6.	Occupational Safety and Health	Leq 8 hr	Sound Level Calibrator/ST-120	S/N ST120C0263E	21/12/2023	December 2024
			Integrated Sound Level/ACO 6236	S/N 152074	01/05/2024	31/05/2024
			Integrated Sound Level/ACO 6236	S/N 222039	01/05/2024	31/05/2024
			Integrated Sound Level/ACO 6236	S/N 222040	01/05/2024	31/05/2024
			Integrated Sound Level/ACO 6226	S/N 130130	01/06/2024	30/06/2024
			Integrated Sound Level/ACO 6236	S/N 160203	01/06/2024	30/06/2024
			Integrated Sound Level/ACO 6226	S/N 130128	01/06/2024	30/06/2024
			Integrated Sound Level/ACO 6226	S/N 110102	01/06/2024	30/06/2024
			Integrated Sound Level/ACO 6226	S/N 100101	01/06/2024	30/06/2024
			Integrated Sound Level/ACO 6226	S/N 100098	01/06/2024	30/06/2024
			Integrated Sound Level/ACO 6226	S/N 110098	01/06/2024	30/06/2024
			WET BULB GLOBE TEMPERATURE (WBGT) METER/ JANTYTECH/JT2011-E2A	S/N 3522210140	18/03/2024	March 2025
		Heat	WET BULB GLOBE TEMPERATURE (WBGT) METER/ JANTYTECH/JT2011-E2A	S/N 3522210142	18/03/2024	March 2025
			WET BULB GLOBE TEMPERATURE (WBGT) METER/ JANTYTECH/JT2011-E2A	S/N 3522210147	19/03/2024	March 2025
			Liquid in Glass Thermometer/AMA	S/N 2197300	15/02/2024	February 2025
			Liquid in Glass Thermometer/AMA	S/N 2197297	15/02/2024	February 2025
			Liquid in Glass Thermometer/AMA	S/N 2197301	15/02/2024	February 2025
			Liquid in Glass Thermometer/AMA	S/N 2197268	15/02/2024	February 2025
			Liquid in Glass Thermometer/AMA	S/N 2197269	15/02/2024	February 2025
			Liquid in Glass Thermometer/AMA	S/N 2197270	15/02/2024	February 2025



THAI ENVIRONMENTAL TECHNIC LIMITED
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

CONTROL UNIT CALIBRATION

(Metric units , mm)

Date **7-Feb-24**

	Initial	Final	Average	
Barometric press, Pb	758.7	759.2	759.0	mmHg

Dry Gas Meter Data

Console No. **M50-01**

Metering System ID

DGM Number **8005333**

DGM Model **SK 25**

Reference Dry Gas Meter Data

Serial No. **913428**

Model **S-110**

Correction factor(Yr) **1.0209**

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

Orifice manometer setting ΔH mm H ₂ O	Ref .	DGM Volume V _m Liters	Temperature (° C)				Time min	DGM Correction factor (Y)	$\Delta H@$ mm H ₂ O
	DMG		Ref DGM T _r	Dry Gas Meter					
	Volume V _r Liters			Inlet T _i	Outlet T _o	Avg T _m			
15.00	100.00	100.02	28.00	28.00	29.00	28.50	8.36	1.0209	46.0356
25.00	100.00	99.95	28.00	28.00	29.00	28.50	6.49	1.0206	46.2849
50.00	100.00	99.73	28.00	28.00	29.00	28.50	4.58	1.0204	46.2125
80.00	100.00	99.47	28.00	28.00	29.00	28.50	3.59	1.0201	45.5608
100.00	100.00	99.25	28.00	28.00	29.00	28.50	3.23	1.0204	46.1904

Average **1.0205** **46.0568**

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

Calibrated by :

adms

Approved :

Pramual M.

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

Note: For $\Delta H@$, Orifice pressure differential that equates to 0.7565m³ (0.0212m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ± 0.2 inches (5.1mm)H₂O.



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



Certificate of Calibration

Certificate No. : 24P1478

Page : 1 of 2

Equipment : Digital Barometer

Manufacturer: Lutron

Model : PHB-318

Serial No.: B011414

ID No.: NO.7

Condition As-Received: Used Item

Received Date: 30 April 2024

Calibration Date: 03 May 2024

Reference: 2404-0751DSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 15) %

Atmospheric Pressure: 1004 mbar

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1/8 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung,
Bangkok 10240

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

Condition of this result of calibration

1.Reference standards instruments :

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

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

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

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

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

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

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

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

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Suwit Aussarree

Issue Date : 07 May 2024

Approved Signatory :

Attapol P.

[] Phalinee Prabpaipal

[] Sura Suwannasri

[✓] Attapol Panurach



Cert.No.: 24P1478

Page: 2 of 2

Result of calibration:- Without adjustment

Range: 730 mmHg to 790 mmHg

Function:- Absolute Pressure Measurement

Resolution: 0.1 mmHg

Increasing Pressure

Applied Pressure (mmHg)	731.02	741.02	751.02	761.02	771.02	781.02	791.02
UUC* Indication (mmHg)	731.5	741.5	751.5	761.5	771.5	781.5	791.5
Error (mmHg)	0.48	0.48	0.48	0.48	0.48	0.48	0.48

Decreasing Pressure

Applied Pressure (mmHg)	791.02	781.02	771.02	761.02	751.02	741.02	731.02
UUC* Indication (mmHg)	791.5	781.5	771.5	761.5	751.5	741.5	731.5
Error (mmHg)	0.48	0.48	0.48	0.48	0.48	0.48	0.48

The uncertainty of measurement was ± 0.18 mmHg

* UUC = Unit Under Calibration

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

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TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No. : 23T1576

Page : 1 of 2

Equipment : Digital Thermometer With Sensor

Manufacturer: Digicon

Model : DP-52

Serial No.: I.392059

ID No.: No.9

Condition As-Received: Used Item

Received Date: 23 August 2023

Calibration Date: 31 August 2023
to 13 September 2023

Reference: 2308-0733DSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

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Corporate Services 3: Equipment Calibration and Testing Services.

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

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

Condition of this result of calibration

1. Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Digital Thermometer	1529-R	B19520	23I796	11 Jul 2024
2) Platinum Resistance Thermometer	935-14-95	261589/1	23I796	11 Jul 2024
3) Digital Multimeter	2700	4016315	22E3264	05 Oct 2023
4) Standard Thermocouple Probe (Type S)	TCS	TCS-001	TT-0165-22	15 Dec 2023

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

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

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

Calibrated by : Theerapong Ameen
Issue Date : 18 September 2023

Approved Signatory :

- ☐ Phalinee Prabpaipal
☒ Chatchawan Khunpiluek
☐ Wanlop Larpkern

B 0323474



Cert. No.: 23T1576

Page.: 2 of 2

Result of Calibration:-

Without Adjustment

Function:

Temperature measurement for Channel T1

This equipment was connected with Thermocouple Type K ID No. No.9

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

<u>Immersion</u>	<u>Standard</u>	<u>UUC*</u>		<u>Uncertainty</u>
<u>Depth</u>	<u>Temperature</u>	<u>Reading</u>	<u>Error</u>	<u>of Measurement</u>
(mm.)	(°C)	(°C)	(°C)	(±°C)
180	200.0050	200.2	0.1950	0.74
180	399.9973	399.6	-0.3973	1.4
180	599.95	600.4	0.4500	3.1

UUC* : Unit Under Calibration

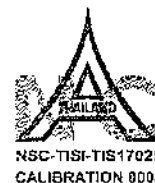
The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

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534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert.No.: 24MM272

Page.: 1 of 3

Equipment : Electronic Balance

Manufacturer : Mettler Toledo

Model : AB204

Serial No. : 1116392227

ID No. : Ins-LAB-033

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

Location : Balance Room

Received order : 09 April 2024

Calibration Date : 10 April 2024

Ambient Temperature : 15 °C to 40 °C

Relative Humidity : 30 % to 90 %

Calibrated by : Khit Ruttanaprapachai

Approved by :

Kunchit

Approved Signatory

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

Issue Date :

12 April 2024

The Uncertainties are for a confidence probability of approximately 95%

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



Equipment : Electronic Balance

Cert.No.: 24MM272

Condition As-Received : Used Item

Page: 2 of 3

Reference : 2404-0113OC-14

Procedure used :-

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

Condition of this result of calibration

1. Reference standard instruments:-

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

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

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

4. This certificate is not certified for any commercial transaction.

5. This certification is traceable to the International System of Unit.

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

Range capacity : 0 g to 210 g Resolution 0.0001 g

Before Adjustment :

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

After Adjustment :

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

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



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

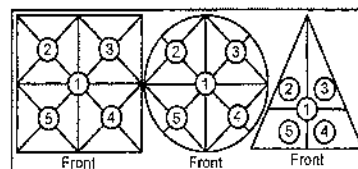
Cert.No.: 24MM272

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Result of calibration

2. Effect of off center loading

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



Maximum difference between
off-center and central loading

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

(g)
0.0003

3. Departure from nominal value

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

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

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Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Portable Gas Calibration Report

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

Date of Calibration: 7-Jul-23
Ambient Condition
Temperature (23±5 °C) : 25.0 °C
Humidity (55±15 % RH) : 50.0 % RH
Barometer (mmHg) : 758.4 mmHg

Standard gas References

Standard gas	Cylinder No.	Traceability	Due date
Oxygen (O ₂)	27906	Linde	August 4, 2023
Nitric Oxide(NO)	D025806	Linde	August 18, 2023
	D824524	Linde	August 22, 2025
Nitrogen Dioxide(NO ₂)	CC518873	Airgas	August 17, 2024
	CC518878	Airgas	August 18, 2024
Sulfur Dioxide (SO ₂)	D824500	Linde	October 11, 2024
	D271305	Linde	October 11, 2024
Carbon Monoxide(CO)	D824500	Linde	October 11, 2024
	D271305	Linde	October 11, 2024

Calibration Results

Parameter	Standard gas	Reading	Actual Error	Test Limit	Results
O ₂ (%vol)	0.0	0.0	0.0	±0.2 % vol	PASS
	13.9	13.9	0.0		
NO (ppm)	0.0	0.0	0.0	±5.0 ppm 0...100 ppm ±5% measured Value 101....5000 ppm	PASS
	199.0	203.0	4.0		
	392.0	394.0	2.0		
NO ₂ (ppm)	0.0	0.0	0.0		PASS
	40.1	40.0	-0.1		
	82.2	83.0	0.8		
SO ₂ (ppm)	0.0	0.0	0.0		PASS
	406.0	405.0	-1.0		
	804.0	802.0	-2.0		
CO (ppm)	0.0	0.0	0.0		PASS
	404.0	403.0	-1.0		
	793.0	792.0	-1.0		

Calibrate by:

Approved by:

TISCH

Environmental



RECALIBRATION

DUE DATE:

September 21, 2023

Certificate of Calibration

Calibration Certification Information

Cal. Date: September 21, 2022 Roots-meter S/N: 438320 Ta: 296 °K
Operator: Jim Tisch Pa: 748.3 mm Hg
Calibration Model #: TE-5025A Calibrator S/N: 0062

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3760	3.2	2.00
2	3	4	1	0.9710	6.4	4.00
3	5	6	1	0.8730	8.0	5.00
4	7	8	1	0.8300	8.8	5.50
5	9	10	1	0.6870	12.7	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
0.9870	0.7173	1.4080	0.9957	0.7236	0.8895
0.9828	1.0121	1.9912	0.9914	1.0211	1.2579
0.9806	1.1233	2.2262	0.9893	1.1332	1.4064
0.9796	1.1802	2.3349	0.9882	1.1907	1.4750
0.9744	1.4184	2.8160	0.9830	1.4309	1.7789
QSTD	m=	2.01042	QA	m=	1.25889
	b=	-0.03659		b=	-0.02312
	r=	0.99996		r=	0.99996

Calculations

Vstd= $\Delta Vol((Pa-\Delta P)/Pstd)(Tstd/Ta)$	Va= $\Delta Vol((Pa-\Delta P)/Pa)$
Qstd= $Vstd/\Delta Time$	Qa= $Va/\Delta Time$

For subsequent flow rate calculations:

$Qstd = 1/m \left(\left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} \right) - b \right)$	$Qa = 1/m \left(\left(\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)} \right) - b \right)$
--	---

Standard Conditions

Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH: calibrator manometer reading (in H2O)	
ΔP: roots-meter manometer reading (mm Hg)	
Ta: actual absolute temperature (°K)	
Pa: actual barometric pressure (mm Hg)	
b: intercept	
m: slope	

RECALIBRATION

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

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

www.tisch-env.com
TOLL FREE: (877)263-7610
FAX: (513)467-9009



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech

Site ID : Bangkok

Date : 13-Jul-23

ITEM : TSP

Serial No : (No. 29)

Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 750.6

Average Temp (°C) : 28.7

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 : 2.01042

Qstd Intercept : -0.36590

Calibration Due Date : 21-Sep-23

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m ³ /min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 29.8227 Intercept : 0.5039 Corr. Coeff : 0.9888 # of Observations: 5
1	12.40	1.934	60.0	57.00	
2	9.80	1.739	54.0	52.00	
3	7.20	1.517	50.0	48.00	
4	5.00	1.294	40.0	40.00	
5	3.00	1.044	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:

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

m = sampler slope

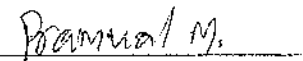
b = sampler intercept

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



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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech

Site ID : Bangkok

Date : 11-Jul-23

ITEM : TSP

Serial No : (No.38)

Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 750.8

Average Temp (°C) : 29.2

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 : 2.01042

Qstd Intercept : -0.36590

Calibration Due Date : 21-Sep-23

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m ³ /min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 30.2297 Intercept : 0.1413 Corr. Coeff : 0.9875 # of Observations: 5
1	12.50	1.941	60.0	57.00	
2	9.20	1.691	54.0	52.00	
3	7.20	1.517	50.0	48.00	
4	5.00	1.294	40.0	40.00	
5	3.00	1.044	30.0	30.00	

Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(P_a/P_{std}))(T_{std}/T_a)] - b]$$

$$IC = I[\text{Sqrt}(P_a/P_{std})(T_{std}/T_a)]$$

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:

$$1/m((I)[\text{Sqrt}(298/T_{av})(P_{av}/760)] - b)$$

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

m = sampler slope

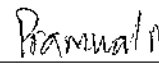
b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



Thai Environmental Technic Limited
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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech

Site ID : Bangkok

Date : 5-Jul-23

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) : 750.6

Average Temp (°C) : 28.9

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 : 2.01042

Qstd Intercept : -0.36590

Calibration Due Date : 21-Sep-23

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m ³ /min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 29.4911 Intercept : 1.2335 Corr. Coeff : 0.9818 # of Observations: 5
1	12.80	1.962	60.0	57.00	
2	9.20	1.691	54.0	52.00	
3	7.00	1.498	50.0	48.00	
4	5.00	1.294	40.0	40.00	
5	3.00	1.044	30.0	30.00	

Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(P_a/P_{std}))(T_{std}/T_a)] - b]$$

$$IC = I[\text{Sqrt}(P_a/P_{std})(T_{std}/T_a)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

T_a = actual temperature during calibration (deg K)

P_a = actual pressure during calibration (mm Hg)

T_{std} = 298 deg K

P_{std} = 760 mm Hg

For subsequent calculation of sampler flow:

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

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

m = sampler slope

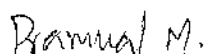
b = sampler intercept

I = chart response

T_{av} = daily average temperature

P_{av} = daily average pressure

Calibrate By : 

Approve By : 



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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech

Site ID : Bangkok

Date : 13-Jul-23

ITEM : TSP

Serial No : (No.41)

Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 750.8

Average Temp (°C) : 29.2

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 : 2.01042

Qstd Intercept : -0.36590

Calibration Due Date : 21-Sep-23

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m ³ /min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 30.9129 Intercept : -0.8070 Corr. Coeff : 0.9909 # of Observations: 5
1	12.10	1.912	60.0	57.00	
2	9.40	1.707	54.0	52.00	
3	7.20	1.517	50.0	48.00	
4	5.00	1.294	40.0	40.00	
5	3.00	1.044	30.0	30.00	

Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(P_a/P_{std}))(T_{std}/T_a)] - b]$$
$$IC = I[\text{Sqrt}(P_a/P_{std})(T_{std}/T_a)]$$

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:

$$1/m((I[\text{Sqrt}(298/T_{av})(P_{av}/760)] - b)$$

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

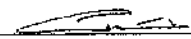
m = sampler slope

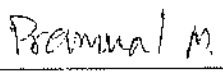
b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech

Site ID : Bangkok

Date : 5-Jul-23

ITEM : PM10

Serial No : (No. 17)

Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 750.8

Average Temp (°C) : 28.5

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-S025A

Serial# : 0068

Qstd Slope : 2.01042

Qstd Intercept : -0.03659

Calibration Due Date : 21-Sep-23

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m ³ /min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 34.2829 Intercept : 1.0003 Corr. Coeff : 0.9913 # of Observations: 5
1	12.00	1.741	60.0	60.00	
2	9.80	1.575	54.0	54.00	
3	7.20	1.353	50.0	50.00	
4	5.00	1.130	40.0	40.00	
5	3.00	0.880	30.0	30.00	

Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(P_a/P_{std}))(T_{std}/T_a)] - b]$$

$$IC = I[\text{Sqrt}(P_a/P_{std})(T_{std}/T_a)]$$

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:

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

m = sampler slope

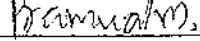
b = sampler intercept

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



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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech

Site ID : Bangkok

Date : 5-Jul-23

ITEM : PM10

Serial No : (No. 23)

Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 750.8

Average Temp (°C) : 29.4

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 : 2.01042

Qstd Intercept : -0.03659

Calibration Due Date : 21-Sep-23

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 35.1530 Intercept : 0.0074 Corr. Coeff : 0.9904 # of Observations: 5
1	12.80	1.798	62.0	62.00	
2	10.20	1.607	56.0	55.00	
3	7.60	1.389	52.0	52.00	
4	5.20	1.152	40.0	40.00	
5	3.00	0.880	30.0	30.00	

Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(P_a/P_{std}))(T_{std}/T_a)] - b$$

$$IC = I[\text{Sqrt}(P_a/P_{std})(T_{std}/T_a)]$$

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:

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

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


m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



Thai Environmental Technic Limited
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High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Tech

Site ID : Bangkok

Date : 5-Jul-23

ITEM : PM10

Serial No : (No. 18)

Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 750.5

Average Temp (°C) : 28.5

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 : 2.01042

Qstd Intercept : -0.03659

Calibration Due Date : 21-Sep-23

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m ³ /min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 35.0529 Intercept : 0.4420 Corr. Coeff : 0.9897 # of Observations: 5
1	12.00	1.741	60.0	60.00	
2	9.20	1.527	54.0	54.00	
3	7.00	1.334	50.0	50.00	
4	5.00	1.130	40.0	40.00	
5	3.00	0.880	30.0	30.00	

Calculations

$$Q_{std} = 1/m[\text{Sqrt}(H_2O(P_a/P_{std}))(T_{std}/T_a)] - b]$$

$$IC = I[\text{Sqrt}(P_a/P_{std}))(T_{std}/T_a)]$$

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:

$$1/m((I)[\text{Sqrt}(298/T_{av})(P_{av}/760)] - b)$$

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 Environmental Tech

Site ID : Bangkok

Date : 13-Jul-23

ITEM : PM10

Serial No : (No. 31)

Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 750.8

Average Temp (°C) : 28.7

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 : 2.01042

Qstd Intercept : -0.03659

Calibration Due Date : 21-Sep-23

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m ³ /min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 30.3423 Intercept : 4.5728 Corr. Coeff : 0.9299 # of Observations: 5
1	12.20	1.756	60.0	60.00	
2	9.40	1.543	45.0	45.00	
3	7.20	1.353	50.0	50.00	
4	5.00	1.130	40.0	40.00	
5	3.00	0.880	30.0	30.00	

Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(P_a/P_{std}))(T_{std}/T_a)] - b$$

$$IC = I[\text{Sqrt}(P_a/P_{std})(T_{std}/T_a)]$$

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:

$$1/m((I[\text{Sqrt}(298/T_{av})(P_{av}/760)] - b)$$

m = sampler slope

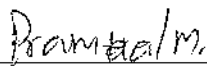
b = sampler intercept

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

THE LINDE GROUP

Linde

Certificate Of Analysis Special Gases Mixture

Customer Details

Name

Thai Environmental Technic Limited

Address:

1/6 Soi Ramkhamhaeng 45, Saphanong,
Khet Saphan Sung, Bangkok 10740

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-14

Cylinder No:

A00917SK

Gas content:

5.520 M¹

Filling pressure:

145.0 bar

Valve:

CGA 660 SS

Cylinder Owner:

LINDE

Cylinder Material:

Spectra seal

Cylinder Size:

40L

Laboratory Report

Analytical Result

Component	Normal Concentration	Analysis Result	Uncertainty	Method of Analysis	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 iS50

Analytical Principle
FTIR-NO

Last 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

This certificate is valid only for the gases specified herein. It does not constitute a warranty or guarantee of the purity or quality of the gases. The gases are supplied as received from the manufacturer. The purity and quality of the gases are subject to the manufacturer's specifications. The gases are not to be used for any purpose other than that specified herein. The gases are not to be used in any process where they may come in contact with any other substance. The gases are not to be used in any process where they may be exposed to any other substance. The gases are not to be used in any process where they may be exposed to any other substance.

This certificate is valid only for the gases specified herein. It does not constitute a warranty or guarantee of the purity or quality of the gases. The gases are supplied as received from the manufacturer. The purity and quality of the gases are subject to the manufacturer's specifications. The gases are not to be used for any purpose other than that specified herein. The gases are not to be used in any process where they may come in contact with any other substance. The gases are not to be used in any process where they may be exposed to any other substance. The gases are not to be used in any process where they may be exposed to any other substance.

Silanya Pachayasoontorn

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

Page 1 of 1

For more information, please contact your local Linde office.

USAN: 8011 (US: 8011) 8011 (8011)

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8011 (8011) 8011 (8011)

Linde (Thailand) Public Company Limited

8011 (8011) 8011 (8011)

100 Phloeng Phruang Road, P.O. Box 114, Bangkok 10540, Thailand

8011 (8011) 8011 (8011) 8011 (8011) 8011 (8011)

8011 (8011) 8011 (8011) 8011 (8011) 8011 (8011) 8011 (8011)

Thailand, Tel: (66) 24 570 470-53

Fax: (66) 24 570 473



Thai Environmental Technic Limited
บริษัท เทคนิกล้างแวล้อมไทย จำกัด

NOx Analyzer Calibration Report

Calibrate Date : 9-Nov-23
Analyzer Type : NOx
Brand : Teledyne
Model : T200
Serial Number : 5154 (No. 30)
Range : 500 ppb

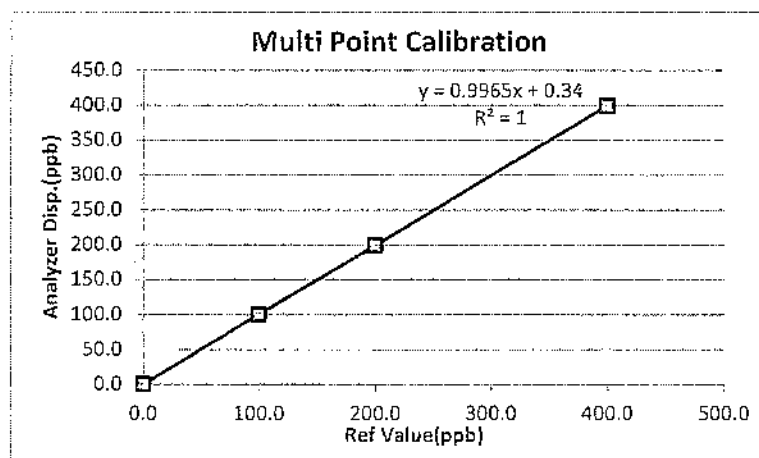
Temperature (°C) : 25°C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0%RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : A00917 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	0.8	0.4	0.4	0.0	0.0	0.0	0.0
Span	400.0	408.0	401.0	7.0	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	0.5	0.3	0.2	0.30	0.001	0.08
100.0	100.3	100.4	-0.1	0.40	0.004	0.40
200.0	199.7	199.1	0.6	-0.90	-0.005	0.45
400.0	399.5	399.1	0.4	-0.90	-0.002	0.22
Average Diff (%)						0.36



Calibrate by: [Signature]

Approved by: [Signature]



Thai Environmental Technic Limited
บริษัท เทคนิกลิ่งแวดล้อมไทย จำกัด

NOx Analyzer Calibration Report

Calibrate Date : 10-Nov-23
Analyzer Type : NOx
Brand : Teledyne
Model : T200
Serial Number : 5158 (No. 31)
Range : 500 ppb

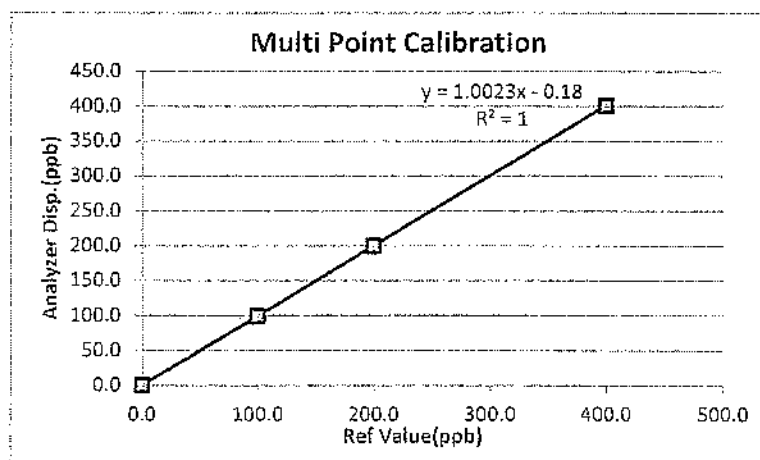
Temperature (°C) : 25 °C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0%RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : A00917 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span(ppb)			After of Span(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	2.5	2.2	0.3	0.0	0.0	0.0	0.0
Span	400.0	413.0	408.0	5.0	400.0	400.0	0.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO ₂	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.7	0.4	0.3	0.40	0.001	0.10
100.0	100.2	99.4	0.8	-0.60	-0.006	0.60
200.0	200.4	200.1	0.3	0.10	0.000	0.05
400.0	402.0	401.0	1.0	1.00	0.003	0.25
Average Diff (%)						0.30



Calibrate by:

Approved by:



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

NOx Analyzer Calibration Report

Calibrate Date : 1-Nov-23
Analyzer Type : NOx
Brand : Teledyne
Model : T200
Serial Number : 5159 (No. 32)
Range : 500 ppb

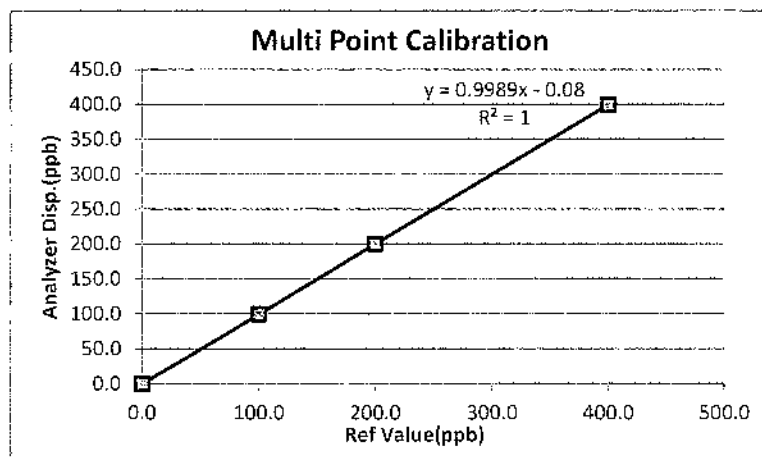
Temperature (°C) : 25°C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0%RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : A00917 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	2.1	1.8	0.3	0.0	0.0	0.0	0.0
Span	400.0	399.0	395.0	4.0	400.0	400.0	0.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO ₂	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.7	0.2	0.5	0.20	0.001	0.05
100.0	99.5	99.3	0.2	-0.70	-0.007	0.70
200.0	200.8	199.9	0.9	-0.10	0.000	0.05
400.0	400.3	399.5	0.8	-0.50	-0.001	0.13
Average Diff (%)						0.29



Calibrate by:

Approved by:



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

NOx Analyzer Calibration Report

Calibrate Date : 1-Nov-23
Analyzer Type : NOx
Brand : Teledyne
Model : T200
Serial Number : 5160 (No. 33)
Range : 500 ppb

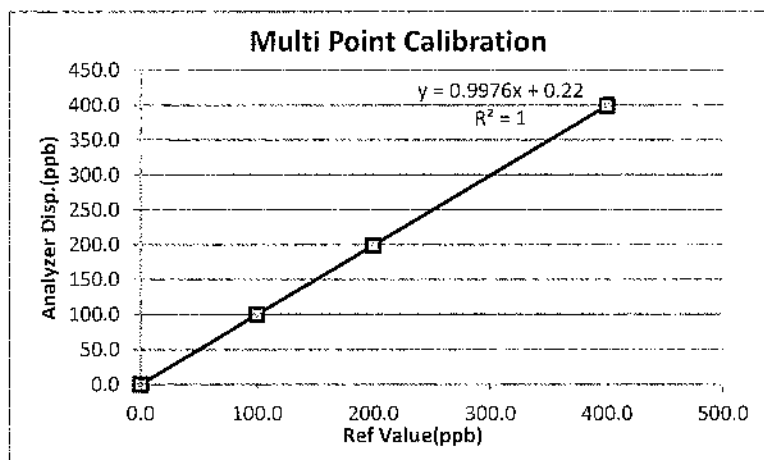
Temperature (°C) : 25 °C
Barometer (mmHg) : 760.0
Humidity (50±15 %) : 50.0%RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : A00917 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0
Span	400.0	411.0	409.0	2.0	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	0.5	0.4	0.1	0.40	0.001	0.10
100.0	100.5	100.1	0.4	0.10	0.001	0.10
200.0	199.9	199.2	0.7	-0.80	-0.004	0.40
400.0	400.3	399.5	0.8	-0.50	-0.001	0.13
Average Diff (%)						0.21



Calibrate by:

Approved by:

Certificate Of Analysis
Special Gases Mixture

Customer Details

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

Certificate Details

Number: 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 M³ 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	BOC1506295G	25.35 ± 0.25 ppm	9-Jun-2024

Analytical Instruments used in Assay

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR Spectrometers Nicolet iS50	FTIR-SQ2	6-Sep-2023

Recommend usage condition

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

Comments

When reordering, please quote the material number

Note:

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

Sukanya Parinyasoonorn

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

PB-002/1006

Issued: 01 August 2023

บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขทะเบียนพาณิชย์: 010557000005

ชั้น 15 อาคารทาวเวอร์ เอ 2/3 หมู่ 14 ถนนรามคำแหง-ตราด กม. 6.5 แขวงคลอง

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

โรงงานหลัก: 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

Tel Registration No: 010557000005

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Road Km. 6.5 Road, Bangknew

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

Wellgrow Plant: 105 Moo 5, 1.Bangsaniak, A.Bangpakong, Chachoengsan 24180

Thailand, Tel (66) 38.570-479-93

Fax (66) 38.570-323



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Analyzer Calibration Report

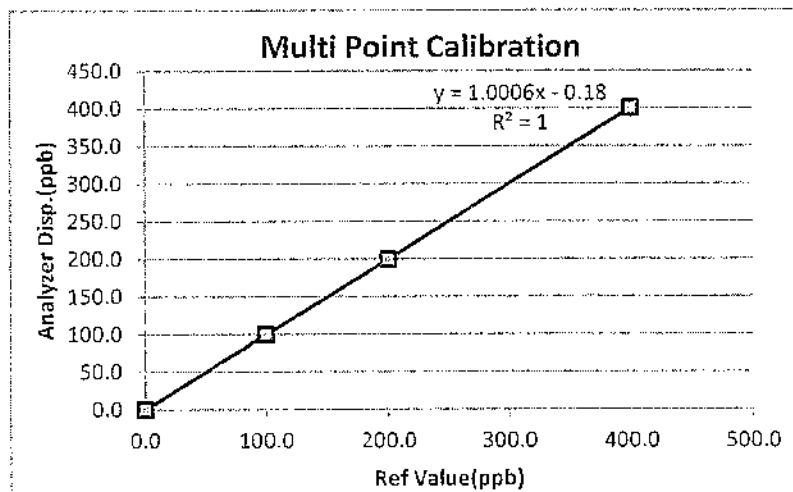
Calibrate Date	6-Nov-23	Temperature (°C)	: 25°C
Analyzer Type	SO ₂	Barometer (mmHg)	: 755.0
Brand	API	Humidity (50±15 %)	: 50.0 %RH
Model	100E	Dilutor	: API M700 S/N 625
Serial Number	2658 (No.18)	Zero Air	: API M701 S/N 1926
Range	500 ppb	Standard gas	: D636157

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)	After of Span.(ppb)	Abs% diff of Span
Zero	0.0	0.5	0.0	0.0
Span	400.0	399.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference		
		Diff (ppb)	Percent Diff	Abs Percent Diff
0.0	0.1	0.1	0.00	0.03
100.0	99.8	-0.2	0.00	0.20
200.0	199.5	-0.5	0.00	0.25
400.0	400.3	0.3	0.00	0.08
Average Diff (%)				0.14



Calibrate by: [Signature]

Approved by: [Signature]

แก้ไขครั้งที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QP16-06



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Analyzer Calibration Report

Calibrate Date : 8-Nov-23
Analyzer Type : SO_2
Brand : Teledyne
Model : TML-50
Serial Number : S02870 (No.19)
Range : 500 ppb

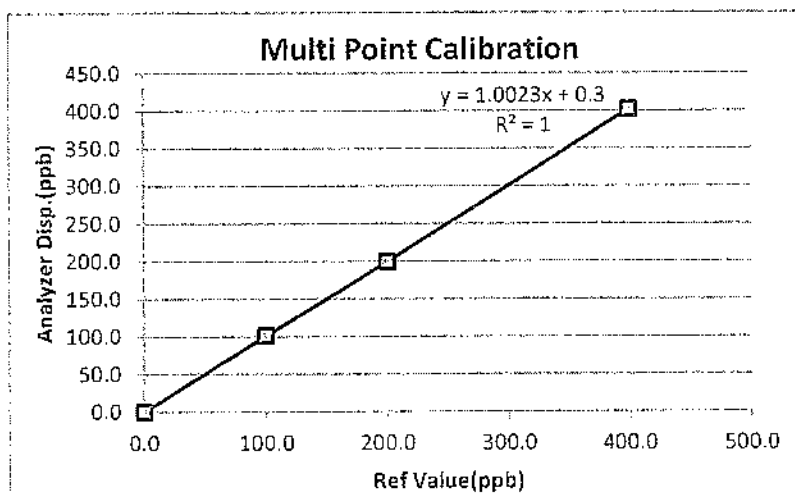
Temperature ($^{\circ}\text{C}$) : 25 $^{\circ}\text{C}$
Barometer (mmHg) : 760.0
Humidity (50 \pm 15 %) : 50.0 %RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : D636157

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)	After of Span.(ppb)	Abs% diff of Span
Zero	0.0	1.9	0.0	0.0
Span	400.0	395.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference		
		Diff (ppb)	Percent Diff	Abs Percent Diff
0.0	0.2	0.2	0.00	0.05
100.0	101.5	1.5	0.02	1.50
200.0	199.5	-0.5	0.00	0.25
400.0	401.6	1.6	0.00	0.40
Average Diff (%)				0.55



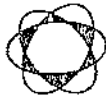
Calibrate by:

Approved by:

แก้ไขครั้งที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QP16-06



Thai Environmental Technic Limited
บริษัท เทคนิสิ่งแวดล้อมไทย จำกัด

Analyzer Calibration Report

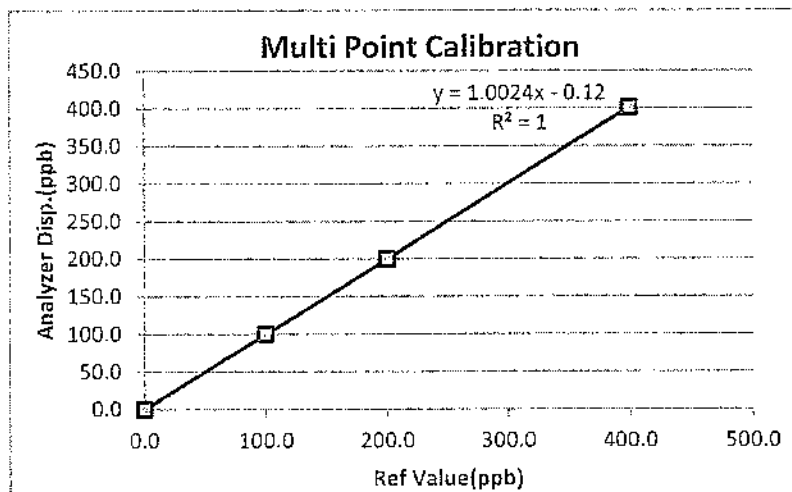
Calibrate Date	8-Nov-23	Temperature (°C)	: 25°C
Analyzer Type	SO ₂	Barometer (mmHg)	: 760.0
Brand	Teledyne	Humidity (50±15 %)	: 50.0 %RH
Model	100 E	Dilutor	: API M700 S/N 625
Serial Number	110 (No. 21)	Zero Air	: API M701 S/N 1926
Range	500 ppm	Standard gas	: D636157

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)	After of Span.(ppb)	Abs% diff of Span
Zero	0.0	0.2	0.0	0.0
Span	400.0	391.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference		
		Diff(ppb)	Percent Diff	Abs Percent Diff
0.0	0.1	0.1	0.00	0.03
100.0	100.2	0.2	0.00	0.20
200.0	199.8	-0.2	0.00	0.10
400.0	401.1	1.1	0.00	0.28
Average Diff (%)				0.15



Calibrate by:

Approved by:

แก้ไขครั้งที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QP16-06



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Analyzer Calibration Report

Calibrate Date 7-Nov-23
Analyzer Type SO₂
Brand Teledyne
Model 100 E
Serial Number 1412 (No. 22)
Range 500 ppm

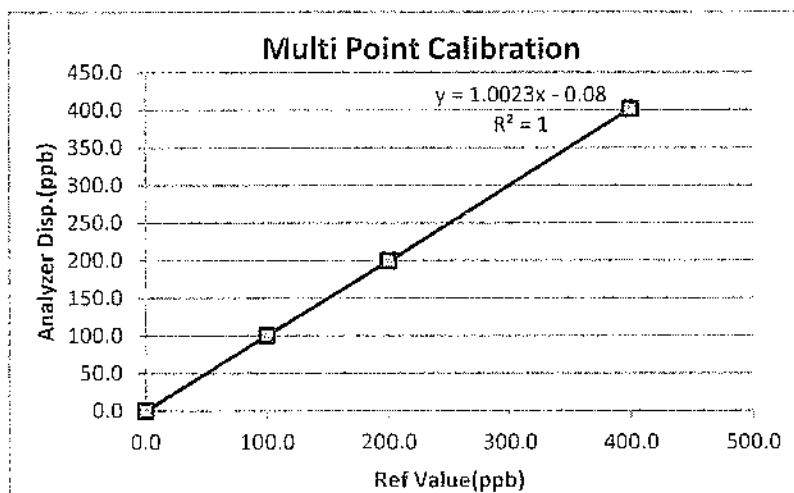
Temperature (°C) : 25°C
Barometer (mmHg) : 759.8
Humidity (50±15 %) : 50.0 %RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : D636157

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)	After of Span.(ppb)	Abs% diff of Span
Zero	0.0	3.4	0.0	0.0
Span	400.0	392.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference		
		Diff (ppb)	Percent Diff	Abs Percent Diff
0.0	0.2	0.2	0.00	0.05
100.0	100.5	0.5	0.01	0.50
200.0	199.3	-0.7	0.00	0.35
400.0	401.3	1.3	0.00	0.33
Average Diff (%)				0.31



Calibrate by: [Signature]

Approved by: [Signature]

แก้ไขครั้งที่ : 00

วันที่อนุมัติ 02/09/15

เลขที่แบบฟอร์ม : QF-QP16-06



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 17 January, 2024

Certification No. 046/24

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III

Serial No. : WC21014A92 ID No. : No.17

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

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1015.1 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

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

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

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

Serial Number 110730029 (sensor 120629586)

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

Calibrated by : *Watcharapol Subwat*

Mr. Watcharapol Subwat

Mechanical Engineer

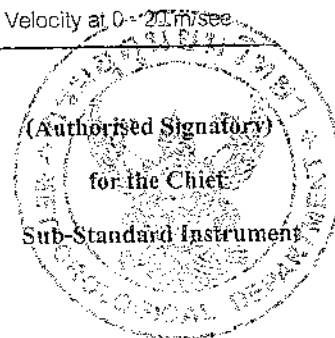
Signed :

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. 046/24

17 January, 2024

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H ₂ O	Vacuum inches H ₂ O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.2	0.82
5.00	-	-	-	4.5	0.50
7.00	-	-	-	6.3	0.70
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.3	0.71
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.5	0.51
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.5	0.52

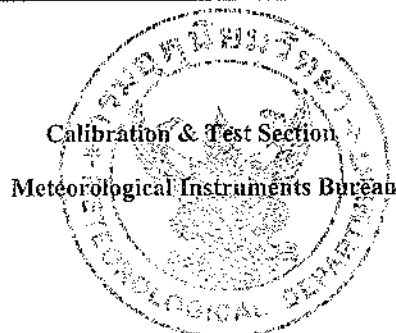
Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Watchapol

Mr. Watchapol Subwat

Mechanical Engineer



THAI METEOROLOGICAL DEPARTMENT



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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 13 September, 2023

Certification No. 315/23

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III

Serial No. : WE61121A25A ID No. : No.23

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

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1008.6 hPa

NATIONAL STANDARD WIND TUNNEL :

: Thermal Anemometer 642 S/N 91563

: 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 : Watchapol

Mr. Watchapol Subwat

Mechanical Engineer

Signed :

Mr. Pisod Promsut





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 315/23

13 September, 2023

Page : 2 of 2

Standard Ultrasonic Anemometer	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
m/sec	inches H ₂ O	inches H ₂ O	m/sec	m/sec	m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.2	0.82
5.00	-	-	-	4.5	0.50
7.00	-	-	-	6.3	0.70
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.3	0.71
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.3	0.71
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.3	0.72

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

Calibrated by :

Watcharapol

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau





THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 17 January, 2024

Certification No. 049/24

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard II

Serial No. : W21110A55 ID No. : No.29

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

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1013.6 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 : *Watcharapoi*
Mr. Watcharapoi Subwat
Mechanical Engineer

Signed : *Pisood Promsut*
Mr. Pisood Promsut





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 049/24

17 January, 2024

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H ₂ O	Vacuum inches H ₂ O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.00	-	-	-	6.5	0.50
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.5	0.51
13.01	-	-	-	12.7	0.31
15.01	-	-	-	14.5	0.51
17.02	-	-	-	16.7	0.32
20.02	-	-	-	19.5	0.52

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

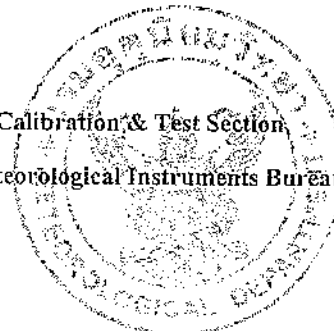
Calibrated by :

Watcharapol

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



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 20 November, 2023

Certification No. 411/23

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 1016.0 hPa

NATIONAL STANDARD WIND TUNNEL :

: Thermal Anemometer 642 S/N 91563

: 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

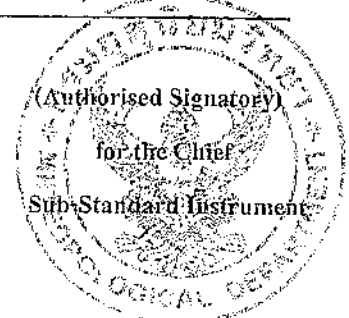
Calibrated by :

Mr. Watcharapoi Subwat

Mechanical Engineer

Signed :

Mr. Pisod Promsut





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 411/23

20 November, 2023

Page : 2 of 2

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H ₂ O	Vacuum inches H ₂ O	Velocity m/sec	Velocity m/sec	Correction 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	-	-	-	15.0	0.01
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.0	0.02

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

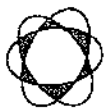
Calibrated by :

Watcharapol

Mr. Watcharapol Subwat

Mechanical Engineer





Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Personal Pump Calibration Report

Equipment Type : Personal Pump/Parameter
Equipment Range : 0.1-7.0 l/min
Calibration Range : 0.1-4.0 l/min
Calibration Type : Drycal
Calibration S/N : 4491

Item	Personal Pump S/N	Hi Flow/Low Flow	ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	Average	Uncertainty
1.	20120103064	2.5	2.4850	2.4920	2.4970	2.4910	±0.0060
2.	20080703009	2.5	2.4860	2.4920	2.4960	2.4910	±0.0050
3.	20110605104	2.5	2.4870	2.4940	2.4970	2.4930	±0.0051

Calibration Date 15 / 05 / 67

Calibration By วิญญ์

Remark : Uncertainty Type A = $\sigma = \frac{SD}{\sqrt{n}}$

: SD = Standard deviation
: \bar{X} = Mean



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Personal Pump Calibration Report

Equipment Type : Personal Pump/Parameter
Equipment Range : 0.1-7.0 V/min
Calibration Range : 0.1-4.0 V/min
Calibration Type : Drycal
Calibration S/N : 4491

Item	Personal Pump S/N	Hi Flow/Low Flow	ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	Average	Uncertainty
1.	20110605104	2.5	2.4940	2.4940	2.4960	2.4940	±0.0012
2.	20120202045	2.5	2.4960	2.4960	2.4980	2.4960	±0.0012
3.	20080703009	2.5	2.4920	2.4920	2.4930	2.4920	±0.0006

Calibration Date 17 / 05 / 67

Calibration By วิภา

Remark : Uncertainty Type A = $\sigma = \frac{SD}{\sqrt{n}}$

: SD = Standard deviation
: \bar{X} = Mean



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



Certificate of Calibration

Cert.No.: 24MM273

Page.: 1 of 3

Equipment : Electronic Balance
Manufacturer : Mettler Toledo
Model : XP205DR
Serial No. : 1129273885
ID No. : Ins-LAB-035
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240
Location : Balance Room
Received order : 09 April 2024
Calibration Date : 10 April 2024
Ambient Temperature : 15 °C to 40 °C
Relative Humidity : 30 % to 90 %
Calibrated by : Khit Ruttanaprapachai

Approved by :

Kunchit

Approved Signatory

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

Issue Date :

12 April 2024

The Uncertainties are for a confidence probability of approximately 95%

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



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2404-01130C-15

Cert.No.: 24MM273

Page: 2 of 3

Procedure used :-

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

Condition of this result of calibration

1. Reference standard instruments:-

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

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

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

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	0.29	2

After Adjustment :

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

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



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

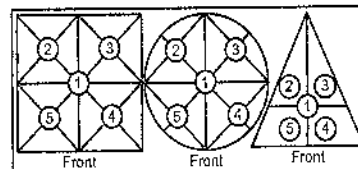
Cert.No.: 24MM273

Page: 3 of 3

Result of calibration

2. Effect of off center loading

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



Maximum difference between
 off-center and central loading

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

3. Departure from nominal value

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

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

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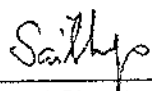


Cert.No.: 23CHO644

Page.: 1 of 2

Certificate of Calibration

Equipment : pH Meter
Manufacturer : Horiba
Model : LAQUA-PH1300
Serial No. : B06D0012
ID No. : Ins-LAB-026
Condition As-Received: Used Item
Received Date : 31 October 2023
Calibration Date : 01 November 2023
Reference : 2310-08430C-7
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240
Calibration Place : Laboratory (Thai Environment Technic Limited)
Ambient Temperature : (25.4 - 24.2) °C
Relative Humidity : (69.3 - 66.7) %
Calibration Procedure : In - house method :
- CP-OCH2 by direct measurement with standard
voltage calibrator and direct measurement
with certified reference material (CRM)
Calibrated by : Khit Ruttanaprachai

Approved by : 
Approved Signatory
(✓) Saitip Meangmai
() Warakorn Lernagatrakul
() Ponpan Paipim
Issue Date : 10 November 2023

The Uncertainties are for a confidence probability of approximately 95%

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

A 0060438



Cert. No.: 23CHO644

Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument : -

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	43160066	130RC092	23E1284	10 Apr 2024
2) Digital Thermometer	-	130RC018	23T1595	13 Sep 2024

This certification is traceable to the International System of Unit maintained 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

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 1.679	CPA chem	823319	20 Jun 2024
pH 4.008	CPA chem	931958	01 Oct 2025
pH 6.865	CPA chem	788996	01 Jan 2024
pH 9.181	CPA chem	931960	01 Oct 2024
*pH 12.45	Hach Lenge GmbH	C02902	19 Nov 2023

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 Fluke at pH (1.7,4,7,10)**

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (\pm mV)	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N.: B06D0012	1.680	314.73	314.7	1.680	0.058	2.00
	4.000	177.48	177.4	4.000	0.058	2.00
	6.860	8.28	8.3	6.860	0.058	2.00
	7.000	0.00	0.0	7.000	0.058	2.00
	9.180	-128.97	-129.0	9.180	0.058	2.00
	10.000	-177.48	-177.4	10.000	0.058	2.00

Function : pH Measurement**Performing four buffers standard curve by using buffer nominal pH (1.7,4,7,9)**

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (\pm)	Coverage factor k
pH Electrode S/N.: 9X3D0537	1.679	1.686	296.3	0.0071	2.13
	4.008	3.992	159.1	0.0089	2.25
	6.865	6.845	-10.1	0.015	2.20
	9.181	9.138	-143.9	0.014	2.00
	*12.45	12.427	-335.9	0.056	2.00

Remark: * : Not NSC-ONSC AccreditedThe 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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Saitthip

a 1188741



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
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Cert. No.: 23TM704

Page: 1 of 3

Certificate of Calibration

Equipment : BOD Incubator
Manufacturer : Accuplus
Model : I250-DS
Serial No. : 2059-1017-0029
ID No. : LAB BOD 06
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240
Location : Laboratory (Thai Environmental Technic Limited)
Received Order : 29 June 2023
Calibration Date : 29 June 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Suwit Imjai

Approved by :

Approved Signatory

() Pornthippa Tameyakul

(✓) Malee Butkruea

Issue Date :

5 July 2023

The Uncertainties are for a confidence probability of approximately 95%

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

A 0053593



Equipment : BOD Incubator
 Condition As-Received : Used Item
 Reference : 2306-0712OC-8
 Procedure Used :-

Cert. No.: 23TM704
 Page : 2 of 3

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013823	23LM66	TPA	25 Mar 2024

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

3. This certification is traceable to the international System of Unit.

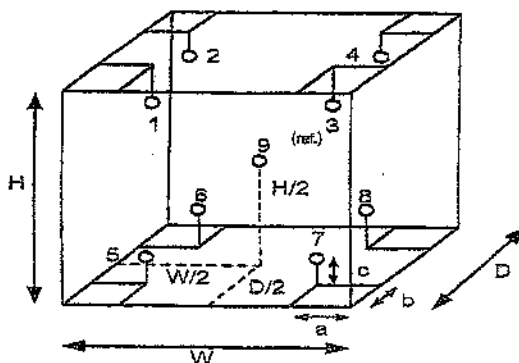
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	24	24
REL.Humid. (%)	67	64
AC Supply (Volt)	229	227



Position :	Ref. Std. ID No.:
1	21-17RTD-01
2	21-17RTD-02
3	17RTD-03
4	17RTD-04
5	17RTD-05
6	17RTD-06
7	17RTD-07
8	23-17RTD-08
9 (ref.)	23-17RTD-09

Probe Installation Details :

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

Dimension of Chamber :

D = 0.48 m
 W = 0.50 m
 H = 1.1 m
 Capacity = 0.26 m³

Malu.

a 1168975



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2306-07120C-8
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 23TM704
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor <i>k</i>
20.0	20.0	19.7	0.38	0.36	1.1	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.244	20.180	20.158	20.066	20.002	19.974	19.712	19.822	19.965	0.58

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

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

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

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

UUC* : Unit Under Calibration

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

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

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Mahu.

a 1168974



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Cert.No.: 23MM160
Page.: 1 of 3

Certificate of Calibration

Equipment : Electronic Balance

Manufacturer : Mettler Toledo

Model : AB204

Serial No. : 1116392227

ID No. : TET.LAB.BAL01

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

Location : Balance Room

Received order : 10 April 2023
Calibration Date : 11 April 2023
Ambient Temperature : 15 °C to 40 °C
Relative Humidity : 30 % to 90 %

Calibrated by : Khit Ruttanaprapachai

Approved by : Malee Butkruea
Approved Signatory

() Pornthippa Tameyakul
(✓) Malee Butkruea
() Suwit Imjai

Issue Date : 25 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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

A 0053464



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-0146OC-12
Procedure used :-

Cert.No.: 23MM160

Page: 2 of 3

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

Condition of this result of calibration

1. Reference standard instruments:-

Instruments	Model	Serial No.	ID No.	Test report No.	Due date
1) Standard Weight Set (E2)	15884	24053	70RC007	MM-0010-22	20 Jan 2024

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

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

4. This certificate is not certified for any commercial transaction.

5. This certification is traceable to the International System of Unit.

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

Range capacity : 0 g to 210 g Resolution 0.0001 g

Before Adjustment :

Applied Weight	Balance Reading	Correction	Measurement Uncertainty	Coverage Factor
(g)	(g)	(g)	(\pm mg)	(k)
100	99.9982	+0.0018	0.18	2.00
200	199.9965	+0.0035	0.29	2.00

After Adjustment :

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

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

Malu:

a 1158499



Equipment : Electronic Balance
 Condition As-Received : Used Item
 Reference : 2304-0146OC-12

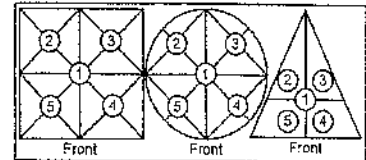
Cert.No.: 23MM160

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	Position 2	Position 3	Position 4	Position 5
(g)	(g)	(g)	(g)	(g)
-0.0002	-0.0002	-0.0003	-0.0003	-0.0002

Maximum difference between
 off-center and central loading
 (g)
 0.0001

3. Departure from nominal value

Applied Weight	Balance Reading	Correction	Measurement Uncertainty	Coverage Factor
(g)	(g)	(g)	(\pm mg)	(k)
Unload	0.0000	0.0000	0.14	2.11
0.01	0.0100	0.0000	0.14	2.11
0.1	0.1001	-0.0001	0.14	2.11
0.5	0.5000	0.0000	0.14	2.11
1	1.0001	-0.0001	0.14	2.11
5	5.0000	0.0000	0.14	2.11
10	9.9999	+0.0001	0.14	2.11
25	24.9998	+0.0002	0.15	2.07
50	49.9998	+0.0002	0.16	2.05
100	99.9999	+0.0001	0.18	2.00
200	200.0000	0.0000	0.29	2.00

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

-o0o-

Malu.

a 1158498



MAINTENANCE REPORT

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAAnalyst 100

Customer :	บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด	Date Tested:	29-ก.ย.-66
Address :	1/6 ซอยรามคำแหง 145, แขวงสะพานสูง, เขตสะพานสูง, กรุงเทพฯ 10240 TH	Recommendation Recertification Period	6 Months
User Name:	คุณ กิตติศักดิ์ เมืองงาม	Recertification Due:	28-มี.ค.-67
Phone:	02-3737799	Date Last Certified:	30-มี.ค.-66
E-mail:	phorntip.p@tet1995.com ketsarin.c@tet1995.com	Visit Number:	1 of 2
		TH ONE SOURCE Phone:	081-7316733, 082-1086572
		E-mail:	thonesource@gmail.com

CONFIGURATION TESTED

MODEL	SERIAL NUMBER	SOFTWARE
AAAnalyst 100	040S0110503	AA WinLab 3.2
TEST STANDARD USED	PART NUMBER	
Copper	N9300183	
Filter 0.2 %	MG0-057	



MAINTENANCE REPORT

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAAnalyst 100

SERIAL NUMBER 040S0110503
DATE TESTED
29-n.11.-66
1. OPTIC CHECKS

A. Optical alignment condition (if necessary)

☐ OK

B. Condition of Mirrors,Lenses etc.(if necessary)

☐ OK

C. D2,HCL beam adjust (if necessary)

☐
2. GAS SYSTEM CHECKS

A. Leak test all internal and external gas box joints

☐ OK

B. All gas box safety features

☐ OK

C. Burner system including nebulizer and all o-ring and gasket

☐ OK

D. Drain system (safety)

☐ F

3. ELECTRONICS CHECKS

A. Power Supplies

 + 5.00 Vdc \pm 0.2 Vdc

+ 5.02 Vdc

 + 11.50 Vdc \pm 0.2 Vdc

+ 11.46 Vdc

 + 15.00 Vdc \pm 1.0 Vdc

+14.99 Vdc

 - 15.00 Vdc \pm 1.0 Vdc

-15.06 Vdc

 + 35.00 Vdc \pm 3.0 Vdc

+35.13 Vdc

4. WAVELENGTH ACCURACY TEST

 A. Zn Lamp wavelength 213.9 nm \pm 0.3 nm.

213.83 nm.

 B. Fe Lamp wavelength 248.3 nm \pm 0.3 nm.

231.92 nm.

 C. Cu Lamp wavelength 324.8 nm \pm 0.3 nm.

324.87 nm.



MAINTENANCE REPORT

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAAnalyst 100

SERIAL NUMBER <u>040S0110503</u>	DATE TESTED <u>29-n.11.-66</u>
5. PERFORMANCE TESTS	SPEC. RESULTS
*A. Neutral density filter checks with Copper (324.8 nm)	
Neutral Density Filter $0.2 \pm 10\%$	0.180 <u>0.174</u> Abs.
B. AA Baseline noise test with Copper (324.8 nm)	
Integration time = 0.5 seconds	
Replicates = 99 times	
Standard Deviation	≤ 0.001 <u>0.001</u>
C. Flame sensitivity with Copper (324.8nm)	
(5 mg/L Cu Standard a read time of 10 seconds	
10 replicates, standard burner)	
Stainless steel nebulizer	≥ 0.25 <u>0.275</u> Abs.
%RSD	≤ 0.3 <u>0.20</u> %
Measured Characteristic Concentration :	<u>0.080</u> mg/L



MAINTENANCE REPORT
ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL
AAAnalyst 100

SERIAL NUMBER 040S0110503DATE TESTED 29-ก.ย.-66

Remarks :

This is to certify that the above tests have been performed 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

Method Name: Cu Baseline Element: Cu
Method Description: Cu BL Noise

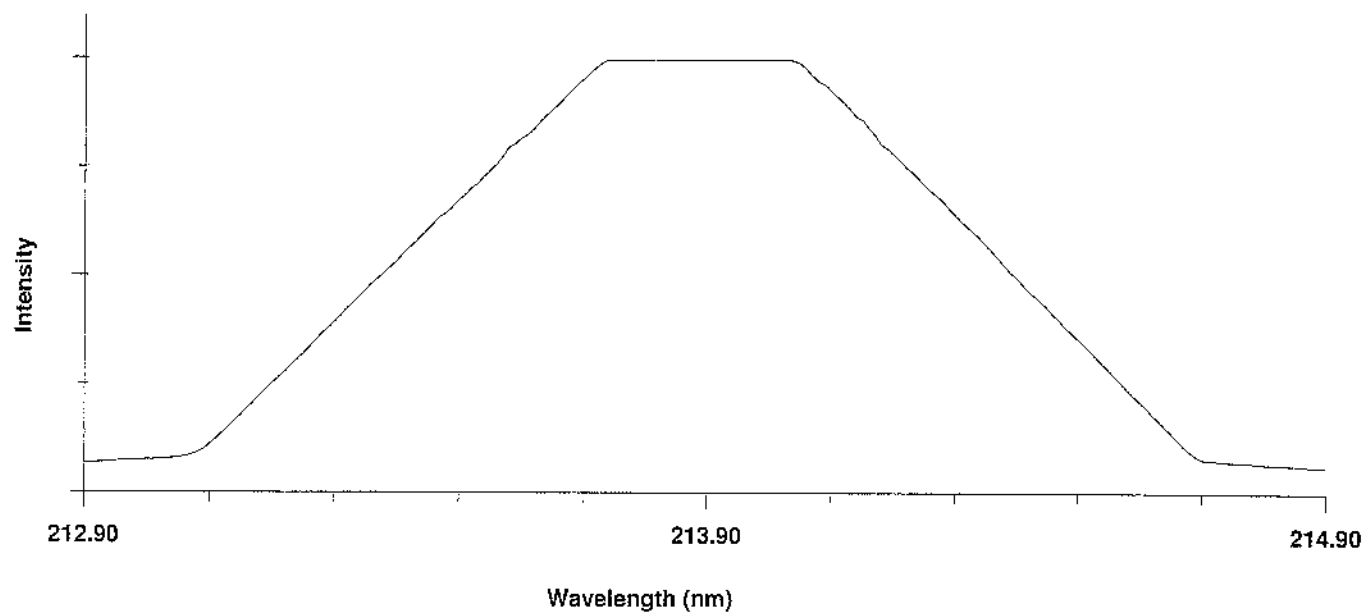
Date: 01/01/2002
Technique: Flame Calibration Equation: Zero Intercept: Nonlinear
Wavelength: 324.8 nm Slit Width: 0.70 nm
Lamp Current: 15 Energy: 72
Sample Info File: Untitled Results Data Set:

Element: Cu Seq. No.: 2 AS Loc.: --- Date: 01/01/2002
Sample ID: CU BLN Noise

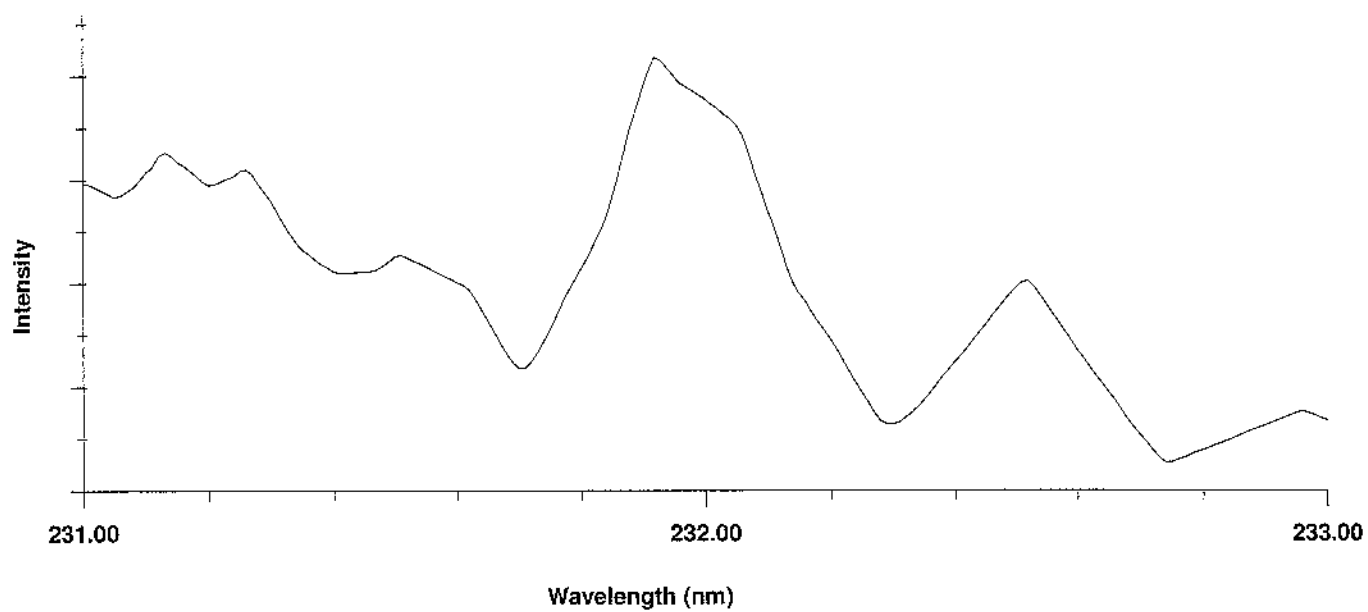
Repl #	SampleConc mg/L	StdConc mg/L	BlkCorr Signal	Time
1			0.000	10:35:46
2			0.000	10:35:49
3			0.000	10:35:51
4			0.000	10:35:53
5			0.000	10:35:55
6			-0.001	10:35:57
7			-0.001	10:36:00
8			-0.002	10:36:02
9			-0.001	10:36:04
10			0.000	10:36:07
11			-0.001	10:36:09
12			0.001	10:36:11
13			0.001	10:36:13
14			0.001	10:36:15
15			0.001	10:36:17
16			0.000	10:36:19
17			-0.001	10:36:21
18			0.001	10:36:24
19			0.000	10:36:26
20			0.001	10:36:28
21			0.000	10:36:30
22			0.002	10:36:32
23			0.000	10:36:34
24			0.000	10:36:36
25			0.002	10:36:38
26			0.002	10:36:41
27			0.001	10:36:43
28			0.001	10:36:45
29			0.000	10:36:47
30			-0.001	10:36:49
31			-0.002	10:36:51
32			-0.001	10:36:53
33			-0.001	10:36:55
34			0.000	10:36:58
35			0.000	10:37:00
36			0.000	10:37:03
37			0.003	10:37:05
38			0.000	10:37:07
39			0.000	10:37:09
40			0.001	10:37:11
41			-0.001	10:37:13
42			-0.001	10:37:16
43			-0.002	10:37:18
44			-0.001	10:37:20
45			0.002	10:37:22
46			0.000	10:37:24
47			0.001	10:37:26
48			0.000	10:37:28
49			0.000	10:37:30
50			0.001	10:37:33
51			0.002	10:37:35
52			0.002	10:37:37
53			0.001	10:37:39
54			0.000	10:37:41
55			-0.001	10:37:43
56			0.001	10:37:45
57			0.001	10:37:47
58			0.000	10:37:50
59			0.001	10:37:52

60	0.001	10:37:54
61	0.000	10:37:56
62	0.001	10:37:58
63	0.000	10:38:00
64	-0.001	10:38:03
65	-0.002	10:38:06
66	-0.002	10:38:08
67	-0.001	10:38:10
68	-0.001	10:38:12
69	-0.002	10:38:14
70	0.000	10:38:16
71	0.000	10:38:18
72	0.000	10:38:21
73	0.000	10:38:23
74	-0.001	10:38:25
75	-0.001	10:38:27
76	0.002	10:38:29
77	0.002	10:38:31
78	0.000	10:38:33
79	0.002	10:38:36
80	0.001	10:38:38
81	0.000	10:38:40
82	0.001	10:38:42
83	-0.001	10:38:44
84	-0.001	10:38:46
85	-0.001	10:38:49
86	-0.002	10:38:51
87	-0.002	10:38:53
88	-0.001	10:38:55
89	-0.001	10:38:57
90	-0.001	10:39:00
91	0.000	10:39:02
92	-0.001	10:39:04
93	0.000	10:39:07
94	0.000	10:39:09
95	-0.001	10:39:11
96	-0.001	10:39:13
97	0.000	10:39:16
98	0.002	10:39:18
99	0.001	10:39:20
Mean:	0.000	
SD :	0.001	
%RSD:	4766.11	

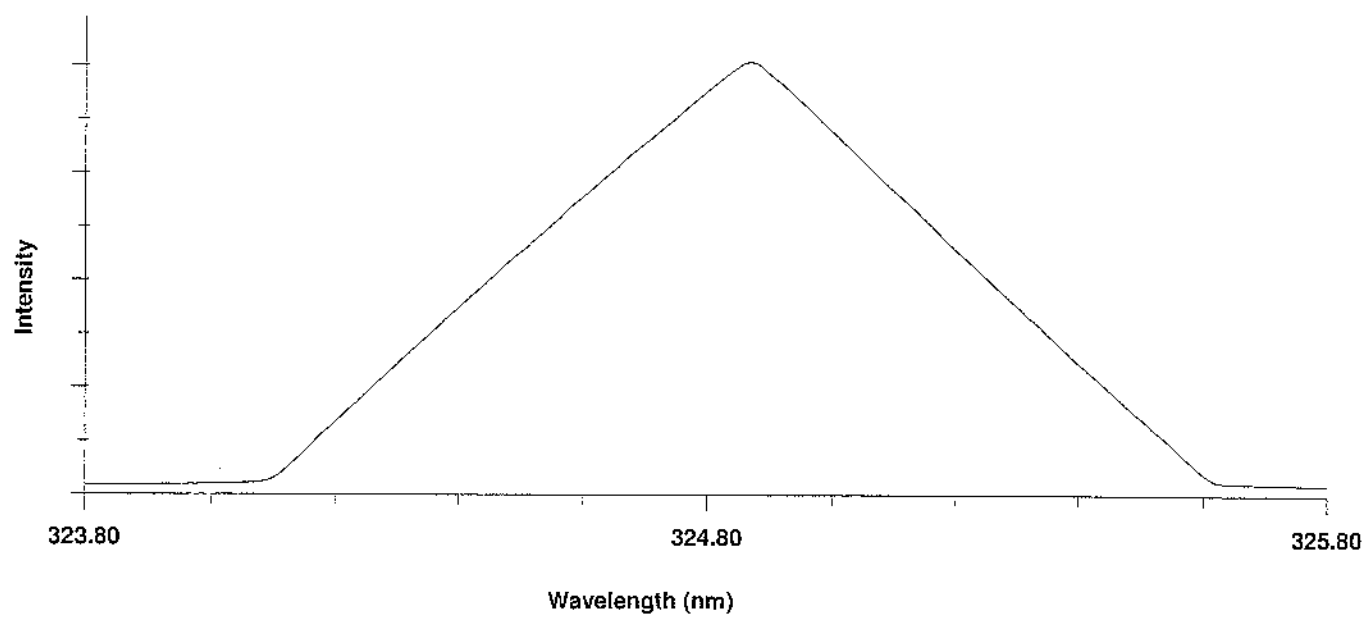
Current Wavelength: 214.90 Peak Wavelength: 213.83



Current Wavelength: 233.00 Peak Wavelength: 231.92



Current Wavelength: 325.80 Peak Wavelength: 324.87



Method Name: Cu5ppm
Method Description: Cu 5 ppm

Element: Cu

Date: 01/01/2002

Technique: Flame

Wavelength: 324.8 nm

Lamp Current: 15

Sample Info File: Untitled

Calibration Equation: Zero Intercept: Nonlinear

Slit Width: 0.70 nm

Energy: 72

Results Data Set:

Element: Cu Seq. No.: 3 AS Loc.: --- Date: 01/01/2002
Sample ID: Calib Blank

Repl	SampleConc	StdConc	BlkCorr	Time
#	mg/L	mg/L	Signal	
1			-0.011	11:30:33
2			-0.011	11:30:46
3			-0.011	11:31:00
4			-0.011	11:31:14
5			-0.011	11:31:28
6			-0.011	11:31:43
7			-0.011	11:31:57
8			-0.012	11:32:11
9			-0.012	11:32:24
10			-0.012	11:32:38
Mean:			-0.011	
SD :			0.000	
%RSD:			3.15	

Auto-zero performed.

Element: Cu Seq. No.: 4 AS Loc.: --- Date: 01/01/2002
Sample ID: Copper 5 ppm

Repl	SampleConc	StdConc	BlkCorr	Time
#	mg/L	mg/L	Signal	
1			0.275	11:33:12
2			0.275	11:33:26
3			0.274	11:33:40
4			0.274	11:33:54
5			0.274	11:34:08
6			0.276	11:34:23
7			0.275	11:34:37
8			0.275	11:34:50
9			0.274	11:35:04
10			0.274	11:35:18
Mean:			0.275	
SD :			0.001	
%RSD:			0.20	

MAINTENANCE REPORT AND TEST CERTIFICATE OPTIMA 8000

Customer : บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด Address : 1/6 ซอยรามคำแหง 145 แขวงสะพานสูง เขตสะพานสูง กรุงเทพมหานคร 10240 User Name: Khun Nattapong Phone: 02-3737799 Fax:	Date Tested: September 29, 2023 Recommendation Recertification Period 6 Months Recertification Due: March 29, 2024 Date Last Certified: April 3, 2023 Visit Number: 2 of 2 PerkinElmer Phone: 02-719-6420 ext 203 PerkinElmer Fax: 02-318-5597
--	--

CONFIGURATION TESTED

MODEL	SERIAL NUMBER
OPTIMA 8000	078S1310024C
S10	

TESTED EQUIPMENT

IPV Methods

CALIBRATION NUMBER

ACCESSORIES/COMPONENT NOT INCLUDED

EXPIRATION

TEST STANDARD USED

Mixed standard 1/10
Mixed standard 1/100

PART NUMBER

N069-1579
N930-0221

EXPIRATION DATE

November 30, 2023
November 30, 2023

CUSTOMER SUPPLIED

2 % HNO3
10 % HNO3

COMMENTS

CUSTOMER INITIALS

MAINTENANCE REPORT AND TEST CERTIFICATE OPTIMA 8000

SERIAL NUMBER : 078S1310024C

DATE TESTED : September 29, 2023

1. MECHANICAL CHECKS

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

OK

OK

OK

OK

OK

OK

2. OPTICAL CHECKS

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

OK

OK

OK

3. COOLING SYSTEM CHECKS

- A. Perform preventive maintenance on chiller.
- B. Flush out the chiller every six months.

OK

OK

4. PERFORMANCE CHECKS

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

OK

OK

MAINTENANCE REPORT AND TEST CERTIFICATE

OPTIMA 8000

SERIAL NUMBER : 078S1310024C

DATE TESTED : September 29, 2023

PARAMETER	SPECIFICATION		FINAL VALUE
Spectral Resolution : UV	As 193.696 nm	≤ 0.009	0.00702
	Ni 231.604 nm	≤ 0.011	0.00790
	Ni 341.476 nm	≤ 0.015	0.01192
Spectral Resolution : VIS	Ba 455.403 nm	≤ 0.020	0.01500
Precision			
	Zn 206.200 nm	% RSD < 1.0	0.60
	Mg 280.271 nm	% RSD < 1.0	0.36
	Mg 285.213 nm	% RSD < 1.0	0.67
	Ba 455.403 nm	% RSD < 1.0	0.72
Detection Limits : Axial	As 193.696 nm	3(SD) ppb	1.11
	Se 196.026 nm	3(SD) ppb	7.96
	Tl 190.801 nm	3(SD) ppb	0.05
	Pb 220.353 nm	3(SD) ppb	3.67
Detection Limits : Radial	As 193.696 nm	3(SD) ppb	0.28
	Zn 213.857 nm	3(SD) ppb	0.83
	Mn 257.610 nm	3(SD) ppb	0.07
	La 379.478 nm	3(SD) ppb	1.89
	Ba 455.403 nm	3(SD) ppb	0.08
	Ba 493.408 nm	3(SD) ppb	0.12
BEC : Axial (IB X 1000)/(IS-IB)	Mn 257.610 nm	≤ 30 ppb	15.70
BEC : Radial (IB X 1000)/(IS-IB)	Mn 257.610 nm	≤ 30 ppb	23.89

MAINTENANCE REPORT AND TEST CERTIFICATE
OPTIMA 8000

SERIAL NUMBER : 078S1310024C

DATE TESTED : September 29, 2023

Remarks :

Commissioning follow as commissioning performance sheets.

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



meets



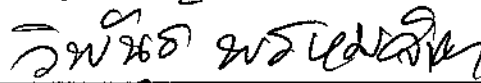
does not meet

the PerkinElmer Specifications listed on this certificate.

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

Service Department PerkinElmer Ltd.

Authorized Representative :



(Wiphan Promlumda)

Service Engineer

PerkinElmer TruQ

Atomic Spectroscopy Standard



Certificate of Analysis

PerkinElmer Number: N9300221

Description: Instrument Calibration Standard 4

Matrix: 5% HNO₃

Lot Number: 58-169CRY1

Certification Date: MAY - - 2022

Expiration Date: NOV 30 2023

* Instrumental Analysis using ICP Spectrometer:

Analyte	Labeled	Measured	SRM	Analyte	Labeled	Measured	SRM
As	100 µg/mL	99.8 µg/mL	3103a*	Pb	50.0 µg/mL	49.9 µg/mL	3128*
Tl	100 µg/mL	99.4 µg/mL	3158*	Se	50.0 µg/mL	49.8 µg/mL	3149*
Cd	50.0 µg/mL	50.0 µg/mL	3108*				

* - indicates NIST SRM

† - indicates CRM (when NIST SRM is not available)

Reference Multi: Lot# 57-156CR, 1-177YJ, 54-134CR

Refer to side 2 for details of certification.

Balances are calibrated with weight sets traceable to NIST.

We guarantee that our PerkinElmer TruQ Atomic Spectroscopy Standards are stable and accurate to $\pm 0.5\%$ of certified concentration until the expiration date, provided the standards are kept tightly capped and stored under normal laboratory conditions. This value is the sum of cumulative errors associated with the analytical determinations, pipetting, and diluting to final volume. For these solutions we use high purity acids, ASTM Type I water (18 megohm double deionized), and leached, triple-rinsed bottles. All glassware used is class A.



Certifying Officer:

Y. Parikh

PerkinElmer®

PerkinElmer, Inc.

U.S.A. Tel: 1-203-925-4600

U.S.A. Toll Free: 1-800-762-4000

Visit www.perkinelmer.com/lasoffices for a complete listing of our global offices.

PerkinElmer TruQ

Atomic Spectroscopy Standard



Certificate of Analysis

PerkinElmer Number: N9300221

Description: Instrument Calibration Standard 4

Matrix: 5% HNO₃

Lot Number: 58-169CRY1

Certification Date: MAY -- 2022

Expiration Date: NOV 30 2023

* Instrumental Analysis using ICP Spectrometer:

Analyte	Labeled	Measured	SRM	Analyte	Labeled	Measured	SRM
As	100 µg/mL	99.8 µg/mL	3103a*	Pb	50.0 µg/mL	49.9 µg/mL	3128*
Tl	100 µg/mL	99.4 µg/mL	3158*	Se	50.0 µg/mL	49.8 µg/mL	3149*
Cd	50.0 µg/mL	50.0 µg/mL	3108*				

* - indicates NIST SRM

† - indicates CRM (when NIST SRM is not available)

Reference Multi: Lot# 57-156CR, 1-177YJ, 54-134CR

Refer to side 2 for details of certification.

Balances are calibrated with weight sets traceable to NIST.

We guarantee that our PerkinElmer TruQ Atomic Spectroscopy Standards are stable and accurate to $\pm 0.5\%$ of certified concentration until the expiration date, provided the standards are kept tightly capped and stored under normal laboratory conditions. This value is the sum of cumulative errors associated with the analytical determinations, pipetting, and diluting to final volume. For these solutions we use high-purity acids, ASTM Type I water (18 megohm double deionized), and leached, triple-rinsed bottles. All glassware used is class A.



Certifying Officer:

Y. Parikh

PerkinElmer®

PerkinElmer, Inc.

U.S.A. Tel: 1-203-925-4600

U.S.A. Toll Free: 1-800-762-4000

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PerkinElmer TruQ

Atomic Spectroscopy Standard



Certificate of Analysis

PerkinElmer Number: N0691579

Description: Multi-Element Standard

Matrix: 2% HNO₃

Lot Number: 58-146CRX1

Certification Date: APR -- 2022

Expiration Date: OCT 30 2023

* Instrumental Analysis using ICP Spectrometer:

Analyte	Labeled	Measured	SRM	Analyte	Labeled	Measured	SRM
As	50.0 µg/mL	49.3 µg/mL	3103a*	Ni	10.0 µg/mL	9.89 µg/mL	3136*
K	50.0 µg/mL	50.0 µg/mL	3141a*	Sr	10.0 µg/mL	10.0 µg/mL	3153a*
La	10.0 µg/mL	9.91 µg/mL	3127a*	Zn	10.0 µg/mL	9.99 µg/mL	3168a*
Li	10.0 µg/mL	9.96 µg/mL	3129a*	Ba	1.00 µg/mL	0.996 µg/mL	3104a*
Mn	10.0 µg/mL	10.1 µg/mL	3132*	Mg	1.00 µg/mL	0.992 µg/mL	3131a*

* - indicates NIST SRM

† - indicates CRM (when NIST SRM is not available)

Reference Multi: Lot# 57-138CR, 3-250MJ, 57-024CR, 57-208CR

Refer to side 2 for details of certification.

Balances are calibrated with weight sets traceable to NIST.

We guarantee that our PerkinElmer TruQ Atomic Spectroscopy Standards are stable and accurate to $\pm 0.5\%$ of certified concentration until the expiration date, provided the standards are kept tightly capped and stored under normal laboratory conditions. This value is the sum of cumulative errors associated with the analytical determinations, pipetting, and diluting to final volume. For these solutions we use high purity acids, ASTM Type I water (18 megohm double deionized), and leached, triple-rinsed bottles. All glassware used is class A.



Certifying Officer: Y. Parvath

PerkinElmer

PerkinElmer, Inc.

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U.S.A. Toll Free: 1-800-762-4000

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PerkinElmer TruQ

Atomic Spectroscopy Standard



Certificate of Analysis

PerkinElmer Number: N0691579
Description: Multi-Element Standard
Matrix: 2% HNO₃
Lot Number: 58-146CRX1

Certification Date: MAY -- 2022

Expiration Date: NOV 30 2023

* Instrumental Analysis using ICP Spectrometer:

Analyte	Labeled	Measured	SRM	Analyte	Labeled	Measured	SRM
As	50.0 µg/mL	49.3 µg/mL	3103a*	Ni	10.0 µg/mL	9.89 µg/mL	3136*
K	50.0 µg/mL	50.0 µg/mL	3141a*	Sr	10.0 µg/mL	10.0 µg/mL	3153a*
La	10.0 µg/mL	9.91 µg/mL	3127a*	Zn	10.0 µg/mL	9.99 µg/mL	3168a*
Li	10.0 µg/mL	9.96 µg/mL	3129a*	Ba	1.00 µg/mL	0.996 µg/mL	3104a*
Mn	10.0 µg/mL	10.1 µg/mL	3132*	Mg	1.00 µg/mL	0.992 µg/mL	3131a*

* - indicates NIST SRM

† - indicates CRM (when NIST SRM is not available)

Reference Multi: Lot# 57-138CR, 3-250MJ, 57-024CR, 57-208CR

Refer to side 2 for details of certification.

Balances are calibrated with weight sets traceable to NIST.

We guarantee that our PerkinElmer TruQ Atomic Spectroscopy Standards are stable and accurate to $\pm 0.5\%$ of certified concentration until the expiration date, provided the standards are kept tightly capped and stored under normal laboratory conditions. This value is the sum of cumulative errors associated with the analytical determinations, pipetting, and diluting to final volume. For these solutions we use high purity acids, ASTM Type I water (18 megohm double deionized), and leached, triple-rinsed bottles. All glassware used is class A.



Certifying Officer: Y. Pavich

PerkinElmer*

PerkinElmer, Inc.

U.S.A. Tel: 1-203-925-4600

U.S.A. Toll Free: 1-800-762-4900

Visit www.perkinelmer.com/lasoffices for a complete listing of our global offices.



PerkinElmer

Global Service Training Department

Service Engineer Certification

Wiphan Promlunda

**This is to certify that the above mentioned
PerkinElmer representative has been trained to
service the instrument indicated below:**

ICP220B Optima 8300 & Optima 4X/5X/7X00 Series

Instructor:

Geoff Cook

Date: July 20, 2012

Certified by:

(Manager, Global Training Operations)



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. 0-2719-9434



Cert.No.: 23CHO493

Page.: 1 of 3

Certificate of Calibration

Equipment : Spectrophotometer
Manufacturer : Perkin Elmer
Model : Lambda 365
Serial No. : 365K9042909
ID No. : -
Condition As-Received: Used Item
Received Date : 18 August 2023
Calibration Date : 18 August 2023
Reference : 2308-0469OC-1
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240
Calibration Place : Laboratory (Thai Environment Technic Limited)
Ambient Temperature : (25.5 - 25.3) °C (On-Site)
Relative Humidity : (57.8 - 60.6) % (On-Site)
Calibration Procedure : In - house method :
CP-OCH4 based on ASTM E 275-01

Calibrated by : Kunchit Promprat

Approved by :

Approved Signatory

- (✓) Sathip Meangmai
() Warakorn Lerngatrakul
() Ponpan Paipim

Issue Date : 22 August 2023

The Uncertainties are for a confidence probability of approximately 95%

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

A 0057186



Cert. No. : 23CHO493

Page : 2 of 3

Condition of calibration result

1. Reference Standard Material :

<u>Material</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due date</u>
1. Absorbance Standard set	8331	105939	28 Sep 2024
2. Wavelength Standard set	8417	100498	25 Mar 2024
3. Wavelength Standard set	8418	100499	25 Mar 2024
4. Stray Light Standard set	8419	108963	01 Feb 2025

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 (\pm nm)	Coverage Factor k
418.53	418.54	0.12	2.00
536.52	536.13	0.12	2.00
638.00	637.64	0.14	2.05
684.50	684.49	0.13	2.00
879.41	879.42	0.12	2.00

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Cert. No. : 23CHO493

Page : 3 of 3

Calibration Results : without adjustment**Photometric Accuracy**

Wavelength (nm)	Certified Values of Reference Material (Abs)	UUC Reading (Abs)	Uncertainty of Measurement (\pm Abs)	Coverage Factor <i>k</i>
420.0	Zero	0.0000	0.0028	2.00
	0.5712	0.5699	0.0031	2.00
	0.7510	0.7494	0.0031	2.00
	1.0893	1.0877	0.0033	2.00
546.1	Zero	-0.0001	0.0028	2.00
	0.5224	0.5209	0.0028	2.00
	0.6856	0.6839	0.0028	2.00
	0.9937	0.9921	0.0028	2.00
635.0	Zero	-0.0001	0.0028	2.00
	0.5397	0.5375	0.0028	2.00
	0.6832	0.6810	0.0028	2.00
	0.9886	0.9861	0.0028	2.00

Stray Light

* Straylight at 260.74 nm \pm 0.11 nm	Reading at 260.74 nm \pm 0.11 nm
Abs	2.0488
%T	0.8951

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 260.74 nm \pm 0.11 nm
- Result = Pass, If Absorbance > 2.00 Abs and Transmission < 1.0 %T at Wavelength 260.74 nm \pm 0.11 nm
- * : Not NSC-ONSC Accredited

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

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Certificate of Calibration

Certificate Number : SPR24020097-8

Page : 1 of 3

Customer : Thai Environmental Technic Limited.

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

Equipment Name : DO Meter

Manufacturer : Horiba

Model : OM-71G

Serial Number : D75J0012

ID. Number : No.07

Environmental Conditions

Ambient Temperature : $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ Received Date : 07 Feb 2024

Relative Humidity : $50\% \pm 15\%$ Calibration Date : 09 Feb 2024

Location of Calibration : In-Lab Recommend Due Date : 09 Feb 2025

Calibration Procedure : In-House Method Date of Issue : 10 Feb 2024

Method of Calibration


This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Sarawut Khitmai

Calibration Officer

Approved by :


(Mr.Yodyaim Chansang)

Authorized Signatory



Calibration Report

Certificate Number : SPR24020097-8

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Zero Oxygen Solution	HI7040L	Lot S0027-23 _	21C31	21 Mar 2028

Traceability

This certification is traceable to the International System of Unit maintained at :
HANNA - Hanna Instruments (Thailand) Ltd.



Result of Calibration

Certificate Number : SPR24020097-8

Page : 3 of 3

Function : Dissolved Oxygen Permanance Test

Unit : mg/L

Actual Standard	UUC Reading	Error	Uncertainty (±)
0.00	0.34	0.34	0.13
8.24	8.72	0.48	0.13

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
554/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3009-29 FAX. 0-2719-9484



Cert. No.: 23TM604

Page : 1 of 3

Certificate of Calibration

Equipment : Incubator

Manufacturer : Memmert

Model : INE 500

Serial No. : E505.0595

ID No. : TET.LAB.INC 01

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

Location : Laboratory (Thai Environmental Technic Limited)

Received Order : 10 April 2023

Calibration Date : 10 April 2023

Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$

Relative Humidity : $(50 \pm 30) \%$

Calibrated by : Man Pattanapongpaiboon

Approved by :

Approved Signatory

☐ Pornthippa Tameyakul

☒ Maee Butkruea

☐ Suwit Imjai

Issue Date :

25 April 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written

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

A 0053457



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2304-0146OC-4
Procedure Used :-

Cert. No.: 23TM604

Page : 2 of 3

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY41021843	22LM172	27 Dec 2023

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

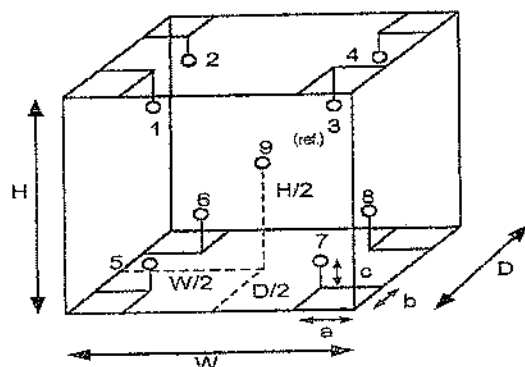
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	25	25
REL.Humid. (%)	54	57
AC Supply (Volt)	223	219



Position :	Ref. Std. ID No.:
1	18-04RTD-01
2	18-04RTD-02
3	18-04RTD-03
4	18-04RTD-04
5	18-04RTD-05
6	18-04RTD-06
7	18-04RTD-07
8	18-04RTD-08
9 (ref.)	18-04RTD-09

Probe Installation Details :

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm

Dimension of Chamber :

D = 0.40 m
W = 0.56 m
H = 0.48 m
Capacity = 0.11 m³

Maku.



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2304-0146OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 23TM604

Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
35.0	35.0	35.0	0.065	0.32	0.67	2
41.5	41.5	41.5	0.032	0.49	0.63	2
44.5	44.5	44.5	0.086	0.60	0.86	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (±°C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
35.0	34.870	34.847	34.722	34.860	34.744	35.047	34.842	35.288	35.026	0.30
41.5	41.625	41.612	41.461	41.733	41.300	41.428	41.418	41.874	41.758	0.30
44.5	44.744	44.708	44.553	44.862	44.205	44.476	44.352	44.931	44.778	0.30

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

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

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

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

UUC* : Unit Under Calibration

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

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

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Certificate of Calibrator

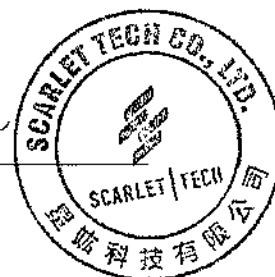
for ST-120 Sound Calibrator

No. 20231221J143

Name of Product Sound Calibrator
 Type ST-120
 Serial Number ST120C0263E
 Specification Class 1
 Date 2023/12/21

Tested by

Jim Lin



1. Outside : OK
 2. Sound Pressure Level : 93.97 dB ; 114.03 dB
 3. Frequency : 998.30 Hz
 4. Distortion : 1.15 % ; 1.35 %

Environment conditions :

Air temperature : 18 °C
 Relative humidity : 62 %
 Static pressure : 101.9 kPa

Scarlet Tech Co., Ltd.

4F-3, No. 347, HePing E Rd, 2nd Sec, DaAn District, Taipei City 106, Taiwan
 E-mail: info@scarlet.com.tw www.scarlet-tech.com

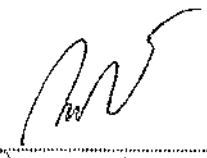


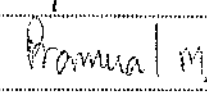
Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : TENMARS Sound Calibrator TM-100
Standard : IEC 60942
Accuracy : 94.0 ± 0.3 dB and 114.0 ± 0.5 dB
Frequency : at 1,000 Hz $\pm 1\%$
Calibrator Serial NO. : ST120C0263E
Calibration Date : 1-May-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23 ± 3)°C : 25.00 °C
Relative Humidity (50 ± 15 %) : 50.0 % RH
Dued Date of Calibrate : 31-May-2024

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



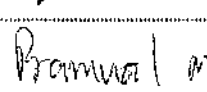
Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	Calibration Date	: 1-May-2024
Calibrator	: TENMARS Sound Calibrator TM-100	Barometric pressure (mmHg)	: 759.0 mmHg
Standard	: IEC 60942	Temperature (23±3)°C	: 25.00 °C
Accuracy	: 94.0 ±0.3 dB and 114.0±0.5 dB	Relative Humidity(50±15 %)	: 50.0 % RH
Frequency	: at 1,000 Hz ±1%	Dued Date of Calibrate	: 31-May-2024
Calibrator Serial NO.	: ST120C0263E		

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	114.2	114.2	114.2	114.2			
36	ACO	6226	110102	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.8	113.8	113.8	113.8			
37	ACO	6226	110101	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	113.9	113.9	113.9	113.9			
38	ACO	6226	110106	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			
39	ACO	6226	110104	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			
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	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
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	94.3	94.3	94.3	94.3	94.0	0.3	PASS
				114.0	114.2	114.2	114.2	114.2			

Calibration By : 

Approve by : 

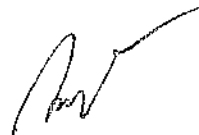


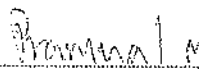
Thai Environmental Technic Limited
บริษัท เทคนิกลสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	Calibration Date	: 1-May-2024
Calibrator	: TENMARS Sound Calibrator TM-100	Barometric pressure (mmHg)	: 759.0 mmHg
Standard	: IEC 60942	Temperature (23±3)°C	: 25.00 °C
Accuracy	: 94.0 ±0.3 dB and 114.0±0.5 dB	Relative Humidity(50±15 %)	: 50.0 % RH
Frequency	: at 1,000 Hz ±1%	Dued Date of Calibrate	: 31-May-2024
Calibrator Serial NO.	: ST120C0263E		

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
46	ACO	6236	112029	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
48	ACO	6236	152074	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
49	ACO	6236	152075	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.1	114.1	114.1	114.1			
50	ACO	6236	152076	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.8	113.8	113.8	113.8			
51	ACO	6236	152077	94.0	94.3	94.3	94.3	94.3	94.0	0.3	PASS
				114.0	114.3	114.3	114.3	114.3			
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	93.8	93.8	93.8	93.8	94.0	0.3	PASS
				114.0	113.9	113.9	113.9	113.9			
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	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
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 : 

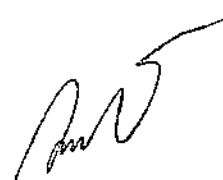


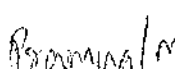
Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	Calibration Date	: 1-May-2024
Calibrator	: TENMARS Sound Calibrator TM-100	Barometric pressure (mmHg)	: 759.0 mmHg
Standard	: IEC 60942	Temperature (23±3)°C	: 25.00 °C
Accuracy	: 94.0 ±0.3 dB and 114.0±0.5 dB	Relative Humidity(50±15 %)	: 50.0 % RH
Frequency	: at 1,000 Hz ±1%	Dued Date of Calibrate	: 31-May-2024
Calibrator Serial NO.	: ST120C0263E		

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	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.2	114.2	114.2	114.2			
58	ACO	6226	160143	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			
59	ACO	6226	160203	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			
60	ACO	6226	160204	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			
61	ACO	6226	160205	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			
62	ACO	6226	160211	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			
63	ACO	6226	160212	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			
64	ACO	6226	160213	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			
66	ACO	6226	160215	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			
67	ACO	6226	160216	94.0	93.7	93.7	93.7	93.7	94.0	0.3	PASS
				114.0	113.6	113.6	113.6	113.6			

Calibration By : 

Approve by : 



Thai Environmental Technic Limited
บริษัท เทคนิกลิ่งแวดล้อมไทย จำกัด


Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : TENMARS Sound Calibrator TM-100
Standard : IEC 60942
Accuracy : 94.0 ± 0.3 dB and 114.0 ± 0.5 dB
Frequency : at 1,000 Hz $\pm 1\%$
Calibrator Serial NO. : ST120C0263E

Calibration Date : 1-May-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23 \pm 3) $^{\circ}$ C : 25.00 $^{\circ}$ C
Relative Humidity(50 \pm 15 %) : 50.0 % RH
Dued Date of Calibrate : 31-May-2024

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust \pm dB	Deviation \pm 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	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
70	ACO	6236	222038	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			
71	ACO	6236	222039	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			
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			
74	ACO	6236	222245	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 : 



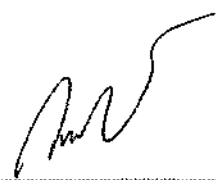
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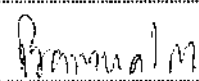
Sound Level Meter Calibration Report

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 $\pm 1\%$
Calibrator Serial NO. : ST120C0263E

Calibration Date : 1-May-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23 ± 3)°C : 25.00 °C
Relative Humidity (50 ± 15 %) : 50.0 % RH
Dued Date of Calibrate : 31-May-2024

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			
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			
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	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
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	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
85	SCARLET	ST-11D	820879	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			
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	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.8	113.8	113.8	113.8			

Calibration By : 

Approve by : 

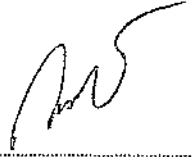


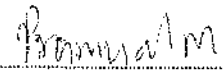
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Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	Calibration Date	: 1-May-2024
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	: 31-May-2024
Calibrator Serial NO.	: ST120C0263E		

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			
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	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
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 : 



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Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	Calibration Date	: 1-May-2024
Calibrator	: TENMARS Sound Calibrator TM-100	Barometric pressure (mmHg)	: 759.0 mmHg
Standard	: IEC 60942	Temperature (23±3)°C	: 25.00 °C
Accuracy	: 94.0±0.3 dB and 114.0±0.5 dB	Relative Humidity(50±15 %)	: 50.0 % RH
Frequency	: at 1,000 Hz ±1%	Dued Date of Calibrate	: 31-May-2024
Calibrator Serial NO.	: ST120C0263E		

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
21	ACO	6226	070049	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.1	114.1	114.1	114.1			
23	RION	NL-21	00487676	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			
25	ACO	6226	100098	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			
26	ACO	6226	100099	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			
28	ACO	6226	100101	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
29	ACO	6226	100102	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
30	ACO	6226	100108	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			
31	ACO	6226	110098	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			
32	ACO	6226	110105	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			
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 : 




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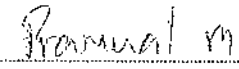
Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : TENMARS Sound Calibrator TM-100
Standard : IEC 60942
Accuracy : 94.0 ± 0.3 dB and 114.0 ± 0.5 dB
Frequency : at 1,000 Hz $\pm 1\%$
Calibrator Serial NO. : ST120C0263E

Calibration Date : 1-May-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23 ± 3)°C : 25.00 °C
Relative Humidity (50 ± 15 %) : 50.0 % RH
Dued Date of Calibrate : 31-May-2024

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	114.2	114.2	114.2	114.2			
36	ACO	6226	110102	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.8	113.8	113.8	113.8			
37	ACO	6226	110101	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	113.9	113.9	113.9	113.9			
38	ACO	6226	110106	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			
39	ACO	6226	110104	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			
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	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
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	94.3	94.3	94.3	94.3	94.0	0.3	PASS
				114.0	114.2	114.2	114.2	114.2			

Calibration By : 

Approve by : 



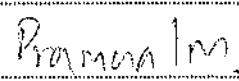
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Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	Calibration Date	: 1-May-2024
Calibrator	: TENMARS Sound Calibrator TM-100	Barometric pressure (mmHg)	: 759.0 mmHg
Standard	: IEC 60942	Temperature (23±3)°C	: 25.00 °C
Accuracy	: 94.0±0.3 dB and 114.0±0.5 dB	Relative Humidity(50±15 %)	: 50.0 % RH
Frequency	: at 1,000 Hz ±1%	Dued Date of Calibrate	: 31-May-2024
Calibrator Serial NO.	: ST120C0263E		

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
46	ACO	6236	112029	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
48	ACO	6236	152074	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
49	ACO	6236	152075	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.1	114.1	114.1	114.1			
50	ACO	6236	152076	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.8	113.8	113.8	113.8			
51	ACO	6236	152077	94.0	94.3	94.3	94.3	94.3	94.0	0.3	PASS
				114.0	114.3	114.3	114.3	114.3			
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	93.8	93.8	93.8	93.8	94.0	0.3	PASS
				114.0	113.9	113.9	113.9	113.9			
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	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
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 : 




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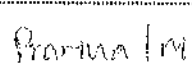
Sound Level Meter Calibration Report

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 $\pm 1\%$
Calibrator Serial NO. : ST120C0263E

Calibration Date : 1-July-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23 ± 3)°C : 25.00 °C
Relative Humidity (50 ± 15 %) : 50.0 % RH
Dued Date of Calibrate : 31-July-2024

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			
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	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
81	SCARLET	ST-11D	820393	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			
82	SCARLET	ST-11D	820394	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			
83	SCARLET	ST-11D	820877	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			
84	SCARLET	ST-11D	820878	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			
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	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.4	114.4	114.4	114.4			
87	SCARLET	ST-11D	821294	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			

Calibration By : 

Approve by : 

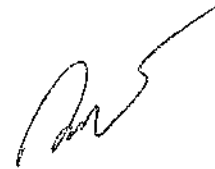


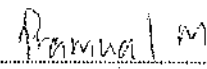
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Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	Calibration Date	: 1-May-2024
Calibrator	: TENMARS Sound Calibrator TM-100	Barometric pressure (mmHg)	: 759.0 mmHg
Standard	: IEC 60942	Temperature (23±3)°C	: 25.00 °C
Accuracy	: 94.0 ±0.3 dB and 114.0 ±0.5 dB	Relative Humidity(50±15 %)	: 50.0 % RH
Frequency	: at 1,000 Hz ±1%	Dued Date of Calibrate	: 31-May-2024
Calibrator Serial NO.	: ST120C0263E		

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	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.2	114.2	114.2	114.2			
58	ACO	6226	160143	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			
59	ACO	6226	160203	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			
60	ACO	6226	160204	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			
61	ACO	6226	160205	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			
62	ACO	6226	160211	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			
63	ACO	6226	160212	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			
64	ACO	6226	160213	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			
66	ACO	6226	160215	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			
67	ACO	6226	160216	94.0	93.7	93.7	93.7	93.7	94.0	0.3	PASS
				114.0	113.6	113.6	113.6	113.6			

Calibration By : 

Approve by : 



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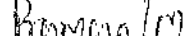
Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : TENMARS Sound Calibrator TM-100
Standard : IEC 60942
Accuracy : 94.0 ±0.3 dB and 114.0 ±0.5 dB
Frequency : at 1,000 Hz ±1%
Calibrator Serial NO. : ST120C0263E

Calibration Date : 1-May-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 31-May-2024

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	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
70	ACO	6236	222038	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			
71	ACO	6236	222039	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			
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			
74	ACO	6236	222245	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 : 




Thai Environmental Technic Limited
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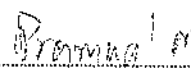
Sound Level Meter Calibration Report

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. : ST120C0263E

Calibration Date : 1-May-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 31-May-2024

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			
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			
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	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
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	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
85	SCARLET	ST-11D	820879	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			
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	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.8	113.8	113.8	113.8			

Calibration By : 

Approve by : 



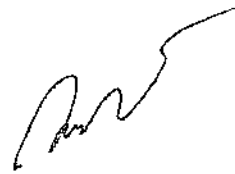
Thai Environmental Technic Limited
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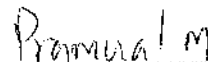
Sound Level Meter Calibration Report

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 $\pm 1\%$
Calibrator Serial NO. : ST120C0263E

Calibration Date : 1-May-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23 \pm 3) $^{\circ}$ C : 25.00 $^{\circ}$ C
Relative Humidity(50 \pm 15 %) : 50.0 % RH
Dued Date of Calibrate : 31-May-2024

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust \pm dB	Deviation \pm dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
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	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
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 : 



CERTIFICATE OF CALIBRATION

NO. 20231214061

Name of Product:	Sound Level Meter
Model:	ST-11D
Serial Number:	820393
Specification:	Class 1
Conclusion:	Pass
Date of calibration:	2023-12-14
Due Date:	2024-12-13

Calibrated by: *Jim Lin*



- This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass then, and applies only to the unit identified above.
- This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

1. Preliminary inspection: OK

2. Type & serial No. of Microphone: AWA14425-52174

3. Adjustments to indicated sound levels:

Type of Calibrator: B&K 4231 Sound

Pressure Level: 94.0 dB

4. Measuring up limit: 140 dBA

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
10	-71.1	-14.6	0.2	1000	0.0	0.0	-0.1
20	-50.3	-6.4	-0.3	2000	0.1	0.0	0.0
31.5	-39.4	-2.1	0.1	4000	1.2	-0.1	0.0
63	-26.1	-0.4	-0.1	8000	1.2	-0.8	0.0
125	-16.4	-0.1	-0.1	12500	-5.2	-7.2	0.1
250	-8.6	0.1	0.0	16000	-11.5	-13.3	0.2
500	-3.1	0.1	0.1	20000	-23.4	-25.8	-0.3

6. Self-generated noise

Microphone replaced by electrical input signal device

7.7 dB(A)	8.4 dB(C)	13.9 dB(Z)
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7. F&S Weighting

Rate of the F weighting decrease (dB/s)	35.2
Rate of the S weighting decrease (dB/s)	4.2
Deviation of F&S	-0.1

8. Level Linearity (A-weighting at frequency 1 kHz)

Reference sound level 90.0 dB

Max error at 10dB steps upper reference sound level 0.1 dB

Max error at 1dB steps within 5dB of the upper limit linear operating range 0.0 dB

Max error at 10dB steps below reference sound level 0.1 dB

Max error at 1dB steps within 5dB upper the lower limit linear operating range 0.1 dB

9. Tone burst response (AWeighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	LAFmax-LA	LASmax-LA	LAE-LA	LAeqT-LA
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
2	-18.1	-26.9	-26.9	-7.0
0.25	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz) :

Cycle	One cycle	nominal value	Positive half	nominal value	Negative half	nominal value
LCpeak-LC(dB)	3.5	3.5	2.4	2.4	2.3	2.4

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 112.8 dB

Sweep amplitude: 40 dB

Scan cycle time: 60 S; Measurement period: 180 S.

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
L _{Aeq,T}	103.2	103.2	0.0
L ₅	110.8	110.8	0.0
L ₁₀	108.8	108.8	0.0
L ₅₀	92.9	92.8	0.1
L ₉₀	76.9	76.8	0.1
L ₉₅	75.0	74.9	0.1

Uncertainty of measurement results: 0,4 dB (k=2)

Environment conditions:

Air temperature: 20 °C
Relative humidity: 50 %
Static pressure: 101.8 kPa

Reference equipment used in the calibration:

Description:	Model	Serial No.	Expiry Date	Traceable To
Microphone	B&K 4191	2929405	2024-12-15	NML
Multi function sound calibrator	B&K 4226	2288444	2024-10-15	CIGISMEC
Signal generator	DS 360	33873	2024-10-15	CEPREI

Test specifications:

1. All Scarlet's Sound level Meter has been calibrated in accordance with the requirements as specified in ISO 17025 and the lab calibration procedure SMTP004-CA-152.
2. The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
3. The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

References:

IEC 61672-3 Sound Level Meters Part 3: Periodic tests

CERTIFICATE OF CALIBRATION

NO. 20231214058

Name of Product:	Sound Level Meter
Model:	ST-11D
Serial Number:	820390
Specification:	Class 1
Conclusion:	Pass
Date of calibration:	2023-12-14
Due Date:	2024-12-13

Calibrated by: *Jim Lin*



- This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass then, and applies only to the unit identified above.
- This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

1. Preliminary inspection: OK

2. Type & serial No. of Microphone: AWA14425-54825

3. Adjustments to indicated sound levels:

Type of Calibrator: B&K 4231 Sound

Pressure Level 94.0 dB

4. Measuring up limit: 140 dBA

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
10	-71.1	-14.6	0.2	1000	0.0	0.0	-0.1
20	-50.3	-6.4	-0.3	2000	0.1	0.0	0.0
31.5	-39.4	-2.2	0.1	4000	1.3	-0.1	0.0
63	-26.2	-0.8	-0.1	8000	-1.1	-0.8	0.0
125	-16.3	-0.1	0.1	12500	-5.6	-7.2	0.1
250	-8.6	0.1	0.0	16000	-11.6	-13.6	0.2
500	-3.1	0.1	0.1	20000	-23.5	-25.8	-0.3

6. Self-generated noise

Microphone replaced by electrical input signal device

6.9 dB(A)	7.0 dB(C)	15.1 dB(Z)
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7. F&S Weighting

Rate of the F weighting decrease (dB/s)	35.0
Rate of the S weighting decrease (dB/s)	4.4
Deviation of F&S	-0.1

8. Level Linearity (A-weighting at frequency 1 kHz)

Reference sound level 90.0 dB

Max error at 10dB steps upper reference sound level 0.1 dB

Max error at 1dB steps within 5dB of the upper limit linear operating range 0.0 dB

Max error at 10dB steps below reference sound level 0.1 dB

Max error at 1dB steps within 5dB upper the lower limit linear operating range 0.1 dB

9. Tone burst response (A Weighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	LAFmax-LA	LASmax-LA	LAE-LA	LAeqT-LA
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
2	-18.1	-26.9	-26.9	-7.0
0.25	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz) :

Cycle	One cycle	nominal value	Positive half	nominal value	Negative half	nominal value
LCpeak-LC(dB)	3.5	3.5	2.4	2.4	2.3	2.4

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 112.8 dB

Sweep amplitude: 40 dB

Scan cycle time: 60 S; Measurement period: 180 S.

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
L _{Aeq,T}	103.2	103.2	0.0
L ₅	110.8	110.8	0.0
L ₁₀	108.8	108.8	0.0
L ₅₀	92.9	92.8	0.1
L ₉₀	76.9	76.8	0.1
L ₉₅	75.0	74.9	0.1

Uncertainty of measurement results: 0.4 dB (k=2)

Environment conditions:

Air temperature: 20 °C

Relative humidity: 50 %

Static pressure: 101.8 kPa

Reference equipment used in the calibration:

Description:	Model	Serial No.	Expiry Date	Traceable To
Microphone	B&K 4191	2929405	2024-12-15	NML
Multi function sound calibrator	B&K 4226	2288444	2024-10-15	CIG/SMC
Signal generator	DS 360	33873	2024-10-15	CEPREI

Test specifications:

1. All Scarlet's Sound level Meter has been calibrated in accordance with the requirements as specified in ISO 17025 and the lab calibration procedure SMTP004-CA-152.
2. The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
3. The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

References:

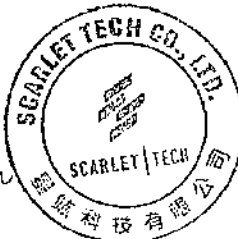
IEC 61672-3 Sound Level Meters Part 3: Periodic tests

CERTIFICATE OF CALIBRATION

NO. 20231214062

Name of Product:	Sound Level Meter
Model:	ST-11D
Serial Number:	820394
Specification:	Class1
Conclusion:	Pass
Date of calibration:	2023-12-14
Due Date:	2024-12-13

Calibrated by: *Jim Lin*



- This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass then, and applies only to the unit identified above.
- This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

1. Preliminary inspection: OK

2. Type & serial No. of Microphone: AWA14425-52756

3. Adjustments to indicated sound levels:

Type of Calibrator B&K 4231 Sound

Pressure Level 94.0 dB

4. Measuring up limit: 140 dBA

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
10	-71.1	-14.4	0.2	1000	0.0	0.0	-0.1
20	-50.3	-6.4	-0.3	2000	0.1	0.0	0.0
31.5	-39.4	-2.2	0.1	4000	1.2	-0.1	0.0
63	-26.1	-0.3	-0.1	8000	1.2	-0.8	0.0
125	-16.1	-0.1	-0.1	12500	-5.2	-7.2	0.1
250	-8.5	0.1	0.0	16000	-11.5	-13.4	0.2
500	-3.2	0.1	0.1	20000	-23.4	-25.8	-0.3

6. Self-generated noise

Microphone replaced by electrical input signal device

10.8 dB(A)	10.3 dB(C)	15.8 dB(Z)
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7. F&S Weighting

Rate of the F weighting decrease (dB/s)	35.1
Rate of the S weighting decrease (dB/s)	4.1
Deviation of F&S	-0.1

8. Level Linearity (A-weighting at frequency 1 kHz)

Reference sound level 90.0 dB

Max error at 10dB steps upper reference sound level 0.1 dB

Max error at 1dB steps within 5dB of the upper limit linear operating range 0.0 dB

Max error at 10dB steps below reference sound level 0.1 dB

Max error at 1dB steps within 5dB upper the lower limit linear operating range 0.1 dB

9. Tone burst response (A Weighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	LAFmax-LA	LASmax-LA	LAE-LA	LAeqT-LA
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
2	-18.1	-26.9	-26.9	-7.0
0.25	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz) :

Cycle	One cycle	nominal value	Positive half	nominal value	Negative half	nominal value
LCpeak-LC(dB)	3.5	3.5	2.4	2.4	2.3	2.4

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 112.8 dB

Sweep amplitude: 40 dB

Scan cycle time: 60 S; Measurement period: 180 S.

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
L _{Aeq,T}	103.2	103.2	0.0
L ₅	110.8	110.8	0.0
L ₁₀	108.8	108.8	0.0
L ₅₀	92.9	92.8	0.1
L ₉₀	76.9	76.8	0.1
L ₉₅	75.0	74.9	0.1

Uncertainty of measurement results: 0.4 dB (k=2)

Environment conditions:

Air temperature: 20 °C
Relative humidity: 50 %
Static pressure: 101.8 kPa

Reference equipment used in the calibration:

Description:	Model	Serial No.	Expiry Date	Traceable To
Microphone	B&K 4191	2929405	2024-12-15	NML
Multi function sound calibrator	B&K 4226	2288444	2024-10-15	GIGISMEC
Signal generator	DS 360	33873	2024-10-15	CEPREI

Test specifications:

1. All Scarlet's Sound level Meter has been calibrated in accordance with the requirements as specified in ISO 17025 and the lab calibration procedure SMTP004-CA-152.
2. The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
3. The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

References:

IEC 61672-3 Sound Level Meters Part 3: Periodic tests

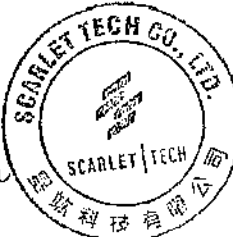


CERTIFICATE OF CALIBRATION

NO. 20240130117

Name of Product:	Sound Level Meter
Model:	ST-11D
Serial Number:	820877
Specification:	Class 1
Conclusion:	Pass
Date of calibration:	2024-01-30
Due Date:	2025-01-29

Calibrated by: *Jim Lin*



- I. This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass then, and applies only to the unit identified above.
- II. This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- III. This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

1. Preliminary inspection: OK

2. Type & serial No. of Microphone: AWA14425-50891

3. Adjustments to indicated sound levels:

Type of Calibrator B&K 4231 Sound

Pressure Level 94.0 dB

4. Measuring up limit: 140 dBA

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
10	-71.1	-14.6	-0.1	1000	0.0	0.0	-0.1
20	-50.3	-6.1	-0.2	2000	1.1	-0.1	-0.1
31.5	-39.3	-2.9	0.0	4000	1.4	-0.8	-0.1
63	-26.1	-0.8	0.0	8000	1.2	-3.1	0.0
125	-16.1	-0.1	0.0	12500	5.8	-7.8	0.0
250	-8.6	0.1	0.0	16000	-11.3	-13.6	0.1
500	-3.1	0.1	0.0	20000	-23.5	-25.9	-0.1

6. Self-generated noise

Microphone replaced by electrical input signal device

7.3 dB(A)	7.8 dB(C)	14.8 dB(Z)
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7. F&S Weighting

Rate of the F weighting decrease (dB/s)	35,2
Rate of the S weighting decrease (dB/s)	4,4
Deviation of F&S	-0,1

8. Level Linearity (A-weighting at frequency 1 kHz)

Reference sound level 90,0 dB

Max error at 10dB steps upper reference sound level 0,1 dB

Max error at 1dB steps within 5dB of the upper limit linear operating range 0,0 dB

Max error at 10dB steps below reference sound level 0,1 dB

Max error at 1dB steps within 5dB upper the lower limit linear operating range 0,1 dB

9. Tone burst response (A Weighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	LAFmax-LA	LASmax-LA	LAE-LA	LAeqT-LA
500	0,0	-4,0	-2,9	-7,0
200	-1,0	-7,4	-6,9	-7,0
2	-18,1	-26,9	-26,9	-7,0
0,25	-27,2	/	-36,0	-7,0

10. Peak C sound level (500Hz) :

Cycle	One cycle	nominal value	Positive half	nominal value	Negative half	nominal value
LCpeak-LC(dB)	3,5	3,5	2,4	2,4	2,3	2,4

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 112,8 dB

Sweep amplitude: 40 dB

Scan cycle time: 60 S: Measurement period: 180 S.

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
LAeq,T	103.2	103.2	0.0
L5	110.8	110.8	0.0
L10	108.8	108.8	0.0
L50	92.9	92.8	0.1
L90	76.9	76.8	0.1
L95	75.0	74.9	0.1

Uncertainty of measurement results: 0.4 dB (k=2)

Environment conditions:

Air temperature: 20 °C
Relative humidity: 50 %
Static pressure: 101.8 kPa

Reference equipment used in the calibration:

Description:	Model	Serial No.	Expiry Date	Traceable To
Microphone	B&K 4191	2929405	2024-12-15	NML
Multi function sound calibrator	B&K 4226	2288444	2024-10-15	CIGISMEC
Signal generator	DS 360	33873	2024-10-15	CEPREI

Test specifications:

1. All Scarlet's Sound level Meter has been calibrated in accordance with the requirements as specified in ISO17025 and the lab calibration procedure SMTP004-CA-152.
2. The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of ±20%.
3. The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responses of the Sound Level Meter.

References:

IEC 61672-3 Sound Level Meters Part 3: Periodic tests



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0632

MTC No. EEL. BP. 28/0866

CALIBRATION CERTIFICATE

Submitted by : THAI ENVIRONMENTAL TECHNIC LIMITED.

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

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

Instrument Calibrated :

Ambient Environment

Description : Sound Calibrator

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

Manufacturer : Digicon

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

Model : Tenmars

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

Serial No. : 180501628

Standards used :

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

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

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

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

Date of Receipt : 10 Aug. 2023

Date of Calibration : 16 Aug. 2023

1/3

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

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

FM.BL.MTC.002 Rev.4

Head Office

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

Office/Laboratory

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

Office

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



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0632

MTC No. EEL. BP. 28/0866

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

Nominal Output of Unit Under Test = 94 dB re 20 μ Pa at 1000 Hz

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

1. Sound Pressure Level

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

2. Frequency

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

3. Total distortion

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

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Date of Calibration : 16 Aug. 2023

2/3 ✓

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

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

FM.BL.MTC.002 Rev.4

Head Office

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

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

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



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0632

MTC No. EEL. BP. 28/0866

Nominal Output of Unit Under Test = 114 dB re 20 μ Pa at 1000 Hz

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

1. Sound Pressure Level

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

2. Frequency

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

3. Total Distortion

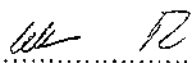
Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	3.14	± 0.70	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.


3. The microphone volume correction was not included.

Calibrated by :



(Mr. Weerachai Deechaiyae)

Approved by :


(Mr. Prasate Kluaypa)
Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 16 Aug. 2023

Date of Issue : 21 Aug. 2023

Ref : 2011266081003103001

End of Certificate

3 / 3

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

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

FM.BL.MTC.002 Rev.4

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
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Tel. (66) 0 2577 9000
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Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office

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



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24020220-5

Page : 1 of 3

Customer : Thai Environmental Technic Limited.

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

Equipment Name : Liquid in Glass Thermometer

Manufacturer : AMA

Model : N/A

Serial Number : 2197297

ID. Number : N/A

Environmental Conditions

Ambient Temperature : $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$

Received Date : 14 Feb 2024

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

Calibration Date : 15 Feb 2024

Location of Calibration : In-Lab

Recommend Due Date : 15 Feb 2025

Calibration Procedure : SP-CPT-04-08

Date of Issue : 16 Feb 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Surasak Ritthikaew

Calibration Officer

Approved by :

(Mr. Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24020220-5

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Super Thermometer with PRT	1575/3850-40-392	58087/100288	PSL-T 0400/66	15 Feb 2024

Traceability

This certification is traceable to the International System of Unit maintained at :

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24020220-5

Page : 3 of 3

Range : -5 to 110 °C

Resolution : 0.5 °C

Unit : °C

Setting Value	Standard Reading	UUC Reading	Error	Uncertainty (±)
25.0	25.009	25.0	-0.009	0.29
30.0	30.008	30.0	-0.008	0.29
35.0	35.009	35.0	-0.009	0.29
40.0	40.008	40.0	-0.008	0.29
45.0	45.010	45.0	-0.010	0.29
50.0	50.012	50.0	-0.012	0.29

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24020220-4

Page : 1 of 3

Customer : Thai Environmental Technic Limited.

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

Equipment Name : Liquid in Glass Thermometer

Manufacturer : AMA

Model : N/A

Serial Number : 2197300

ID. Number : N/A

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Received Date : 14 Feb 2024

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

Calibration Date : 15 Feb 2024

Location of Calibration : In-Lab

Recommend Due Date : 15 Feb 2025

Calibration Procedure : SP-CPT-04-08

Date of Issue : 16 Feb 2024

Method of Calibration

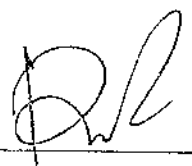
This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Surasak Ritthikaew

Calibration Officer

Approved by :


(Mr. Prayodh Topart)

Authorized Signatory



ID LINE: IEC17025



Calibration Report

Certificate Number : SPR24020220-4

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Super Thermometer with PRT	1575/3850-40-392	58087/100288	PSL-T 0400/66	15 Feb 2024

Traceability

This certification is traceable to the International System of Unit maintained at :

TISTR - Thailand Institute of Scientific and Technological Research

66/2561 No. 1 Klongkiet Klongkiet Road, Bangkok 10120 (Thailand) Tel: (662) 190-2229 & 662-190-2229 www.metrologythailand.com



ID LINE: IEC17025



Result of Calibration

Certificate No. : SPR24020220-4

Page : 3 of 3

Range : -5 to 110 °C

Resolution : 0.5 °C

Unit : °C

Setting Value	Standard Reading	UUC Reading	Error	Uncertainty (±)
25.0	25.005	25.0	-0.005	0.29
30.0	30.007	30.0	-0.007	0.29
35.0	35.006	35.0	-0.006	0.29
40.0	40.007	40.0	-0.007	0.29
45.0	45.009	45.0	-0.009	0.29
50.0	50.012	50.0	-0.012	0.29

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

Notes : 1. For any information, please contact Metrology System (Thailand) Co., Ltd. Tel: (662) 193-2220 or Email: metrology@ms-thailand.com



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24020220-3

Page : 1 of 3

Customer : Thai Environmental Technic Limited.

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

Equipment Name : Liquid in Glass Thermometer

Manufacturer : AMA

Model : N/A

Serial Number : 2197301

ID. Number : N/A

Environmental Conditions

Ambient Temperature : $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$

Received Date : 14 Feb 2024

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

Calibration Date : 15 Feb 2024

Location of Calibration : In-Lab

Recommend Due Date : 15 Feb 2025

Calibration Procedure : SP-CPT-04-08

Date of Issue : 16 Feb 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Surasak Ritthikaew

Calibration Officer

Approved by :

(Mr. Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24020220-3

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Super Thermometer with PRT	1575/3850-40-392	58087/100288	PSL-T 0400/66	15 Feb 2024

Traceability

This certification is traceable to the International System of Unit maintained at :

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE:IEC17025



Result of Calibration

Certificate No. : SPR24020220-3

Page : 3 of 3

Range : -5 to 110 °C

Resolution : 0.5 °C

Unit : °C

Setting Value	Standard Reading	UUC Reading	Error	Uncertainty (±)
25.0	25.007	25.0	-0.007	0.29
30.0	30.008	30.0	-0.008	0.29
35.0	35.008	35.0	-0.008	0.29
40.0	40.007	40.0	-0.007	0.29
45.0	45.009	45.0	-0.009	0.29
50.0	50.012	50.0	-0.012	0.29

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24020220-31

Page : 1 of 3

Customer : Thai Environmental Technic Limited.

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

Equipment Name : Liquid in Glass Thermometer

Manufacturer : AMA

Model : N/A

Serial Number : 2197268

ID. Number : N/A

Environmental Conditions

Ambient Temperature : $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$

Received Date : 14 Feb 2024

Relative Humidity : $50\text{ } \% \pm 15\text{ } \%$

Calibration Date : 15 Feb 2024

Location of Calibration : In-Lab

Recommend Due Date : 15 Feb 2025

Calibration Procedure : SP-CPT-04-08

Date of Issue : 16 Feb 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

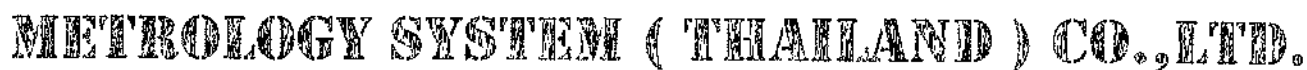
Calibrated by : Mr.Jirasak Pumbut

Calibration Officer

Approved by :

(Mr.Prayoon Topart)

Authorized Signatory



ID LINE: IEC17025



Calibration Report

Certificate Number : SPR24020220-31

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Super Thermometer with PRT	1575/3850-40-392	58087/100288	PSL-T 0400/66	15 Feb 2024

Traceability

This certification is traceable to the International System of Unit maintained at :

TISTR - Thailand Institute of Scientific and Technological Research

33/26 Ave L, Hong Kong Education City 999 Tel: (862) 182-0220 S 4719 www.cse.hku.hk/0550391059.com



ID LINE : IEC17025



ANAB
ASSOCIATION OF NATIONAL ACCREDITATION BODIES
ACCREDITED
CALIBRATION AND
DIMENSIONAL MEASUREMENT

Result of Calibration

Certificate No. : SPR24020220-31

Page : 3 of 3

Range : -5 to 110 °C

Resolution : 0.5 °C

Unit : °C

Setting Value	Standard Reading	UUC Reading	Error	Uncertainty (±)
25.0	25.009	25.0	-0.009	0.29
30.0	30.010	30.0	-0.010	0.29
35.0	35.008	35.0	-0.008	0.29
40.0	40.012	40.0	-0.012	0.29
45.0	45.011	45.0	-0.011	0.29
50.0	50.013	50.0	-0.013	0.29

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24020220-32

Page : 1 of 3

Customer : Thai Environmental Technic Limited.

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

Equipment Name : Liquid in Glass Thermometer

Manufacturer : AMA

Model : N/A

Serial Number : 2197269

ID. Number : N/A

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Received Date : 14 Feb 2024

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

Calibration Date : 15 Feb 2024

Location of Calibration : In-Lab

Recommend Due Date : 15 Feb 2025

Calibration Procedure : SP-CPT-04-08

Date of Issue : 16 Feb 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Jirasak Pumbut

Calibration Officer

Approved by :

(Mr.Prayoon Topart)

Authorized Signatory



ID LINE: IEC17025



Calibration Report

Certificate Number : SPR24020220-32

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Super Thermometer with PRT	1575/3850-40-392	58087/100288	PSL-T 0400/66	15 Feb 2024

Traceability

This certification is traceable to the International System of Unit maintained at :

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



ANAB
ACCREDITED
CALIBRATION AND
DIMENSIONAL MEASUREMENT

Result of Calibration

Certificate No. : SPR24020220-32

Page : 3 of 3

Range : -5 to 110 °C

Resolution : 0.5 °C

Unit : °C

Setting Value	Standard Reading	UUC Reading	Error	Uncertainty (±)
25.0	25.006	25.0	-0.006	0.29
30.0	30.005	30.0	-0.005	0.29
35.0	35.007	35.0	-0.007	0.29
40.0	40.008	40.0	-0.008	0.29
45.0	45.008	45.0	-0.008	0.29
50.0	50.012	50.0	-0.012	0.29

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24020220-30

Page : 1 of 3

Customer : Thai Environmental Technic Limited.

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

Equipment Name : Liquid in Glass Thermometer

Manufacturer : AMA

Model : N/A

Serial Number : 2197270

ID. Number : N/A

Environmental Conditions

Ambient Temperature : $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$

Received Date : 14 Feb 2024

Relative Humidity : $50\text{ \%} \pm 15\text{ \%}$

Calibration Date : 15 Feb 2024

Location of Calibration : In-Lab

Recommend Due Date : 15 Feb 2025

Calibration Procedure : SP-CPT-04-08

Date of Issue : 16 Feb 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Jirasak Pumbut

Calibration Officer

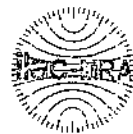
Approved by :

(Mr. Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24020220-30

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Super Thermometer with PRT	1575/3850-40-392	58087/100288	PSL-T 0400/66	15 Feb 2024

Traceability

This certification is traceable to the International System of Unit maintained at :

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24020220-30

Page : 3 of 3

Range : -5 to 110 °C

Resolution : 0.5 °C

Unit : °C

Setting Value	Standard Reading	UUC Reading	Error	Uncertainty (±)
25.0	25.005	25.0	-0.005	0.29
30.0	30.005	30.0	-0.005	0.29
35.0	35.006	35.0	-0.006	0.29
40.0	40.007	40.0	-0.007	0.29
45.0	45.008	45.0	-0.008	0.29
50.0	50.010	50.0	-0.010	0.29

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No. : 24H557

Page : 1 of 2

Equipment : Thermal Environment Monitor

Manufacturer: JANTYTECH

Model : JT2011-E2A

Serial No.: 3522210140

ID No.: HD 2

Condition As-Received: Used Item

Received Date: 12 March 2024

Calibration Date: 18 March 2024

Reference: 2403-0381DSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: (25 \pm 3) °C

Relative Humidity: (50 \pm 20) %

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

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

Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Handheld Thermometer With Sensor	1521	A5A339	2311238	16 Oct 2024

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

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

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

Calibrated by : Somchai Dumwor

Issue Date : 25 March 2024

Approved Signatory :

☒ Chakrit Waewwanjua

☐ Pornthippa Tameyakul

☐ Unnopphol Harachai



Cert. No.: 24H557

Page.: 2 of 2

Result of Calibration:- Without Adjustment

Function: Temperature Measurement for Tn

<u>Standard</u> <u>Temperature</u> (°C)	<u>UUC*</u> <u>Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty</u> <u>of Measurement</u> (±°C)
20.019	19.9	-0.119	0.42
30.028	29.8	-0.228	0.42
39.998	39.6	-0.398	0.42

Result of Calibration:- Without Adjustment

Function: Temperature Measurement for Tnw

<u>Standard</u> <u>Temperature</u> (°C)	<u>UUC*</u> <u>Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty</u> <u>of Measurement</u> (±°C)
20.019	19.8	-0.219	0.42
30.028	29.8	-0.228	0.42
39.998	39.7	-0.298	0.42

Result of Calibration:- Without Adjustment

Function: Temperature Measurement for Tg

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

UUC* : Unit Under Calibration

The reported uncertainty of measurement was base on standard uncertainty multiplied by coverage factor $k = 2.00$, providing confidence level approximately 95%.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No. : 24H559

Page : 1 of 2

Equipment : Thermal Environment Monitor
Manufacturer: JANTYTECH
Model : JT2011-E2A
Serial No.: 3522210142
ID No.: HD 4

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

Condition As-Received: Used Item

Received Date: 12 March 2024

Calibration Date: 18 March 2024

Reference: 2403-0381DSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

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

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

Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Handheld Thermometer With Sensor	1521	A5A339	2311238	16 Oct 2024

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

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

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

Calibrated by : Somchai Dumwor
Issue Date : 25 March 2024

Approved Signatory :

☒ Chakrit Waewwanjua
☐ Pornthippa Tameyakul
☐ Unnopphol Harachai

B 0336872



Cert. No.: 24H559

Page.: 2 of 2

Result of Calibration:-

Without Adjustment

Function: Temperature Measurement for T_n

<u>Standard</u> <u>Temperature</u> (°C)	<u>UUC*</u> <u>Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty</u> <u>of Measurement</u> (±°C)
20.019	19.8	-0.219	0.42
30.028	29.9	-0.128	0.42
39.998	39.9	-0.098	0.42

Result of Calibration:-

Without Adjustment

Function: Temperature Measurement for T_{nw}

<u>Standard</u> <u>Temperature</u> (°C)	<u>UUC*</u> <u>Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty</u> <u>of Measurement</u> (±°C)
20.019	19.9	-0.119	0.42
30.028	29.9	-0.128	0.42
39.998	39.9	-0.098	0.42

Result of Calibration:-

Without Adjustment

Function: Temperature Measurement for T_g

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

UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor $k = 2.00$, providing confidence level approximately 95%.

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a 1208146



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
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TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No. : 24H564

Page : 1 of 2

Equipment : Thermal Environment Monitor

Manufacturer: JANTYTECH

Model : JT2011-E2A

Serial No.: 3522210147

ID No.: HD 9

Condition As-Received: Used Item

Received Date: 12 March 2024

Calibration Date: 19 March 2024

Reference: 2403-0381DSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

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except with the prior written approval of the head of
Corporate Services 3: Equipment Calibration and Testing Services.

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

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

Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Handheld Thermometer With Sensor	1521	A5A339	231238	16 Oct 2024

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

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

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

Calibrated by : Somchai Dumwor

Issue Date : 25 March 2024

Approved Signatory :

☒ Chakrit Waewwanjua

☐ Pornthippa Tameyakul

☐ Unnopphol Harachai

B 0336877



Cert. No.: 24H564

Page.: 2 of 2

Result of Calibration:- Without Adjustment

Function: Temperature Measurement for T_n

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

Result of Calibration:- Without Adjustment

Function: Temperature Measurement for T_{nw}

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

Result of Calibration:- Without Adjustment

Function: Temperature Measurement for T_g

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

UUC* : Unit Under Calibration

The reported uncertainty of measurement was base on standard uncertainty multiplied by coverage factor $k = 2.00$, providing confidence level approximately 95%.

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a 1208151



ภาคผนวก จ

หนังสือขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์

เอกชนทะเบียน ว-236



ที่ อก ๐๓๑๐(๑)/ ๕ ๘ ๗ ๖

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒ ๒ มิถุนายน ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๓ มีนาคม ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด จำนวน ๒๘ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียน
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๓๖ สถานที่ตั้งเลขที่ ๑/๖ ซอยรามคำแหง ๑๔๕ แขวงสะพานสูง
เขตสะพานสูง กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด ต่ออายุหนังสือรับขึ้น
ทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

- | | |
|------------------------------|----------------------------|
| ๑) นายณัฐพงศ์ โคตะมา | ทะเบียนเลขที่ ว-๒๓๖-ค-๐๐๐๑ |
| ๒) นางสาววาริรัตน์ ประชุมแดง | ทะเบียนเลขที่ ว-๒๓๖-ค-๐๐๐๒ |
| ๓) นางพรทิพย์ เพชรชี | ทะเบียนเลขที่ ว-๒๓๖-ค-๐๐๐๓ |
| ๔) นายสมชาย ปิยะวรสกุล | ทะเบียนเลขที่ ว-๒๓๖-ค-๐๐๐๔ |
| ๕) นายประมวล มุลสาร | ทะเบียนเลขที่ ว-๒๓๖-ค-๐๐๐๕ |
| ๖) นายรัฐพล สุขดี | ทะเบียนเลขที่ ว-๒๓๖-ค-๐๐๐๖ |

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

- | | |
|-----------------------------------|----------------------------|
| ๑) นางสาวทอฝัน อัครชัยสุภิกรม | ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๐๑ |
| ๒) นางสาวกมลลักษณ์ ตีมมงคล | ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๐๒ |
| ๓) นางสาวกนกวรรณ เริ่มประชาธิปไตย | ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๐๓ |
| ๔) นางสาวฐิติพรรณ ศรีสุวรรณ | ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๐๔ |
| ๕) นางสาวธนิดา กุมุขชาติ | ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๐๕ |
| ๖) นางสาวมาลินี มณีรัตน์ | ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๐๖ |
| ๗) นางสาวพัชราพรรณ สว่างภพ | ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๐๗ |
| ๘) นายสุริยะพงศ์ ยงยุทธ | ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๐๘ |
| ๙) นางสาวดอกรัก สีแท้ | ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๐๙ |
| ๑๐) นางสาวศิริพร กาจิตร | ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๑๐ |
| ๑๑) นายสุชาติ ศรีบุญ | ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๑๑ |
| ๑๒) นายเกียรติศักดิ์ วันดี | ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๑๒ |

๑๓) นายจิรวัฒน์...

๑๓) นายจิรวุฒิ อินทเสย์	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๑๓
๑๔) นางสาวนิตยา เย็นวัฒนา	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๑๔
๑๕) นางสาวณัฐธยาน์ สารแสง	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๑๕
๑๖) นายกิตติศักดิ์ เมืองงาม	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๑๖
๑๗) นายเทพพงศ์ เขยวัดเกาะ	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๑๗
๑๘) นายเฉลิมวุฒิ พูลสงวน	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๑๘
๑๙) นางสาวนุชศิริ อรชร	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๑๙
๒๐) นางสาววรรณศิริ สุริยวงศ์	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๒๐
๒๑) นายวิฑูร วลัยรัตน์	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๒๑
๒๒) นางสาวกังสาด จอกสูงเนิน	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๒๒
๒๓) นางสาวสุกัญญา อยู่นิม	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๒๓
๒๔) นางสาวลลิตา ตริยโตมร	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๒๔
๒๕) นายเจอ แซ่หั่ว	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๒๕
๒๖) นายอรรถพล วงศ์สวัสดิ์	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๒๖
๒๗) นายประหยัด จิวเดช	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๒๗
๒๘) นายเบญจพล กรีคงคา	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๒๘
๒๙) นายวีรพล บุตสา	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๒๙
๓๐) นายพิเชฐ อยู่ดีรัมย์	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๓๐
๓๑) นายณัฐดนัย ศรีรัตน์ชัชวาลย์	ทะเบียนเลขที่ ว-๒๓๖-จ-๐๐๓๑

ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๑๓ มีนาคม ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

จกจ ฉ.ว. ✓

(นายประสม ดำรงพงษ์)

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

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เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

เลขทะเบียน ว-๒๓๖

ที่ อก ๐๓๑๐(๑)/ ๙ ๘ ๗ ๖

ลงวันที่ ๒๒ มิถุนายน ๒๕๖๖

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๓๗ รายการ

น้ำเสีย จำนวน 40 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
2	Arsenic	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4]
3	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
4	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
5	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
6	Biochemical Oxygen Demand	5-Day BOD Test, Azide Modification Method ^[4]
7	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
8	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method ^[4]
9	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
10	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
11	Color	ADMI Weighted-Ordinate Spectrophotometric Method ^[4]
12	Copper	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
13	Cyanide	Distillation, Colorimetric Method ^[4]
14	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
15	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
16	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
18	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
19	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
20	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
21	Formaldehyde	Distillation, Colorimetric Method ^[3]
22	Free Chlorine	DPD Ferrous Titrimetric Method ^[4]
23	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
24	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
25	Hexavalent Chromium	Colorimetric Method ^[4]
26	Lead	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
27	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
28	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[4]
29	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
30	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ^[4] 2) Soxhlet Extraction Method ^[4]
31	pH	Electrometric Method ^[4]
32	Phenols	Distillation, Direct Photometric Method ^[4]
33	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4]
34	Sulfide	1) Iodometric Method ^[4] 2) Methylene Blue Method ^[4]
35	Temperature	Laboratory and Field Methods ^[4]
36	Total Dissolved Solids	Dried at 180 °C ^[4]
37	Total Kjeldahl Nitrogen	Macro-Kjeldahl Method ^[4]
38	Total Suspended Solids	Dried at 103-105 °C ^[4]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
39	Trivalent Chromium	Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^[4]
40	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]

น้ำใต้ดิน จำนวน 122 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
2	Acetone	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
5	Antimony	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
6	Arsenic	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4]
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
8	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
10	Benzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
13	Benzoic acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
15	Benzo(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
16	Beryllium	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
19	Bromodichloromethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
20	Bromoform	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
21	Butanol	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
23	Cadmium	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
25	Carbon disulfide	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
26	Carbon tetrachloride	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
29	Chlorobenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
30	Chlorodibromomethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
31	Chloroform	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
32	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
33	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method; Colorimetric Method; Calculation ^[4] 3) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^[4]
34	Chromium (VI)	Colorimetric Method ^[4]
35	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
36	Cyanide	Distillation, Colorimetric Method ^[4]
37	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
38	DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
39	DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
40	DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
41	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
42	Di-n-butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[4]
43	1,2-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
44	1,3-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
45	1,4-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
46	1,1-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
47	1,2-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
48	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]
49	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ^[4]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
50	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
51	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
52	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
53	1,3-Dichloropropene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
54	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
55	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
56	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
57	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
58	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
59	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
60	Di-n-Octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
61	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
62	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
63	Ethylbenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
64	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
65	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
66	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
67	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
68	Hexachloro-1,3-butadiene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
69	n-Hexane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
70	α -HCH	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
71	β -HCH	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
72	γ -HCH	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
73	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
74	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
75	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
76	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
77	Lead	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
78	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
79	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[4]
80	Methanol	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
81	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
82	Methyl bromide	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
83	Methylene chloride	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
84	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
85	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
86	Methyl tert-butyl ether	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
87	Naphthalene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
88	Nickel	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
89	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
90	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
91	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
92	Polychlorinated Biphenyls PCB-1016 PCB-1221 PCB-1232 PCB-1242 PCB-1248 PCB-1254 PCB-1260	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
93	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
94	pH	Electrometric Method ^[4]
95	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
96	Phenol	1) Distillation, Direct Photometric Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
97	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4]
98	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4]
99	Silver	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 3) Digestion, Inductively Coupled Plasma Method ^[4]
100	Styrene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
101	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
102	Tetrachloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
103	Toluene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
104	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
105	TPH (C ₅ -C ₈)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[12,22]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
106	TPH (C ₈ -C ₁₆)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[9,22]
107	TPH (C ₁₆ -C ₃₅)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[9,22]
108	1,2,4-Trichlorobenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
109	1,1,1-Trichloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
110	1,1,2-Trichloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
111	Trichloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
112	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
113	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ^[4]
114	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
115	Vanadium	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]
116	Vinyl acetate	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
117	Vinyl chloride	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
118	m-Xylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
119	o-Xylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
120	p-Xylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
121	Xylene (Total)	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^[4]
122	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ^[4] 2) Digestion, Inductively Coupled Plasma Method ^[4]

อากาศเสีย (ปล่อยระบาย) จำนวน 18 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5] 2) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^[5] 3) Isokinetic Sampling, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[5]
2	Arsenic	Isokinetic Sampling, Digestion, Hydride Generation/ Atomic Absorption Spectrometric Method ^[5]
3	Carbon monoxide	Instrumental Analyzer Method ^[5]
4	Chlorine	Absorption Sampling, Ion Chromatographic Method ^[5]
5	Copper	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5] 2) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^[5]
6	Cresol	Adsorption Sampling, Gas Chromatographic Method ^[5]
7	Dioxins/Furans	Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory (Dioxins/Furans Analysis Approved) ^[5]
8	Hydrogen Chloride	Absorption Sampling, Ion Chromatographic Method ^[5]
9	Hydrogen Fluoride	Absorption Sampling, Ion Chromatographic Method ^[5]
10	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ^[5]
11	Lead	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^[5] 2) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^[5] 3) Isokinetic Sampling, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[5]
12	Mercury	Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[5]
13	Opacity	Ringelmann's Method ^[2]
14	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic acid Method ^[5] 2) Instrumental Analyzer Method ^[5]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	Sulfur dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method ^[5] 2) Instrumental Analyzer Method ^[5]
16	Sulfuric acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ^[5]
17	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ^[5]
18	Xylene	Adsorption Sampling, Gas Chromatographic Method ^[5]

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 36 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^[1,10,29] 2) Solid-Phase Extraction, Gas Chromatographic Method ^[10,24] 3) Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
2	Antimony	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14]
3	Arsenic	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[1,6,17] 2) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[7,17]
4	Barium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
5	Beryllium	4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14] 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14]
6	Cadmium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14]
7	Chlordane	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^[1,10,24] 2) Solid-Phase Extraction, Gas Chromatographic Method ^[10,24] 3) Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
8	Chromium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Chromium (III)	3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14]
10	Chromium (VI)	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation ^[1,6,15,18] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation ^[1,6,16,18] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation ^[1,6,14,18] 4) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^[7,8,15,18] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^[7,8,16,18] 6) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^[7,8,14,18]
11	Cobalt	1) Waste Extraction, Colorimetric Method ^[1,18] 2) Alkaline Digestion, Colorimetric Method ^[8,18] 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
12	Copper	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14]
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,24] 2) Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
14	DDD	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^[1,10,24] 2) Solid-Phase Extraction, Gas Chromatographic Method ^[10,24] 3) Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
15	DDE	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^[1,10,24] 2) Solid-Phase Extraction, Gas Chromatographic Method ^[10,24] 3) Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
16	DDT	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^[1,10,24] 2) Solid-Phase Extraction, Gas Chromatographic Method ^[10,24] 3) Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
17	Dieldrin	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^[1,10,24] 2) Solid-Phase Extraction, Gas Chromatographic Method ^[10,24] 3) Soxhlet Extraction, Gas Chromatographic Method ^[11,24]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
18	Endrin	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
19	Heptachlor	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
20	Lead	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)
21	Lindane	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1,6,19) 2) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽²⁰⁾
23	Methoxychlor	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24)

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
24	Mirex	3) Soxhlet Extraction, Gas Chromatographic Method ^[11,24] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,24] 2) Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
25	Molybdenum	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14]
26	Nickel	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14]
27	Polychlorinated Biphenyls Aroclor 1016 Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1260 2,4,4'-Trichlorobiphenyl 2,2',5,5'-Tetrachlorobiphenyl	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,25] 2) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^[1,10,25] 3) Soxhlet Extraction, Gas Chromatographic Method ^[11,25]

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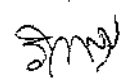
ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	2,2',4,5,5'-Pentachlorobiphenyl 2,2',3,4,4',5'- Hexachlorobiphenyl 2,2',4,4',5,5'- Hexachlorobiphenyl 2,2',3,4,4',5,5'- Heptachlorobiphenyl Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^[1,9,24] 2) Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
29	Selenium	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[1,6,21] 2) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[7,21]
30	Silver	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14]
31	Thallium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
32	Toxaphene	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^[1,10,24] 2) Solid-Phase Extraction, Gas Chromatographic Method ^[10,24] 3) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[11,27]
33	Trichloroethylene	1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[1,12,26] 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
34	Vanadium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14]
35	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[13,26]
36	Zinc	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,6,15] 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[1,6,16] 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,14] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 6) Digestion, Inductively Coupled Plasma Method ^[7,14]

Signature

ดิน จำนวน 121 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
3	Aldrin	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
4	Anthracene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
5	Antimony	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,14]
6	Arsenic	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[7,17]
7	Atrazine	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
8	Barium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,14]
9	Benz(a)anthracene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
11	Benzo(b)fluoranthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
12	Benzo(k)fluoranthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
13	Benzoic acid	Soxhlet Extraction, Gas Chromatographic Method ^[11,23]
14	Benzo(a)pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
15	Benzo(g,h,i)perylene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
16	Beryllium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Bis(2-chloroethyl)ether	2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,14] Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
18	Bis(2-ethylhexyl)phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
22	Butyl benzyl phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
23	Cadmium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,14]
24	Carbazole	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
27	Chlordane	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
28	p-Chloroaniline	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
32	Chromium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
33	Chromium (III)	2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,14] 1) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^[7,8,15,18] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^[7,8,16,18] 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^[7,8,14,18]
34	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^[8,18]
35	Chrysene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
36	Cyanide	1) Extraction, Distillation, Titrimetric Method ^[28,29,30] 2) Extraction, Distillation, Colorimetric Method ^[28,29,30]
37	2,4-D	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
38	DDD	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
39	DDE	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
40	DDT	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
41	Dibenz(a,h)anthracene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
42	Di-n-butyl phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
43	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
44	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
45	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
46	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
47	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
48	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
49	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
50	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
51	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
52	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
53	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
54	Dieldrin	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
55	Diethyl phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
56	2,4-Dimethylphenol	Soxhlet Extraction, Gas Chromatographic Method ^[11,23]
57	2,4-Dinitrophenol	Soxhlet Extraction, Gas Chromatographic Method ^[11,23]
58	2,4-Dinitrotoluene	Soxhlet Extraction, Gas Chromatographic Method ^[11,23]
59	2,6-Dinitrotoluene	Soxhlet Extraction, Gas Chromatographic Method ^[11,23]
60	Di-n-Octyl phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
61	Endosulfan	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
62	Endrin	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
63	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
64	Fluoranthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
65	Fluorene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
66	Heptachlor	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
67	Heptachlor epoxide	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
68	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
69	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
70	α -HCH	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
71	β -HCH	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
72	γ -HCH	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
73	Hexachlorocyclopentadiene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
74	Hexachloroethane	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
75	Indeno(1,2,3-cd)pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
76	Isophorone	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
77	Lead	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,14]
78	Manganese	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,14]
79	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[20]
80	Methanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
81	Methoxychlor	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
82	Methyl bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
83	Methylene chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
84	2-Methylphenol	Soxhlet Extraction, Gas Chromatographic Method ^[11,23]
85	2-Methylnaphthalene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
86	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
87	Naphthalene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
88	Nickel	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,14]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
89	Nitrobenzene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
90	N-Nitrosodiphenylamine	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
91	N-Nitrosodi-n-propylamine	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
92	Polychlorinated Biphenyls Aroclor 1016 Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1260 2,2',5,5'-Tetrachlorobiphenyl 2,2',4,5,5'-Pentachlorobiphenyl 2,2',3,4,4',5'- Hexachlorobiphenyl 2,2',4,4',5,5'- Hexachlorobiphenyl 2,2',3,4,4',5,5'- Heptachlorobiphenyl	Soxhlet Extraction, Gas Chromatographic Method ^[11,25]
93	Pentachlorophenol	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
94	Phenanthrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
95	Phenol	Soxhlet Extraction, Gas Chromatographic Method ^[11,23]
96	Pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[11,27]
97	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[7,21]
98	Silver	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,14]
99	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]

Small

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
100	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
101	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
102	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
103	Toxaphene	Soxhlet Extraction, Gas Chromatographic Method ^[11,24]
104	TPH (C ₅ -C ₈)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
105	TPH (C ₈ -C ₁₆)	Soxhlet Extraction, Gas Chromatographic Method ^[11,22]
106	TPH (C ₁₆ -C ₃₅)	Soxhlet Extraction, Gas Chromatographic Method ^[11,22]
107	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
108	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
109	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
110	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
111	2,4,5-Trichlorophenol	Soxhlet Extraction, Gas Chromatographic Method ^[11,23]
112	2,4,6-Trichlorophenol	Soxhlet Extraction, Gas Chromatographic Method ^[11,23]
113	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
114	Vanadium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,14]
115	Vinyl acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
116	Vinyl chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
117	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
118	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
119	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
120	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,26]
121	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method ^[7,15] 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^[7,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,14]

เอกสารอ้างอิง

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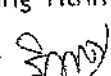
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ภาคผนวก ช

ใบอนุญาตเป็นผู้ตรวจวัดและวิเคราะห์สภาวะการทำงาน เกี่ยวกับความร้อน แสงสว่างเสียง และสารเคมี
อันตรายในบรรยากาศ



แบบ ภ.บ.ท.ที่ ๖
ฉบับที่ ๖๖๖

กรมสวัสดิการและคุ้มครองแรงงาน

ใบอนุญาต

เป็นผู้ใช้บริการตรวจวัดระดับความเข้มแข็งของสารเคมีอันตราย
ในบรรยากาศของสถานที่ทำงาน และสถานที่เก็บรักษาสารเคมีอันตราย

ใบอนุญาตเลขที่ ๑๒๐๑-๐๓-๒๕๖๔-๐๐๑๓

อนุญาตให้.....บริษัท เทคโนโลยีสิ่งแวดล้อม จำกัด

ดำเนินงานเป็นนิติบุคคล.....๑๒๐๑-๐๓-๒๕๖๔-๐๐๑๓
ตั้งอยู่ เลขที่ ๑๖/๖ ซอยสวนบัวแม่ ๑๕๕ แขวงสะพานสูง เขตสะพานสูง กรุงเทพมหานคร
เพื่อให้บุคคลผู้ให้บริการด้านความปลอดภัย อาชีวอนามัย และสภาพแวดล้อม
ในการทำงานไม่ก่ออันตราย ภัยพิบัติ และอื่น ๆ ให้แก่ผู้ปฏิบัติงานและผู้เกี่ยวข้อง
ในการดำเนินงานเกี่ยวกับความปลอดภัย อาชีวอนามัย และสภาพแวดล้อมในการทำงาน
ของสำนักงานมีอำนาจตามกฎหมายว่าด้วยความปลอดภัย อาชีวอนามัย และสภาพแวดล้อม
ในการทำงาน และระเบียบกระทรวงการกำหนดการอนุญาตให้บริการเพื่อส่งเสริมความปลอดภัย อาชีวอนามัย
และสภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ แห่งพระราชบัญญัติความปลอดภัย อาชีวอนามัย และ
สภาพแวดล้อมในการทำงาน พ.ศ. ๒๕๖๔ โดยมีบุคลากร จำนวน ๒๓ ราย

ทั้งนี้ ตั้งแต่วันที่ ๑๔ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๑๓ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๑๔ ธันวาคม พ.ศ. ๒๕๖๔

(นายสมพงษ์ งามนัย)

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

รายชื่อบุคลากรแบบที่ ๖ ใบอนุญาต
เป็นนิติบุคคลผู้ให้บริการตรวจวัดระดับความเข้มแข็งของสารเคมีอันตรายในบรรยากาศของสถานที่ทำงาน

และสถานที่เก็บรักษาสารเคมีอันตราย

ขอรับใช้ที่ เขตป้อมปราบศัตรูพ่าย กรุงเทพมหานคร จี. ดีดี

ใบอนุญาตเลขที่ ๐๒๐๑-๐๓-๒๕๖๔-๐๐๐๑

- | | |
|----------------------------|------------------------|
| ๑. นายปิยะชัย บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๒. นายประจักษ์ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๓. นายวิวัฒน์ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๔. นายประจักษ์ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๕. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๖. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๗. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๘. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๙. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๑๐. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๑๑. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๑๒. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๑๓. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๑๔. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๑๕. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๑๖. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๑๗. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๑๘. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๑๙. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๒๐. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |
| ๒๑. นายรุ่งเกียรติ บุญธรรม | นายรุ่งเกียรติ บุญธรรม |

ทั้งนี้ ตั้งแต่วันที่ ๑๔ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๑๓ ธันวาคม พ.ศ. ๒๕๖๗

ให้ไว้ ณ วันที่ ๑๔ ธันวาคม พ.ศ. ๒๕๖๔

(นายสมพงษ์ งามนัย)

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน



ไปรษณีย์

ပြည်သူ့ကျန်းမာရေးနှင့် အားကစားဝန်ကြီးဌာန

เลขทะเบียนภาษีนิติบุคคล.....๐๑๒๕๖๓๗๐๐๐๐๘๙๔

ตั้งแต่ พ.ศ. ๒๔๖๕ ของสมัยท่านหลวง ๑๙๙๙ แล้วลงมาจนถึง พ.ศ. ๒๕๖๕ นี้เอง เป็นที่พิศมัยให้บริการด้านความปลอดภัย และภาพแวดล้อมในการทำงาน ตามกฎกระทรวง
กำหนดแนวมาตรฐานในการปฏิบัติงาน และตามนโยบายของรัฐบาลไทย ซึ่งได้มีมติให้กระทรวงมหาดไทยเป็นหน่วยงานหลักในการดูแลความปลอดภัย
ในการปฏิบัติงานของหน่วยงานราชการ และหน่วยงานอื่นที่เกี่ยวข้อง และให้กระทรวงมหาดไทยเป็นหน่วยงานหลักในการดูแลความปลอดภัย
ในการปฏิบัติงานของหน่วยงานราชการ และหน่วยงานอื่นที่เกี่ยวข้อง และให้กระทรวงมหาดไทยเป็นหน่วยงานหลักในการดูแลความปลอดภัย

หนังสือพิมพ์ที่ ๑๕ ธันวาคม พ.ศ. ๒๕๖๔ ถึงวันที่ ๑๗ ธันวาคม พ.ศ. ๒๕๖๔

[illegible]

✓

(มาฆสงครมาญ) กวางแก้ว

ผู้ตรวจราชการกรม ปฏิบัติราชการแทน
อธิบดีกรมสวัสดิการและคุ้มครองแรงงาน

ราชภัฏรำไพพรรณี

เป็นกิตติบุคคลผู้ให้บริการจรรยาดีและวิเคราะหะผลการทำหนกยว้แ่ส่อง
ของบริษัท เพศมีคสีงแวลย้อยไทย จั๊ยัต

“ใบข่าขมิ้น” ๐๘๐๓-๐๙-๒๕๖๔-๐๐๐๓

๑. นายป๋วยอภัย
๒. นางสาวพัชราภ
๓. นางสาวอุษิตา
๔. นภาพัทธ
๕. นางสาวณิรรัตน์

๕๖๖
ทพ. ตงแตมทิ ๑๔ ต.วาคม พ.ศ. ๒๕๖๔ ถึง ๒๕๖๕ ๑๓ ต.วาคม พ.ศ. ๒๕๖๕

เพื่อให้ ณ วันที่ ๑๖ ธันวาคม ๒๕๖๕

✓

(1) $\mathcal{M}(\mathcal{A})$ is a $\mathcal{M}(\mathcal{A})$ -module.

ผู้ทรงอำนาจและภูมิปัญญา ปฎิบัติราชการและ
จัดตั้งกรมพลศึกษาและสโมสรของโรงเรียน