



ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์
(Calibration)

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration Date	Next Calibration
1.	Stack Air	Particulate	Dry Gas Meter/SK25EX	S/N 1169	21/02/2023	February 2024
			Digital Barometer/PHB-318	S/N B011410	11/05/2022	May 2023
			Digital Thermometer/DP-52	S/N I.392059	06-09/09/2022	September 2023
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	22/04/2022	April 2023
			Gas Analyzer (E-Instrument)/4400S	S/N 2178	07/01/2023	January 2024
2.	Ambient Air	NO _x as NO ₂	Gas Analyzer (E-Instrument)/4400S	S/N 2178	07/01/2023	January 2024
		SO ₂	Gas Analyzer (E-Instrument)/4400S	S/N 2178	07/01/2023	January 2024
		CO	Gas Analyzer (E-Instrument)/4400S	S/N 2178	07/01/2023	January 2024
		NO ₂	CERTIFICATE OF ANALYSIS : Linde	S/N A00962SK	18/08/2021	August 2023
			NO _x Analyzer/Teledyne 200E	S/N 2789	21/11/2022	May 2023
		SO ₂	CERTIFICATE OF ANALYSIS : Linde	S/N A00822SK	18/08/2021	August 2023
			SO ₂ Analyzer/Thermo 43C	S/N 43C73734373	21/11/2022	May 2023
		VOCs, Epichlorohydrin (ECH))	Gas Chromatograph/GC 7890	S/N CN10723012	28/06/2022	June 2023
			Mass Spectrometry/MS 5975	US 71236314	28/06/2022	June 2023
		Bisphenol A (BPA)	Personal Air Sampler/Gilian	S/N 20111203071	09/01/2023	February 2023
			Personal Air Sampler/Gilian	S/N 20110605018	27/02/2023	March 2023
			Personal Air Sampler/Gilian	S/N 20151002115	07/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140505073	05/04/2023	May 2023
			Personal Air Sampler/Gilian	S/N 20151102080	09/05/2023	June 2023
			Personal Air Sampler/Gilian	S/N 14903	14/06/2023	June 2023
			Gas Chromatograph/GC7890B	S/N CN16343040	26/09/2022	September 2023
			Wind speed and wind direction/Weather Wizard III	S/N WE61121A25A	12/09/2022	September 2023



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Item	Description	Parameter	List of Equipment	Equipment No.	Calibration Date	Next Calibration
3.	Working Air	ECH	Personal Air Sampler/Gilian	S/N 200310205001	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140505103	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20151002115	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140505029	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20111203065	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20151003024	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20151003009	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20140505103	13/06/2023	July 2023
			Gas Chromatograph/GC7890B	S/N CN16343040	26/09/2022	September 2023
		BPA	Personal Air Sampler/Gilian	S/N 20140504112	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20110803069	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140505074	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20031009020	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20111203071	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20111203067	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20151003049	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20111203067	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20120103069	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20111203056	13/06/2023	July 2023
		Xylene	Gas Chromatograph/GC7890B	S/N CN16343040	26/09/2022	September 2023
			Personal Air Sampler/Gilian	S/N 101157	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140505013	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140605015	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 101157	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20151002106	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20111203065	13/06/2023	July 2023



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Item	Description	Parameter	List of Equipment	Equipment No.	Calibration Date	Next Calibration
3.	Working Air (Cont.)	Xylene	Personal Air Sampler/Gilian	S/N 20080703002	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20120103092	13/06/2023	July 2023
			Gas Chromatograph/GC7890B	S/N CN16343040	26/09/2022	September 2023
		NaOH	Personal Air Sampler/Gilian	S/N 20080703006	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20151102097	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140605016	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20080703007	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20111203060	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140605003	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20151002109	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20151003045	13/06/2023	July 2023
		MIBK	Personal Air Sampler/Gilian	S/N 20140505029	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20080703020	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140605015	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140605001	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140505104	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20120103092	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20110605047	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20080703002	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20120103092	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20111203065	13/06/2023	July 2023
			Gas Chromatograph/GC7890B	S/N CN16343040	26/09/2022	September 2023



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Item	Description	Parameter	List of Equipment	Equipment No.	Calibration Date	Next Calibration
3.	Working Air (Cont.)	Toluene	Personal Air Sampler/Gilian	S/N 101157	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20120103081	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140505105	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140505104	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140605001	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 2015100210	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20151003043	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20111203065	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20120103092	13/06/2023	July 2023
			Gas Chromatograph/GC7890B	S/N CN16343040	26/09/2022	September 2023
		Phenol	Personal Air Sampler/Gilian	S/N 20140605001	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 11591	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140505023	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20031025001	09/03/2023	April 2023
			Personal Air Sampler/Gilian	S/N 20140505105	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20120103092	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20080703002	13/06/2023	July 2023
			Personal Air Sampler/Gilian	S/N 20151003043	13/06/2023	July 2023
			Gas Chromatograph/GC7890B	S/N CN16343040	26/09/2022	September 2023
			Sound level Calibrator/TENMARS TM-100	S/N 181203570	16/01/2023	January 2024
			Integrate Sound Level/SCARKET ST-11D	S/N 82394	24/02/2023	31 March 2023
4.	Sound Level	Leq 24 & เสียงรบกวน				



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Item	Description	Parameter	List of Equipment	Equipment No.	Calibration Date	Next Calibration
5.	Water	pH	pH Meter/Horiba F-71G	S/N V3B1F8H3	01/11/2022	November 2023
		Temperature	pH Meter/Horiba F-71G	S/N V3B1F8H3	01/11/2022	November 2023
		Color	SPECTROPHOTOMETER/Spectroquant Prove 100	S/N 1618111041	02/05/2023	May 2024
		TSS	Electronic Balance/METTLER TOLEDO	S/N 1116392227	11/04/2023	April 2024
		TDS	Electronic Balance/METTLER TOLEDO	S/N 1116392227	11/04/2023	April 2024
		BOD	BOD Incubator	ID/N TET.LAB.BOD 05	11/04/2023	April 2024
		Oil & Grease	Electronic Balance/METTLER TOLEDO	S/N 1116392227	11/04/2023	April 2024
		Phenol	Spectrophotometer/PerkinElmer	S/N 365K9042909	01/11/2022	November 2023
		Formaldehyde	Spectrophotometer/PerkinElmer	S/N 365K9042909	01/11/2022	November 2023
		Leq 8 hr	Sound Level Calibrator/TENMARS TM-100	S/N 181203570	16/01/2023	March 2024
6.	Occupational Safety and Health	Integrated Sound Level	ACO TYPE 6236	S/N 110166	24/05/2023	30/06/2023
			ACO TYPE 6236	S/N 110100	24/05/2023	30/06/2023
			ACO TYPE 6236	S/N 110100	24/05/2023	30/06/2023
		Noise Dose	Sound Level Calibrator/TENMARS TM-100	S/N 181203570	16/01/2023	March 2024
			Noise Dose Meter /Tenmas ST-130	S/N 170800201	07/03/2023	January 2024
			Noise Dose Meter /Tenmas ST-130	S/N 170400165	07/03/2023	January 2024
			Noise Dose Meter /Tenmas ST-130	S/N 200300134	21/02/2023	February 2024
			Noise Dose Meter /Tenmas ST-130	S/N 200300133	13/02/2023	February 2024
			Noise Dose Meter /Tenmas ST-130	S/N 200300133	13/02/2023	February 2024
		Heat	Thermal Environment Monitor/JANTYTECH JT2011-E2A	S/N 3522210144	09-13/03/2023	March 2024



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CONTROL UNIT CALIBRATION

(Metric units , mm)

Date **21-Feb-23**

Initial Final Average

Barometric press, Pb **758.8 758.3 758.6** mmHg

Dry Gas Meter Data

Reference Dry Gas Meter Data

Console No.

Serial No.

Metering System ID

Model

DGM Number

Correction factor(Yr)

DGM Model

Last Calibration Data

Orifice manometer setting ΔH mm H ₂ O	Ref . DMG Volume V _r Liters	DGM Volume V _m Liters	Temperature (° C)				Time min	DGM Correction factor (Y)	$\Delta H@$ mm H ₂ O
			Ref DGM	Dry Gas Meter					
				Inlet T _i	Outlet T _o	Avg T _m			
15.00	100.00	100.22	30.00	30.00	29.00	29.50	8.17	0.9917	46.5849
25.00	100.00	100.25	30.00	30.00	29.00	29.50	6.32	0.9905	46.5055
50.00	100.00	99.98	30.00	30.00	29.00	29.50	4.47	0.9908	46.6405
80.00	100.00	99.54	30.00	30.00	29.00	29.50	3.52	0.9923	46.4097
100.00	100.00	99.25	30.00	30.00	29.00	29.50	3.14	0.9932	46.2517
Average									46.4785

Dued Date of Calibrate

21-Feb-24

Calibrated by : *ydwis*

Approved : *T.yachon B*

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 0.75cfm (0.0212m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ± 0.2 inches (5.1mm)H₂O

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484



NSG-TSI-TIS-T7025
CALIBRATION 0008

Certificate of Calibration

Certificate No. : 22P1745
Page : 1 of 2

Equipment : Digital Barometer

Manufacturer : Lutron

Model : PHB-318

Serial No. : B011410

ID No. : No.4

Condition As-Received: Used Item

Received Date: 06 May 2022

Calibration Date: 11 May 2022

Reference: 2205-0152WSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: (23 \pm 2) °C

Relative Humidity: (50 \pm 15) %

Atmospheric Pressure: 1008 mbar

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

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments
Standard according to in-house calibration procedure CP-P10, using "DKD-R 6-1 : Calibration of Pressure
Gauges, Edition 03/2014 " as a guidelines.

Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Digital Manometer	767367	91R724799	22P396	08 Feb 2023
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 connector 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 at:-
-National Institute of Metrology Thailand (NIMT)

Calibrated by : Suksan Khankhaew

Issue Date : 12 May 2022

Approved Signatory : *Attapol P*

[] Phallinee Prabpaijal

[] Sura Suwanmasri

[x] Attapol Panurach

B 0287405



Cert.No.: 22P1745
Page: 2 of 2

Result of calibration:- Without adjustment
Function:- Absolute Pressure Measurement
Range: 730 mmHg to 770 mmHg
Resolution: 0.1 mmHg

Increasing Pressure					
Applied Pressure (mmHg)	730.85	740.85	750.85	760.85	770.85
UUC* Indication (mmHg)	731.6	741.6	751.6	761.6	771.5
Error (mmHg)	0.75	0.75	0.75	0.75	0.65

Decreasing Pressure					
Applied Pressure (mmHg)	770.85	760.85	750.85	740.85	730.85
UUC* Indication (mmHg)	771.5	761.6	751.7	741.5	731.6
Error (mmHg)	0.65	0.75	0.85	0.75	0.75

The uncertainty of measurement was ± 0.27 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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Attapo / P.

a 1106635



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9184



Certificate of Calibration

Certificate No.: 22T1604
Page: 1 of 2

Equipment: Digital Thermometer With Sensor

Manufacturer: Digicon

Model: DP-52

Serial No.: 1392059

ID No.: No.9

Condition As-Received: Used Item

Received Date: 26 August 2022

Calibration Date: 06 September 2022
to 09 September 2022

Reference: 2208-0934DSC

Ambient Temperature: $(25 \pm 3) ^\circ\text{C}$

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

Submitted by: Thai Environmental Technic Limited

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) and Industrial Platinum Resistance Thermometer (IPRT) into liquid bath temperature controller and comparison with Standard Thermocouple (Type K) into high temperature furnace.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1.Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Black Stack Thermometer	1580	8C454	221616	23 May 2023
2) PRT Scanner Module	2582	A01303	221616	23 May 2023
3) Industrial Platinum Resistance Thermometer	5627	739433	221616	23 May 2023
4) Digital Thermometer	1529-R	B19520	221835	11 Jul 2023
5) Platinum Resistance Thermometer	935-14-95	261589/2	221835	11 Jul 2023
6) Digital Multimeter	2700	4076315	EE-0106-21	14 Oct 2022
7) Standard Thermocouple Probe (Type S)	TCS	TCS-001	TT-0114-21	08 Dec 2022

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 at:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by: Yossapon Poljorn
Issue Date: 15 September 2022

Approved Signatory:

[] Phalinee Prabpai
[] Chatchawan Khurpluek
[x] Wanlop Larpkum

B 0296767



Cert. No.: 22T1604
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

Immersion Depth (mm.)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
180	200.0029	200.3	0.2971	0.73
180	400.0034	399.6	-0.4034	1.4
180	599.92	600.8	0.88	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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NSC-TB-T16025
CALIBRATION 0008

Cert.No.: 22MM27
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 : 20 April 2022
Calibration Date : 22 April 2022
Ambient Temperature : 15 °C to 40 °C
Relative Humidity : 30 % to 90 %

Calibrated by : Uthen Kankawi

Approved by : 
Approved Signatory

() Ponthippa Tameyakul
(✓) Malee Buikrua
() Suwit Imjai

Issue Date : 6 May 2022

The Uncertainties are for a confidence probability of approximately 95 %

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

a 1126038

A 0040784



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2204-0369OC-16
Cert.No.: 22MM27
Page: 2 of 3

Procedure used :-

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

Condition of this result of calibration

1. Reference standard instruments:-

Instruments	Model	Serial No.	ID No.	Test report No.	Due date
1) Standard Weight Set (E2)	15884	-	70RC138	MM-0009-21	3 Feb 2023
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 (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (\pm mg)	Coverage Factor (k)
100	99.9981	+0.0019	0.22	2.00
200	199.9957	+0.0043	0.35	2.00

After Adjustment :

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

Applied Weight (g)	Standard Deviation of Reading (g)
100	0.00006
200	0.00007

Modu.

a 1105869



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2204-0369OC-16
Cert.No.: 22MM27
Page: 3 of 3

Result of calibration

2. Effect of off center loading

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

Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)	Maximum difference between off-center and central loading (g)
-0.0003	-0.0003	-0.0003	-0.0004	0.0000	0.0003

3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (\pm mg)	Coverage Factor (k)
Unload	0.0000	0.0000	0.13	2.09
0.01	0.0099	+0.0001	0.13	2.09
0.1	0.0999	+0.0001	0.13	2.09
0.5	0.5000	0.0000	0.13	2.09
1	1.0001	-0.0001	0.13	2.09
5	5.0001	-0.0001	0.13	2.09
10	10.0000	0.0000	0.13	2.09
25	24.9998	+0.0002	0.15	2.06
50	49.9998	+0.0002	0.15	2.05
100	99.9998	+0.0002	0.22	2.00
200	199.9997	+0.0003	0.35	2.00

Note : This instrument was adjusted before calibration by weight of Mettler Toledo F1 200. g S/N: 11119517
Certificate No.: 21M1956

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-

Modu.

a 1105868



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Portable Gas Calibration Report

Manufacturer : B-Instruments
Instrument Model : 4500-S
Instrument serial no. : 2178
Instrument ID : 8

Date of Calibration: 7-Jan-23
Ambient Condition
Temperature (23±5 °C) : 25.0 °C
Humidity (55±15 % RH) : 50.0 % RH
Barometer (mmHg) : 760.0 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
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		PASS
	199.0	201.0	2.0		
SO ₂ (ppm)	392.0	395.0	3.0	±5.0 ppm 0...100 ppm ±5% measured Value 101...5000 ppm	PASS
	0.0	0.0	0.0		
CO (ppm)	405.0	405.0	-1.0		PASS
	804.0	802.0	-2.0		
	0.0	0.0	0.0		PASS
	404.0	404.0	0.0		
	793.0	794.0	1.0		

Calibrate by: *Jidwin S.* Approved by: *Piyasak B.*

THE LINDE GROUP



Certificate Of Analysis
Special Gases Mixture

Customer Details
Name: Thai Environmental Technic Limited
Address: 1/6 Soi Ramkhamhaeng 45, Khet Saphansong, Bangkok 10240
Customer Tag No.:

Certificate Details
Number: 3452/21
Date of Issue: 18-Aug-2021
Expiry date: 18-Aug-2023
Material Details
Production Order: 90167125
Cylinder No: 640300-SK-44
Gas Content: 5.52 M³
Filling pressure: 145.0 bar
Cylinder Owner: LINDE
Valve: CGA 660 SS
Cylinder Material: Spectra seal
Cylinder Size: 40 L

Laboratory Report
Component: Nominal Concentration
Nitric Oxide: 40.0 ppm
Other: NOx impurity less than 1.9 ppm
Analytical Result
Analysis Result: 39.7 ppm
Uncertainty: ± 1% relative
Method of Analysis: (6) I-P6-352
Assay Date: 11-Aug & 18-Aug-21

Reference Standard used in Assay
Cylinder number: 27881156
Concentration: 51.58 ± 0.41 ppm
Expiry date: 29-Oct-2022

Analytical Instruments used in Assay
Instrument/Make/Model: FIR Spectrometers Nicolet 550
Analytical Principle: FIR-NO
Last Multipoint Calibration: 9-Aug-2021

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

Comments
When reordering, please quote the material number

Note:
1. All results expressed in this report are on a dry basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EN 1869 test method.
2. The reported expanded uncertainty is based on a coverage factor of k=2, which corresponds to 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 Gases or other recognized national metrology institutes.
3. Linde's Chromatography, (2) Paramagnetic Oxygen Analyzers (3) Electrochemical Oxygen Analyzers (4) Electrochemical Moisture Analyzers (5) Gas Application Analyzers (6) Other - Specified

Page: 1 of 1
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Linde (Thailand) Public Company Limited
15 Floor, Bangna Tower A, 25 Moo 14, Bangna Road, K. S. Road, Bangkok
Bangkok, Thailand 10540
Tel: (66) 2373 4100 Fax: (66) 2373 4333
www.linde.co.th
Email: sales@linde.co.th
Sales: (66) 2373 4799



TET

Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

NOx Analyzer Calibration Report

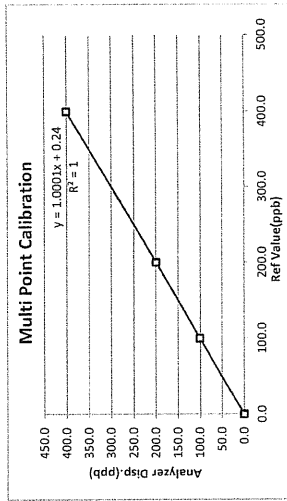
Calibrate Date : 21-Nov-22
Analyzer Type : NOx
Brand : Teledyne
Model : 200 E
Serial Number : 2789 (No. 36)
Range : 500 ppb
Temperature (°C) : 25 °C
Barometer (mmHg) : 758.9
Humidity (50±15 %) : 52.0±8H
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : A00362SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span(ppb)				After of Span(ppb)				% diff of Span
		NOx	NO	NO ₂		NOx	NO	NO ₂		
Zero	0.0	1.6	1.1	0.5		0.0	0.0	0.0		0.0
Span	400.0	382.0	380.0	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	0.4	0.4	0.0		0.40	0.001	0.10	
100.0	101.5	100.6	0.9		0.60	0.006	0.60	
200.0	200.8	199.4	0.6		-0.60	-0.003	0.30	
400.0	401.2	400.6	0.6		0.60	0.002	0.15	
Average Diff (%)								
0.29								



Calibrate by:

[Signature]

Approved by:

[Signature]

แก้ไขครั้งที่ : 00

วันที่แก้ไข : 02/09/15

Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
• Tel : +66(0)2373-7799(Auto) Fax : +66(0)2373-7799 • admin@tet1995.com • www.tet1995.com

เลขที่แบบฟอร์ม : QF-QP16-06

THE LINDE GROUP

Certificate of Analysis Special Gases Mixture

Customer Details
Name: Thai Environmental Technic Ltd.
Address: 1/6 Soi Ramkhamhaeng 145, Saphansong, Saphansong, Bangkok 10240
Customer Tag No.:
Certificate Details
Number: 3367/19
Date of Issue: 19-Sep-2019
Expiry date: 18-Sep-2023
Material Details
Production Order: 90155812
Material Code: 608400-SK-44
Cylinder No.: 118310
Gas content: 5.520 M³
Filling pressure: 145.0 bar
Valve: CGA 660 55
Cylinder Owner: LINDE
Spectra seal
Cylinder Size: 40.0 L

Laboratory Report

Component
Sulphur Dioxide
in Nitrogen
Analytical Result
Analysis Result¹
41.4 ppm
Concentration
40.0 ppm
Uncertainty²
± 1% relative
Method of Analysis³
(6) HP-352
Assay Date
10-Sep-19-Sep-19

Reference Standard used in Assay
Reference Standard
Sulphur Dioxide
in Nitrogen
Cylinder number
11382356
Concentration
25.50±0.25 ppm
Expiry date
7-Mar-2021

Analytical Instruments used in Assay
Analytical Principle
FTIR-SO2
Instrument/Make/Model
FTIR Spectrometers Nicolet i550
Last Multipoint Calibration
10-Sep-2019

Recommend usage condition

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

Comments

When reordering, please quote the material number

Note:
1. All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the EPV, i.e. Enabling 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% of the measurement of this material is traceable to the SI through the reference gas standard which is traceable to Swiss National Standard of Mass of other recognised national metrology institutes.
2. (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyser, (3) Electrochemical Oxygen Analyser, (4) Electrochemical Moisture Analyser, (5) Total Hydrocarbon Analyser, (6) Other - Specified

Page 1 of 1

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บริษัท ลินด์ (ไทยแลนด์) จำกัด (มหาชน)

เลขที่แบบฟอร์ม : QF-QP16-06
วันที่แก้ไข : 02/09/15
Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
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Sukanya Parinyasontorn

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

PB-002/1006
Iss. 1/2, 01 March 2018

Linde (Thailand) Public Company Limited

15th Floor, Bangkok Tower A, 2/3 Moo 14, Bangna Road, 6.5 Road, Bangnaeang, Samutprakan 10540, Tel (66) 2338-6100 Fax (66) 2338-6333
Wellflow Plant, 105 Moo 5, Bangpakong, Chachoengsao 24180 Thailand, Tel (66) 38 570-4793 Fax (66) 38 570-323



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Analyzer Calibration Report

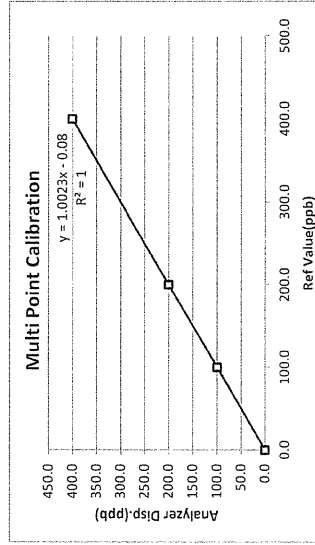
Calibrate Date : 21-Nov-22
Analyzer Type : SO₂
Brand : Thermo
Model : 43C
Serial Number : 43C73374373 (NO. 10)
Range : 500 ppb
Temperature (°C) : 25 °C
Barometer (mmHg) : 753.8
Humidity (50±15 %) : 52.0 %RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : 118310

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	382.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference	
		Diff (ppb)	Abs Percent Diff
0.0	0.3	0.3	0.08
100.0	99.7	-0.3	0.30
200.0	200.3	0.3	0.15
400.0	401.0	1.0	0.25
Average Diff (%)			0.19



Calibrate by: Ydun S Approved by: Piyachon P.
วันที่ตรวจ : 00 วันที่สอบคืน : 02/09/15 เลขที่แบบฟอร์ม : QF-QP16-06

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Agilent Technologies

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Tel: +662 637 6363
Fax: +662 632 4334
Email: ccc-smi@agilent.com
Website: www.agilent.com/chem

SERVICE REPORT

Customer Contact:
Thai Environmental Technic Ltd
Head Office
1/6 Soi Ramkhamhaeng 145
Khwaeng Saphan Sung Khet Saphan
Sung

TAX ID : 0125537008571
ketsarin.c@tet1995.com
098-2894096

Invoice To:
Thai Environmental Technic Ltd
Head Office
1/6 Soi Ramkhamhaeng 145 Khwaeng
Saphan Sung Khet Saphan Sung
BANGKOK 10240

Customer Purchase Order Number:	70494476
Service Request	Service Request Date:
Service Order:	Service Confirmation:
6005337968	6904298852

Delivery Site:
Thai Environmental Technic Ltd
Head Office
1/6 Soi Ramkhamhaeng 145
Khwaeng Saphan Sung Khet Saphan
Sung

Direct Inquiries to:
Contact Name:
Contact E-mail:
Contact Telephone:
Contact Fax:

Customer Contact Center
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+662 632 4334

Location:
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Bldg
Lab
Dept

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Tax ID : 010554208218

Original
CitiBank N.A. Bangkok Branch
399 Interchange 21 Building, Sukhumvit Road, Klongtoey Nue
Sub-district, Wattana District, Bangkok 10110 Thailand
Acc. No: 0124452407,
THB-Kuung Thai Bank PCL
Siam Square Bld. 416/1-2 Rama 1 Rd, Pathumwan, BKK 10330
Thailand

Service Instrument:



Model Number	Model Description	Serial Number	System Handle	Parent Asset
SYS-GM-5975T	GCMS 5975 Turbo System		J8-THAI ENVIRON -GCMS	
G3172A	5975C inert XL MSD Perf Turbo EI Mfr.	US71236314	J8-THAI ENVIRON -GCMS	SYS-GM-5975T
G3440A	Agilent 7890A Series GC Custom	CN10723012	J8-THAI ENVIRON -GCMS	SYS-GM-5975T

Service Items:

Item	Service/Part #	Description	Qty	Entitlement	Service Start	Service End
1000	EOQ	Enterprise Operational Qualification	1.00	Agreement - Entitlement - 100 % covered	28.06.2022	29.06.2022
1010	5188-5372	FID MDL test sample 3x0.5 ml ampoules	1.00	Agreement - Entitlement - 100 % covered		
1020	5190-0585	10 fg/uL OFN GC/MS Checkout std 3 x 1mL	1.00	Agreement - Entitlement - 100 % covered		

Additional Information:

Service Information:

Problem Description: T-NR-S-QC-GM-501023591	
Service Provided: Complete OQ with ace sw	
Service Overview Code: Reason Code: Scheduled Service Diagnosis Code: Scheduled Service Resolution Code: Scheduled Service	
Reported Hours: 6.0	Travel Hours: 2.0
Customer Field Service Representative Name: Chairong Kijchanapanich	Customer Field Service Representative Signature: 
Customer Name: KETSARIN CHUAYPHAN	Customer Signature: 
Date: 28 Jun 2022	
Date: 29 Jun 2022	
Additional Comments:	

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: UST1236314
Organization Name: Thai Environmental Technic Ltd
Organization Location: 1/6 Soi Ramkhamhaeng 145 BANGKOK Krung Thep 10240

Date: June 28, 2022 5:32:37 PM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.52, GCMS.02.52
Overall Qualification Status: Pass

CDS Logon Verification - GC

Logon: admin

Overall CDS Logon Verification - GC Test Status

Pass

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Accuracy

Name: 7890 Back SSL

Setpoint Status: Pass

Inlet Pressure: Setpoint 25.0 psi Actual 25.4 psi

Accuracy: 0.4 psi
Agilent Recommended: <= 1.2 psi

Date: June 28, 2022 5:32:37 PM
System ID: UST1236314

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 °C

Accuracy: -0.4 °C

Agilent Recommended: >= -1.0 °C

<= 1.0 °C

% setpoint in K (-5.0 °C)

% setpoint in K (-5.0 °C)

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 100.0 °C

Accuracy: 0.4 °C

Agilent Recommended: >= -1.0 °C

<= 1.0 °C

% setpoint in K (-3.7 °C)

% setpoint in K (-3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 °C

Stability: 0.0 °C

Agilent Recommended: <= 0.5 °C

Overall GC Oven Temperature Stability Test Status

Pass

Date: June 28, 2022 5:32:37 PM
System ID: UST1236314

Log Amp					
Tested Combination1	Back	SSL	/	External	SQ
Name:	5975C				
Setpoint Status:	Pass				
Overall Log Amp Test Status	Pass				

RFPFA					
Tested Combination1	Back	SSL	/	External	SQ
Name:	5975C				
Setpoint Status:	Pass				
Amu:	1050	m/z	Drift After Five Minutes:	17	mV
Agilent Recommended:	>=	-100	and	<=	100
Overall RFPFA Test Status	Pass				

RFPFA Voltage:		447	mV
>=	<=	1100	

Tune EI

Tested Combination1	Back	SSL	/	External	SQ
Name:	5975C				
Setpoint Status:	Pass				
Filament:	1				
Setpoint Status:	Pass				
Filament:	2				
Overall Tune EI Test Status	Pass				

Signal to Noise EI

Tested Combination1	Back	SSL	/	External	SQ
Name:	5975C				
Source:	EI - Inert	Filament:	1		
Setpoint Status:	Pass				
Signal to Noise:	1231				
Agilent Recommended:	>= 160				
Source:	EI - Inert	Filament:	2		
Setpoint Status:	Pass				
Signal to Noise:	3094				
Agilent Recommended:	>= 160				
Overall Signal to Noise EI Test Status	Pass				

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	US71236314
Manufacturer	Agilent Technologies
Name	7890

Flow Data Input

Manual Data

Temperature Data Input

Manual Data or Other Data Logging

Tested Combination1

Injection Technique

Manual Injection

Inlet

Back

Detector

External

LTM Included?

No

Sampler 1

Manufacturer

Agilent Technologies

Type

Manual Injection

Usage

Sample Injection

Syringe Volume (µL)

10

Mainframe 1

Manufacturer

Agilent Technologies

Name

7890

Model Number

G3440A

Serial Number

CN10723012

Firmware Revision

A.01.07

Oven Type

Standard

Inlet 1

Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Inlet 2

Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

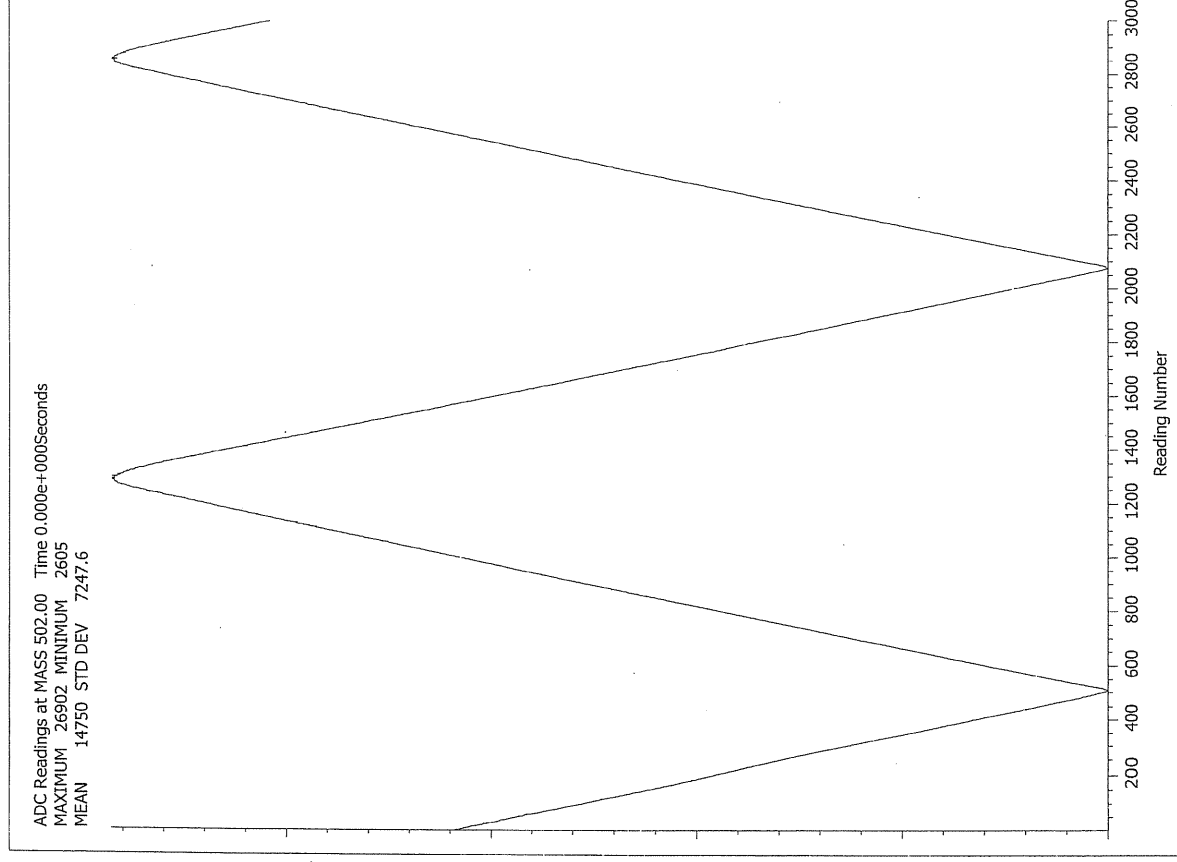
Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5975C
Serial Number	US71236314
Firmware Revision	5975 5.02.02
Rough Pump	Dry Mechanical Vacuum Pump
High Vacuum System	Turbo Pump
Scouting Run Standard	OFN Std

Log Amp Test

Tue Jun 28 13:50:01 2022



Coil Drift report
=====

曹敏P LaserJ0•

Instrument Details

Instrument Name : GCMS
Instrument Model : 5975
Identity smart card : AGILENT TECHNOLOGIES,5975,,5.02.02

Agilent recommended Setpoints and Limits

Default m/z monitored (amu) : 1050
Default drift limit (mV) : 100
Default drift time (minutes) : 5
Default maximum V_f (mV) : 1100

Measured Results

RFPA Voltage (V_i) at m/z 1050 at t= 0 min : 429.688 mV
RFPA Voltage (V_f) at m/z 1050 at t= 5 min : 446.777 mV
RFPA Drift (V_d) at m/z 1050 : 17.089 mV
V_d= ABS(V_f-V_i)

Test Evaluation

m/z monitored (amu) : 1050
Applied Drift Limit (mV) : 100
Applied Drift time (minutes) : 5
Applied maximum V_f (mV) : 1100
Result of this test : PASS

Verified By : Chairong Kijchanapanich

Date : 28 Jun 2022

Report located at : C:\msdchem\1\CoilDrif.txt
Report created on : Tue Jun 28 13:56:00 2022

Macro Rev. A.03.00

5975 Tune

Tue Jun 28 14:33:20 2022

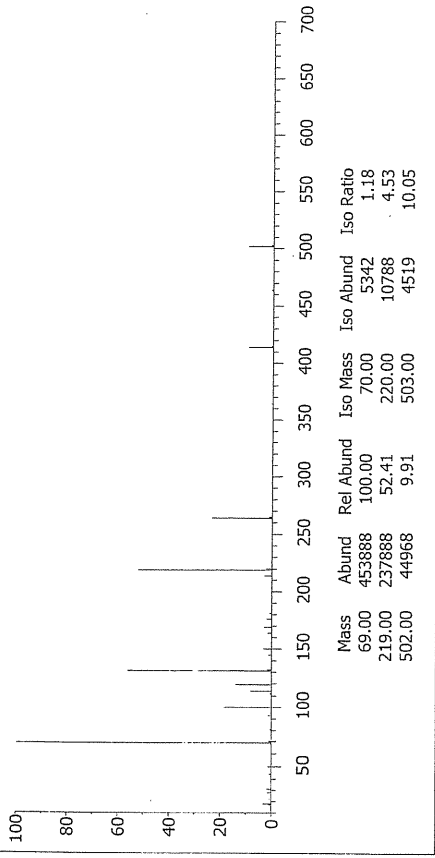
Instrument: GCMS

C:\MSDCHEM\1\5975\tune_F1.U

Mass	69.00	Mass	218.90	Mass	501.90
Ab	478604	Ab	253433	Ab	47136
Pw50	0.60	Pw50	0.61	Pw50	0.59
Ion Pol		Ion Pol		Ion Pol	
Emission		Emission		Emission	
EiEnergy		EiEnergy		EiEnergy	
Filament		Filament		Filament	
Repeller		Repeller		Repeller	
IonFocus		IonFocus		IonFocus	
EntLens		EntLens		EntLens	
EntOffs		EntOffs		EntOffs	
Pos		Pos		Pos	
MassGain		MassGain		MassGain	
MassOffs		MassOffs		MassOffs	
AmuGain		AmuGain		AmuGain	
Wid219		Wid219		Wid219	
DC Pol		DC Pol		DC Pol	
33.31		33.31		33.31	
90.2		90.2		90.2	
HEDenab		HEDenab		HEDenab	
On		On		On	
28.5		28.5		28.5	
EMVolts		EMVolts		EMVolts	
1506		1506		1506	
19.58		19.58		19.58	
Samples		Samples		Samples	
8		8		8	
Open Averages		Open Averages		Open Averages	
3		3		3	
Stepsize		Stepsize		Stepsize	
0.10		0.10		0.10	

Temperatures and Pressures:
MS Source 230 TurboSpd 100
MS Quad 150 HiVac 1.00e+10

Scan: 10.00 - 701.00 Samples: 8 Thresh: 100 Step: 0.10
176 peaks Base: 69.00 Abundance: 453888



Air/Water Check: H2O~3.25% N2~1.57% O2~0.24% CO2~0.84% N2/H2O~48.18%

Ramp Criteria:

Ion Focus Maximum 90 volts using ion 502;
Repeller Maximum 35 volts using ion 219;

MassGain Values(Samples): -1069(3) -1061(2) -1043(1) -1013(0) -926(F5)

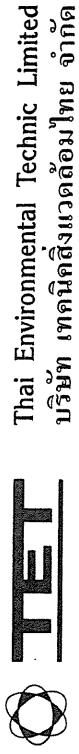
TARGET MASS: 50 69 131 219 414 502 1050
Anu Offset: 120.6 120.6 120.6 120.6 120.6 120.6 120.6
Entrance Lens Offset: 19.6 19.6 19.6 19.6 19.6 19.6 19.6

Instrument Name : GCMS
DC Polarity : Positive
Filament : 2
BasePeak should be 69 or 219
Position of mass 69 69.00 Ok
Position of mass 219 219.00 Ok
Position of mass 502 502.00 Ok
Position of isotope mass 70 70.01 Ok
Position of isotope mass 220 220.00 Ok
Position of isotope mass 503 502.99 Ok
Ratio of mass 70 to mass 69(0.5 - 1.6%) 1.11 Ok
Ratio of mass 220 to mass 219(3.2 - 5.4%) 4.27 Ok
Ratio of mass 503 to mass 502(7.9 - 12.3%) 9.92 Ok
Ratio of 219 to 69 should be > 40% and is 59.96 Ok
Ratio of 502 to 69 should be > 2.4% and is 10.83 Ok
Mass 69 Precursor (<= 3%) 0.36 Ok
Mass 219 Precursor (<= 6%) 0.44 Ok
Mass 502 Precursor (<= 12%) 3.20 Ok

Testing for a leak in the system
Ratio of 18 to 69 (<20%) 2.54 Ok
Ratio of 28 to 69 (<10%) 1.13 Ok

Electron Multiplier Voltage 1506 Ok

Tune portion of System Verification passed.



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย 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.	20080703020	0.2	0.1991	0.1993	0.1995	0.1995	±0.0002
2.	20140505103	0.2	0.1984	0.1986	0.1988	0.1986	±0.0002
3.	20140505029	0.2	0.1994	0.1995	0.1996	0.1995	±0.0001
4.	101157	0.2	0.1975	0.1977	0.1979	0.1977	±0.0002
5.	11591	0.2	0.1993	0.1993	0.1994	0.1993	±0.0001
6.	20031025001	0.2	0.1899	0.1991	0.1993	0.1991	±0.0054
7.	20120103081	0.2	0.1993	0.1995	0.1994	0.1994	±0.0001
8.	20140505013	0.2	0.1997	0.1998	0.1996	0.1998	±0.0001
9.	20140505023	0.2	0.1977	0.1977	0.1978	0.1977	±0.0001
10.	20140605001	0.2	0.1982	0.1984	0.1984	0.1984	±0.0001
11.	20140605015	0.2	0.1975	0.1975	0.1976	0.1975	±0.0001
12.	20140605016	0.2	0.1983	0.1985	0.1987	0.1985	±0.0002
13.	20140505104	0.2	0.1992	0.1994	0.1996	0.1994	±0.0002
14.	20140505074	1.0	0.9970	0.9970	0.9980	0.9970	±0.0006
15.	20140504112	1.0	0.9960	0.9970	0.9980	0.9970	±0.0010
16.	20031009020	1.0	0.9970	0.9980	0.9990	0.9980	±0.0010
17.	20110803069	1.0	0.9960	0.9960	0.9970	0.9960	±0.0006
18.	20080703006	2.0	1.9970	1.9980	1.9980	1.9980	±0.0006

Calibration Date 09 / 03 / 66

Calibration By ธีรยุทธศิลป์

Remark : Uncertainty Type A = σ = SD

: SD = \sqrt{n}

: \bar{x} = Standard deviation

: \bar{x} = Mean



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

[illegible]

Calibration Date 09 / 01 / 66

Calibration By අරුණ

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

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

= Standard deviation

= Mean

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



Personal Pump Calibration Report

Equipment Type	:	Personal Pump/Parameter
Personal Pump	:	Personal Pump/Parameter

Equipment Type : Personal Pump/Parameter

Equipment Range : 0.1-7.0 V/min

Equipment Range : 0.1-7.0 V/min

Calibration Range : 0.1-4.0 V/min

Calibration Range : 0.1-4.0 U/min

Calibration Type : Drycal

Calibration Type : Drycal

4491

4491

[illegible]

Calibration Date 27 / 02 / 66

Calibration Date	07 / 03 / 66
------------------	--------------

Calibration By Calibration By Prashant

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

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

 \sqrt{n} \sqrt{n}

= Standard deviation

= Standard deviation

= Mean

= Mean

: 55

: 55

✕

✕



Personal Pump Calibration Report

Calibration S/N : 4491

[illegible]

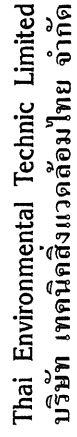
Calibration Date 09 / 05 / 66

Calibration By วิษณุภพ

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

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

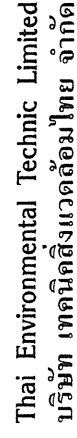
: SD	= Standard deviation
: \bar{X}	= Mean



<i>Equipment Type</i>	: Personal Pump/Parameter
<i>Equipment Range</i>	: 0.1-7.0 U/min
<i>Calibration Range</i>	: 0.1-4.0 U/min
<i>Calibration Type</i>	: Drycal
<i>Calibration S/N</i>	: 4491

[illegible]Calibration By อัตราพท

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



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

Item	Personal Pump S/N	Hi Flow/Low Flow	๕ ครั้งที่ 1	๕ ครั้งที่ 2	๕ ครั้งที่ 3	Average	Uncertainty
1.	20151002106	0.2	0.1986	0.1988	0.1989	0.1988	±0.0002
2.	20111203065	0.2	0.1982	0.1982	0.1981	0.1982	±0.0001
3.	20140505105	0.2	0.1978	0.1979	0.1979	0.1979	±0.0001
4.	20120103092	0.2	0.1972	0.1974	0.1976	0.1974	±0.0002
5.	20151003024	0.2	0.1975	0.1977	0.1979	0.1977	±0.0002
6.	20110605047	0.2	0.1973	0.1975	0.1977	0.1975	±0.0002
7.	20151003043	0.2	0.1975	0.1977	0.1979	0.1977	±0.0002
8.	20080703011	0.2	0.1982	0.1984	0.1986	0.1984	±0.0002
9.	20080703002	0.2	0.1978	0.1979	0.1979	0.1979	±0.0001
10.	20151003009	0.2	0.1948	0.1949	0.1949	0.1949	±0.0001
11.	20140505103	0.2	0.1947	0.1948	0.1948	0.1948	±0.0001
12.	20111203067	1.0	0.9970	0.9980	0.9980	0.9980	±0.0006
13.	20151003049	1.0	0.9970	0.9970	0.9980	0.9970	±0.0006
14.	20120103069	1.0	0.9940	0.9940	0.9980	0.9960	±0.0020
15.	20111203056	1.0	0.9980	0.9980	0.9990	0.9980	±0.0006
16.	20151003045	2.0	0.9970	0.9980	0.9990	0.9980	±0.0010
17.	20151002109	2.0	0.9980	0.9980	0.9990	0.9980	±0.0006
18.	20140605003	2.0	0.9970	0.9970	0.9980	0.9970	±0.0006

Calibration By ପ୍ରଫୁଲ୍ଲ

SD	=	Standard deviation
\bar{X}	=	Mean
		\sqrt{n}

Agilent CrossLab Start Up Services Agilent 7890 Gas Chromatograph Preventive Maintenance Checklist



Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results.

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak. This checklist will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.

Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Important Customer Web Links

- For more information about **Agilent Technologies services**, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>.
- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful **Agilent Resource Center** web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>.
- Need technical support, FAQs, supplies? – visit our **Support Home page** <http://www.agilent.com/search/support>.
- **Videos** about specific preparation requirements for your instrument can be found by searching the *Agilent YouTube* channel at <https://www.youtube.com/user/agilent>.
- **7890B Manuals** are also available on Agilent.com:
 - **Safety** https://www.agilent.com/cs/library/usermanuals/public/7890B_Safety.pdf
 - **Installation and First Startup** https://www.agilent.com/cs/library/usermanuals/Public/7890B_Installation.pdf
 - **Operation Manual** https://www.agilent.com/cs/library/usermanuals/Public/7890B_Operation.pdf
 - **Maintaining Your GC** https://www.agilent.com/cs/library/usermanuals/public/GS430-90052%207890B_Maintaining%20Guide.pdf

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Section not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Complete the total number of pages field in the Service Completion section
- Ask the customer to sign the Service Completion section including the customer's and your signature.

Additional Instruction Notes

- Check for any active service notes for this unit. If there are any applicable "Safety" or "Modification Recommended" Service notes, plan to implement the changes on this unit before doing any qualification service.
- Do not implement firmware updates, unless you get approval from the customer and are sure that they are compatible with the instrument control software.

System Information

- ☒ Check this box if an instrument configuration report is attached instead of completing the table below.

Instrument System Name and ID	GC7840 B	CN16343040
Instrument System Site and Location	TET Laboratory	

List System Component Product Numbers		List the Serial Numbers of each Component
1.	G3440B	CN16343040
2.	G4913A	CN16350082
3.	G4514A	CN16400014
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components, settings as defined by current Service Notes.
- ☒ Check for required firmware updates and verify with customers if they would like them installed.
- Before starting the following procedures, record the Detector Signal Output(s) in the results table. If the GC is turned OFF or in a service mode, comparing the detector outputs before and after the service is not possible.

Preventive Maintenance Procedure

Clean and inspect GC

- ☒ Unplug power cord from the power source.
- ☒ Open GC covers and vacuum/remove any dust/debris. Pay particular attention to cooling fans.
- ☒ Inspect internal connectors for proper contact and placement.
- ☒ Reconnect Power to the GC. Power the GC on and verify the power on self-test passed.
- ☒ Verify oven motor spins freely and turns on with the oven door closed; off when the door is opened.
- ☒ Verify operation of all other fans - the inlet and EPC cooling fans.
- ☒ Verify oven intake/outlet flap assembly is operating smoothly while heating and cooling the oven

Inlet and detector consumable replacement

- ☒ For the inlets installed, perform inlet maintenance as defined in the 7890 manual – "Maintaining Your GC" - for the inlet(s) installed.
- ☒ Replace the split vent trap cartridge filter on units with these inlets: Split/Spitless Capillary (SSL), Multi-Mode Inlet (MMI), Programmed Temperature Vaporizer (PTV), Volatiltes Interface (VI).
- ☒ If the inlet system is used in Split Mode with viscous samples; inspect and clean the split vent tube on the inlet and flush or replace the tubing between the inlet and the split vent trap.
- ☒ If the GC includes a Flame Ionization Detector (FID), replace the jet. If the ignitor shows any buildup of sample or corrosion, replace the ignitor. Examine the FID collector and castle assemblies for contamination – clean as necessary.

Zero Sensors and Leak test

- ☒ Zero all pressure sensors per the procedure in the 7890 "Advanced User Guide".
- ☒ Perform inlet pressure decay test(s) as defined in the 7890 "Troubleshooting Manual". If the PM is done in preparation for an Operational Qualification, then the pressure decay test defined within that protocol can be used for the PM.
- ☒ Record if test passed or failed in the results table.

ALS Maintenance

☐ Section NOT applicable

- ☒ Check all cabling and configuration settings between GC, tray, and injectors.
- ☒ Vacuum or remove any dust, especially around fans.
- ☒ Check operation of all fans.
- ☒ Check syringe for smooth plunger operation.
- ☒ Check for smooth operation of the needle support – clean if necessary

Restore Instrument

- ☒ Restore the normal operating conditions or customer method using the Data System.
- ☒ Purge the system with carrier flow for 15 minutes
- ☒ Bake out the system, then restore the normal operating conditions
- ☒ After equilibration, check and record the post PM detector signal output values. Results should be similar or lower than the detector outputs recorded prior to PM.
- ☒ Perform a chemical checkout. If this is a routine PM, inject the customer's sample using the ALS if applicable. This will act as a final checkout of both the ALS and the GC.

Note: If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Signature Page

Service Review

- ☐ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review with the customer this service, parts replaced, and test results obtained.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.
- ☒ Supply the customer with a copy of the Smart Alerts flyer.
- ☒ Describe Smart Alerts to the customer.
- ☐ Install Smart Alerts if requested.

7890 GC Test Results Table

Detector Signal Outputs	Before PM Service	After PM Service
Front detector output	N/A	24.7
Back detector output	N/A	-322.3 (high)
AUX detector output	N/A	172.6
Pressure decay test	Expected test result	Actual test result
Front inlet pressure decay test	Pass	Pass
Back inlet pressure decay test	Pass	Pass

7890 Parts List Table

The following kits are recommended for capillary and purged packed inlets. If this is a general PM and the customer has a preferred set of consumables, you may use the customer's consumables.

Part description	Part number	Product or model# where used	Quantity consumed
SSL Capillary Inlet PM kit, Splitless	5188-6497	7890A/B	1
SSL Capillary Inlet PM kit, split	5188-6496	7890A/B	1
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	7890A/B	N/A
PP Inlet PM kit	5188-6498	7890A/B	N/A
Split vent trap PM kit, single cartridge (for MMI, PTV & VI)	5188-6495	7890A/B	N/A
MMI Cleaning Kit	63510-60820	7890A/B	N/A
PTV Septumless Head Rebuild Kit	5182-9747	7890A/B	N/A
PTV Septumless Head Teflon Guide	5182-9748	7890A/B	N/A
Ignitor (glow plug) assembly with O-ring	19231-60680	7890A/B	1
FID Collector Rebuild/Cleaning Kit	G1531-67000	7890A/B	N/A
Standard .011-inch FID Jet for capillary FID base	G1531-80560	7890A/B	N/A
High Temperature .018-inch FID Jet for capillary FID base	G1531-80620	7890A/B	N/A
Standard .019-inch FID Jet for packed column with packed FID base	19710-20119	7890A/B	N/A
Standard .011-inch FID Jet for capillary column with packed/adaptable FID base	19244-80560	7890A/B	N/A
High Temperature .018-inch FID Jet for capillary column with packed/adaptable FID base	19244-80620	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID	G1534-80580	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID Extended tip	G1534-80590	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
**FID Collector Replacement Kit, if needed	G1531-67001	7890A/B	N/A

Service Engineer Comments

If there are any specific points you wish to note as part of performing the service or other items of interest for the customer, please write include them in this box.

*Need to condition MCD for high baseline.
and injection Hexane..*

Service Completion

Service request number 60056246 Date service completed 26 Sep 2022
Agilent signature [Signature] Customer signature _____
Total number of pages in this document 9 pages

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 : 12 September, 2022 Certification No. 329/22

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 1007.2 hPa

NATIONAL STANDARD WIND TUNNEL :

: Thermal Anemometer 642 SN 91563

: HOOK GAGE NO 1425 Pilot 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

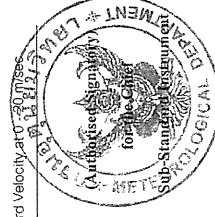
: Standard Velocity at 20 - 30 m/sec

Calibrated by : [Signature] Signed : [Signature]

Mr. Watcharapol Subwat

Mr. Pisod Promsit

Mechanical Engineer





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 329/22

12 September, 2022

Page : 2 of 2

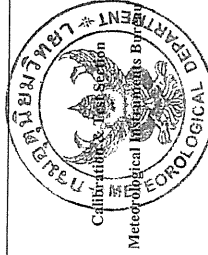
Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacuum inches H2O	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.2	0.82
5.00	-	-	-	4.5	0.50
7.00	-	-	-	6.3	0.70
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.3	0.71
13.01	-	-	-	12.1	0.91
15.01	-	-	-	14.3	0.71
17.02	-	-	-	16.1	0.92
20.02	-	-	-	19.2	0.82

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 :

Wattarapol

Mr. Wattarapol Subwat
Mechanical Engineer



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert.No.: 22CH0626/1
Page.: 1 of 2

Certificate of Calibration

This Certificate was issued to replace to the Certificate No.22CH626.

Equipment : pH Meter
Manufacturer : Horiba
Model : F-71G
Serial No. : V3B1F8H3
ID No. : -
Condition As-Received: Used Item
Received Date : 01 November 2022
Calibration Date : 01 November 2022
Reference : 2211-0001OC-8
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 : (24.9 - 26.5) °C
Relative Humidity : (59 - 43) %
Calibration Procedure : In - house method :
- CP-OCH2 by direct measurement with standard
voltage calibrator and direct measurement
with certified reference material (CRM)

Calibrated by : Uthen Kankawi

Approved by : Wattarapol,
Approved Signatory

() Malee Bulkruea
() Saithip Meangmai
(✓) Wattarapol Lengagatrakul

Issue Date : 2 March 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 0051492



Cert. No.: 22CHO626/1
Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	46530031	130RC098	22E3313	06 Oct 2023
2) Digital Thermometer	130RC017	22T7777		20 Apr 2023

This certification is traceable to the International System of Unit maintained at:-
- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials

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

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	823320	20 June 2024
pH 6.865	CPA chem	788996	01 Jan 2024
pH 9.181	CPA chem	794123	14 Feb 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 (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.: V3B1F8H3	4.000		177.48	177.5	4.000	0.058	2.00
	6.860		8.28	8.3	6.860	0.058	2.00
	7.000		0.00	0.0	7.000	0.058	2.00
	9.180		-128.97	-128.9	9.180	0.058	2.00
	10.000		-177.48	-177.4	10.000	0.058	2.00

Function : pH Measurement

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

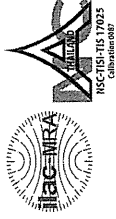
Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (\pm)	Coverage factor k
pH Electrode S/N.: 9X2E0223	4.008	4.012	163.9	0.0047	2.00
	6.865	6.870	-5.6	0.0085	2.00
	9.181	9.182	-140.2	0.014	2.00

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

-000-

Warakorn

a 1149783



Certificate of Calibration

Equipment:

SPECTROPHOTOMETER

Model:

Spectroquant Prove 100

Serial No. (or ID.):

1618111041

Manufacturer:

Merck

Condition:

In Condition

Customer:

Thai Environmental Technic Limited

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

Environment Condition:

Temperature 27.7 °C \pm 0.3 °C
Humidity 59.5 %RH \pm 1.7 %RH

Calibration Place:

Thai Environmental Technic Limited (Laboratory)
1/6 Soi Ramkhamhaeng 145, Khwaeng Saphan Sug,
Khet Saphan Sung, Bangkok 10240 Thailand

Calibration By:

Mr. Siwapan Srijan

Calibration Date:

02 May 2023

The Method used:

In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 387-04

Traceability:

This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Stama Scientific Limited.

The standard for Wavelength Certificate No. 105931 and 105898

The standard for Photometric Certificate No. 105940

The standard for Stray light Certificate No. 101040

Siwapan Srijan

(Mr. Siwapan Srijan)

Person in charge

Mr. Nitinun Srihawan

(Mr. Nitinun Srihawan)

Authorized Signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor ($k=2$) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

DKSH Technology Limited

2533 Sukhumvit Road, Bangkok, Thailand 10259
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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CAL-FM-C06-15: 12 Sep 2022



Certificate No.: C06230177

Page 2 of 3

Calibration Results:
Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of Std at 4 nm and UUC at 4 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.48	418.9	-0.42	0.13
536.90	536.8	0.10	0.13
637.94	638.1	-0.16	0.13
748.28	748.3	-0.02	0.13
807.16	807.0	0.16	0.13

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.5890	0.591	-0.0020	0.0045
	0.7604	0.762	-0.0016	0.0045
	1.0241	1.028	-0.0039	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.5782	0.579	-0.0008	0.0045
	0.7430	0.745	-0.0020	0.0045
	1.0016	1.005	-0.0034	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.5283	0.530	-0.0017	0.0045
	0.6854	0.688	-0.0026	0.0045
	0.9509	0.953	-0.0021	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.5457	0.545	0.0007	0.0045
	0.6944	0.694	0.0004	0.0045
	0.9965	0.996	0.0005	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.5837	0.582	0.0017	0.0045
	0.7223	0.721	0.0013	0.0045
	1.0935	1.091	0.0025	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.5675	0.565	0.0025	0.0045
	0.6900	0.689	0.0010	0.0045
	1.0862	1.085	0.0012	0.0045

บริษัท ดีเคเอส อีซี จำกัด
DKSH Technology Limited
2533 สุขุมวิท ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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CAL-FM-C06-15; 12 Sep 2022



Certificate No.: C06230177

Page 3 of 3

Calibration Results:
Without Adjustment

Stray light *

Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%T)	Absorbance (A)
391.94 +/- 0.11 nm	391.9	1.13	1.947

* Calibration Marked " Not TISI Accredited " in this Certificate have been included for completeness.

The End of Certificate

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DKSH Technology Limited
2533 สุขุมวิท ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: KSPR2306590

หมายเลขเครื่อง: 1618111041

ชนิดเครื่องมือ: SPECTROPHOTOMETER รุ่น: Spectroquant Prove 100

ตรวจสอน (รับ)		รายการตรวจเช็ค		ตรวจสอน (ส่ง)		หมายเหตุ
02 May 2023				02 May 2023		
ปกติ	ไม่ปกติ			ปกติ	ไม่ปกติ	
General						
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Spectrophotometer						
<input type="checkbox"/>	<input type="checkbox"/>	6. แรงดันไฟฟ้า (Battery Backup) ≥ 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV $< 3,000$ hour)	<input type="checkbox"/>	<input type="checkbox"/>		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible $< 5,000$ hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	169 Hours	
<input type="checkbox"/>	<input type="checkbox"/>	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	<input type="checkbox"/>	<input type="checkbox"/>		
pH Meter and Conductivity Meter						
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	14. ผ้าปิดกั้นปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาจับอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>		
Turbidimeter						
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (≥ 2.5 ไม่นเกิน 3.0)	<input type="checkbox"/>	<input type="checkbox"/>		
Automatic titrator						
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาพ Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>		

เพิ่มเติม/ข้อแนะนำ :

Mr. Siwapan Srijan
Service Engineer

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CAL-FM-R31-03: 20 Jul 2022




TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLIANG, SUANLIANG BANGKOK 10250
TEL: 0-2717-3900-29 FAX: 0-2719-9484



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 Rutanaprapachai
Approved by : 
Ponthippa Tameyakul
() Malee Butkruea
() Suwit Injai
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 : 2304-01480C-12
Cert.No.: 23MM160
Page: 2 of 3

Procedure used :-

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

Condition of this result of calibration

1. Reference standard instruments:-

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 (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (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 (g)	Standard Deviation of Reading (g)
100	0.00007
200	0.00007

Mdu

a 1158499



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-01460C-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 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)	Maximum difference between off-center and central loading (g)
-0.0002	-0.0002	-0.0003	-0.0003	-0.0002	0.0001

3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
Unload	0.0000	0.0000	0.14	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 %.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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NECTEC
NECTEC 118171925
CALIBRATION 1998

Cert. No.: 23TM673
Page : 1 of 3

Certificate of Calibration

Equipment : BOD Incubator

Manufacturer : Accuplus

Model : I250

Serial No. : 0408-0115-0008

ID No. : TET.LAB.BOD05

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 : 11 April 2023

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Khit Rutanaprapachai

Approved by :

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

Approved Signatory

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 0053455



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2304-0146OC-2

Procedure Used :-

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 34972A MY57013711 22LM93 02 Jul 2023

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

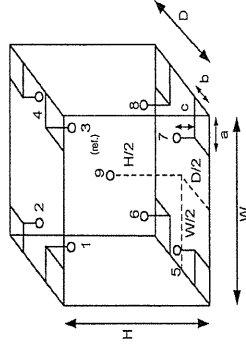
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration	
Beginning	Finished
Temp. (°C)	25 26
REL Humid. (%)	51 54
AC Supply (Volt)	221 221



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

Position :	Ref. Std. ID No.:
1	18-18RTD-01
2	18-18RTD-02
3	18-18RTD-03
4	18-18RTD-04
5	18-18RTD-05
6	18-18RTD-06
7	18-18RTD-07
8	22-18RTD-08
9 (ref.)	18-18RTD-09

Malee

a 1158205



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2304-0146OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 23TM673
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
20.0	19.8	19.7	0.54	0.37	1.1	2
Measured Temperature (°C)						
Calibration Point (°C)	Position					
	1	2	3	4	5	9 (ref.)
20.0	20.121	20.227	19.983	20.088	19.992	19.953
						19.914
						19.936
						20.048
						0.72

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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Walu.

a 1158204



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert.No.: 22CHO625
Page: 1 of 3

Certificate of Calibration

Equipment : Spectrophotometer
Manufacturer : PerkinElmer
Model : Lambda 365
Serial No. : 365K9042909
ID No. : -
Condition As-Received: Used Item
Received Date : 01 November 2022
Calibration Date : 01 November 2022
Reference : 2211-0001OC-5
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 : (24.9 - 24.4) °C (On-Site)
Relative Humidity : (54 - 52) % (On-Site)
Calibration Procedure : In - house method :
CP-OCH4 based on ASTM E 275-01

Calibrated by : Uthen Kankawi

Approved by : 
Approved Signatory

(/) Malee Butkruea
() Sathip Meangmai
() Warakorn Lengagtrakul

Issue Date : 10 November 2022
The Uncertainties are for a confidence probability of approximately 95 %

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A 0047052



Cert. No.: 22CHO625

Page : 2 of 3

Condition of calibration result

1. Reference Standard Material :

Material	Serial No.	Certificate No.	Due date
1. Absorbance Standard set	39130	106269	10 Oct 2024
2. Wavelength Standard set	29829	94776	02 Sep 2023
3. Wavelength Standard set	29829	94777	02 Sep 2023
4. Stray Light Standard set	32629	9112980	03 Aug 2024

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 at :

- National Physical Laboratory (NPL), The United Kingdom of Great Britain and Northern Ireland
- National Institute of Standards and Technology (NIST), The United States of America

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	418.32	0.12	2.00
536.52	536.61	0.12	2.00
638.00	637.96	0.12	2.00
684.50	684.48	0.12	2.00
879.41	879.39	0.12	2.00

Madu.

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Cert. No.: 22CHO625

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 k
420.0	Zero 0.5796 0.7105 1.0186	0.0000 0.5788 0.7095 1.0179	0.0028 0.0028 0.0028 0.0028	2.00 2.00 2.00 2.00
546.1	Zero 0.5281 0.6962 0.9984	0.0000 0.5258 0.6945 0.9956	0.0028 0.0028 0.0028 0.0028	2.00 2.00 2.00 2.00
635.0	Zero 0.5699 0.7606 1.0927	0.0000 0.5684 0.7590 1.0904	0.0028 0.0028 0.0028 0.0028	2.00 2.00 2.00 2.00

Stray Light

* Straylight at 280.05 nm \pm 0.11 nm	Reading at 280.05 nm \pm 0.11 nm
Abs	2.0728
%T	0.8299

Remark

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer
- Cut-off wavelength of stray light reference material (Potassium Iodide) at wavelength 280.05 nm \pm 0.11 nm
- Result = Pass, if Absorbance > 2.00 Abs and Transmission < 1.0 %T at Wavelength 280.05 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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TISTR

TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0197

MTC No. EEL BP. 60/0166

CALIBRATION CERTIFICATE

Submitted by : THAI ENVIRONMENTAL TECHNIC LIMITED.
Address : 1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphanung, Bangkok 10240.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
: Soi 1 C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator
Manufacturer : Temmars
Model : TM-100
Serial No. : 181203570

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$
Relative Humidity : $(50 \pm 15) \%$
Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.
3. Programmable Attenuator Tanagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N M744005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Keithley 2015-P S/N 4106495.
7. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.

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 Jan. 2023

Date of Calibration : 16 Jan. 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.

Head Office

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FM.BLMTC.002 Rev.4



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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0197

MTC No. EEL BP. 60/0166

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 20μPa at 1000 Hz

Acoustic Output in dB re 20μPa , 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 Brüel&Kjær 4180	94.26	0.26	± 0.10	$\pm 0.75 \text{ dB}$

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Brüel&Kjær 4180	989.3	-10.7	± 1.5	$\pm 2.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Brüel&Kjær 4180	2.20	± 0.50	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Date of Calibration : 16 Jan. 2023

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

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

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2323 9165
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 : sunalee@tistr.or.th

FM.BLMTC.002 Rev.4



ทช.ทสร

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No.

21-66/0197

MTC No. EEL. BP. 60/0166

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

Acoustic Output in dB re 20µPa, 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
1/2 inch Briel&Kjaer 4180	113.96	-0.04	± 0.10	±0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit
1/2 inch Briel&Kjaer 4180	983.1	-14.9	± 1.5	±2.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit
1/2 inch Briel&Kjaer 4180	2.60	± 0.60	±4.0%

Note : 1. No adjustment.

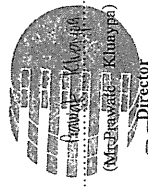
2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

(Mr. Weerachai Deechaiyae)

Approved by :



Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 16 Jan. 2023

Date of Issue : 18 Jan. 2023

Ref : 2011266011000062001

End of Certificate

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

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

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
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Office/Laboratory
Sri 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2579 1121-30 ext. 115, 116
Fax. (66) 0 2579 8592
E-mail : sunalee@tistr.or.th

Office
196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
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Fax. (66) 0 2579 8592
E-mail : sunalee@tistr.or.th

FM.BLMTC.002 Rev.4



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type

: Sound Level Meter

Calibrator

: SCARLET ST-120

Standard

: IEC 60942:2017 CLASS1

Accuracy

: 94.0 ±0.3 dB and 114.0±0.5 dB

Frequency

: at 1,000 Hz ±1%

Calibrator Serial No.

: ST120C0263E

Calibration Date

: 23-Mar-2023

Barometric pressure (mmHg)

: 759.0 mmHg

Temperature (23±3)°C

: 25 °C

Relative Humidity(50±15 %)

: 50.0 % RH

Dued Date of Calibrate

: 30-Apr-2023

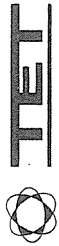
Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust			After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3			
78	SCARLET	ST-11D	820390	94.0	94.0	94.0	94.0	94.0	0.0	PASS
79	SCARLET	ST-11D	820391	94.0	94.0	94.0	94.0	94.0	0.0	PASS
80	SCARLET	ST-11D	820392	94.0	94.0	94.0	94.0	94.0	0.0	PASS
81	SCARLET	ST-11D	820393	94.0	94.1	94.1	94.1	94.0	0.1	PASS
82	SCARLET	ST-11D	820394	94.0	94.0	94.0	94.0	94.0	0.0	PASS
83	SCARLET	ST-11D	820877	94.0	94.0	94.0	94.0	94.0	0.0	PASS
84	SCARLET	ST-11D	820878	94.0	94.0	94.0	94.0	94.0	0.0	PASS
85	SCARLET	ST-11D	820879	94.0	94.0	94.0	94.0	94.0	0.0	PASS

Calibration By :

Approve by :

Piyacha B

Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
• Tel : +66(0)2373-7795 • admin@tetr1995.com • www.tetr1995.com




Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter Calibration Date : 24-Feb-2023
Calibrator : SCARLET ST-120 Barometric pressure (mmHg) : 759.0 mmHg
Standard : IEC 60942:2017 CLASS1 Temperature (23±3)°C : 25 °C
Accuracy : 94.0±0.3 dB and 114.0±0.5 dB Relative Humidity(50±5 %) : 50.0 % RH
Frequency : at 1,000 Hz ±1% Dued Date of Calibrate : 31-Mar-2023
Calibrator Serial NO. : ST120C0263E

Item	Instrument Calibrated		Reference Acoustic dB	Before Adjust			After Adjust ± dB	Deviation ± dB	Result
	Brand	Model		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3			
78	SCARLET	ST-11D	820390	94.0	94.0	94.0	94.0	0.0	PASS
79	SCARLET	ST-11D	820391	94.0	93.9	93.9	94.0	0.1	PASS
80	SCARLET	ST-11D	820392	114.0	113.9	113.9	114.0	0.0	PASS
81	SCARLET	ST-11D	820393	94.0	94.0	94.0	94.0	0.0	PASS
82	SCARLET	ST-11D	820394	94.0	94.0	94.0	94.0	0.0	PASS
83	SCARLET	ST-11D	820877	114.0	114.0	114.0	114.0	0.0	PASS
84	SCARLET	ST-11D	820878	94.0	94.0	94.0	94.0	0.0	PASS
85	SCARLET	ST-11D	820879	94.0	94.0	94.0	94.0	0.0	PASS

Calibration By : 
Approve by : Piyacha B.



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



ISO 17023
CALIBRATION UNIT

Certificate of Calibration

Certificate No. : 23H557
Page : 1 of 2

Equipment : Thermal Environment Monitor
Manufacturer: JANTYTECH
Model : JT201 1-E2A
Serial No.: 3522210144
ID No.: HD 6
Condition As-Received: Used Item
Received Date: 03 March 2023
Calibration Date: 09 March 2023
Reference: 2303-0118DSC
Ambient Temperature: (25 ± 3) °C
Relative Humidity: (50 ± 20) %

Submitted by: Thai Environmental Technic Limited

1/6 Soi Rankhamhaeng 145, Klongwaeng/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 :

Instrument Model Serial No. Certificate No. Due Date
1) Handheld Thermometer With Sensor 1521 A5A339 221/251 12 Oct 2023

2.The 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 at:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Chakrit Waewanjua
Issue Date : 17 March 2023
Approved Signatory : 
[] Chakrit Waewanjua
[] Ponthippa Tameyakul
[✓] Viporn Tantiyawutti



Certificate of Calibration

Certificate Number : SPR23030020-4 Page : 1 of 3

Customer : Thai Environmental Technic Limited.

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

Equipment Name : Noise Dose Meter
Manufacturer : SOUNDTEK
Model : ST-130
Serial Number : 170800201
ID. Number : No.25

Environmental Conditions
Ambient Temperature : $23\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ Received Date : 01 Mar 2023
Relative Humidity : $50\% \pm 15\%$ Calibration Date : 07 Mar 2023
Location of Calibration : In-Lab Recommend Due Date : 07 Mar 2024
Calibration Procedure : SP-CPE-04-01 Date of Issue : 08 Mar 2023

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.
All calibrations are performed within manufacture's specifications. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr. Karoon Pengsalung Approved by :

Calibration Officer

(Mr. Prayoon Topart)

Authorized Signatory



Cert. No.: 23H657
Page.: 2 of 2

Result of Calibration:- Function:

Without Adjustment
Temperature Measurement for T_a

Standard Temperature ($^{\circ}\text{C}$)	UUC* Reading ($^{\circ}\text{C}$)	Error ($^{\circ}\text{C}$)	Uncertainty of Measurement ($\pm^{\circ}\text{C}$)
20.025	19.9	-0.125	0.42
30.018	29.7	-0.318	0.42
40.007	39.8	-0.207	0.42

Result of Calibration:- Function:

Without Adjustment
Temperature Measurement for T_{nw}

Standard Temperature ($^{\circ}\text{C}$)	UUC* Reading ($^{\circ}\text{C}$)	Error ($^{\circ}\text{C}$)	Uncertainty of Measurement ($\pm^{\circ}\text{C}$)
20.025	20.0	-0.025	0.42
30.018	29.7	-0.318	0.42
40.007	39.7	-0.307	0.42

Result of Calibration:- Function:

Without Adjustment
Temperature Measurement for T_g

Standard Temperature ($^{\circ}\text{C}$)	UUC* Reading ($^{\circ}\text{C}$)	Error ($^{\circ}\text{C}$)	Uncertainty of Measurement ($\pm^{\circ}\text{C}$)
20.025	19.8	-0.225	0.42
29.990	29.7	-0.290	0.42
40.012	39.7	-0.312	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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Calibration Report

Certificate Number : SPR23030020-4

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due Date
Sound Level Calibrator	ST-120	211203773	EELBP. 114/0166	17 Jan 2024

Traceability

This certification is traceable to the International System of Unit maintained at :
TISTR - Thailand Institute of Scientific and Technological Research

69/29 Moo 1 Klongsi Klongluang Pathumthani 12120 (Thailand) Tel: (662) 193-2220 5 คลังสาย www.สอบเทียบเครื่องมือวัด.com



Result of Calibration

Certificate No. : SPR23030020-4

Page : 3 of 3

Range : 94 to 114 dB Function : @1kHz

Select A	Standard Setting	UUC Reading		Error		Uncertainty (±)
		Fast	Slow	Fast	Slow	
94	94	93.4	93.4	-0.6	-0.6	0.15
114	114	113.3	113.3	-0.7	-0.7	0.15

Select C	Standard Setting	UUC Reading		Error		Uncertainty (±)
		Fast	Slow	Fast	Slow	
94	94	93.5	93.5	-0.5	-0.5	0.15
114	114	113.3	113.3	-0.7	-0.7	0.15

Select Z	Standard Setting	UUC Reading		Error		Uncertainty (±)
		Fast	Slow	Fast	Slow	
94	94	93.3	93.3	-0.7	-0.7	0.15
114	114	113.2	113.2	-0.8	-0.8	0.15

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 -



Certificate of Calibration

Certificate Number : SPR23030020-7 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 : Noise Dose Meter
Manufacturer : SOUNDTEK
Model : ST-130
Serial Number : 170400165
ID. Number : No.21

Environmental Conditions
Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Received Date : 01 Mar 2023
Relative Humidity : $50\% \pm 15\%$ Calibration Date : 07 Mar 2023
Location of Calibration : In-Lab Recommend Due Date : 07 Mar 2024
Calibration Procedure : SP-CPE-04-01 Date of Issue : 08 Mar 2023

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.

All calibrations are performed within manufacture's specifications. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Karoon Pengsalung

Calibration Officer

Approved by :

(Mr.Prayoon Topart)

Authorized Signatory



Calibration Report

Certificate Number : SPR23030020-7 Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Jan 2024

Traceability

This certification is traceable to the International System of Unit maintained at :
TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate No. : SPR23030020-7

Page : 3 of 3

Range : 94 to 114 dB Function : @1kHz

Select A Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Unit : dB

Select C Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Unit : dB

Select Z Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Unit : dB

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 -

SP-FM-04-15 REV.0



Certificate of Calibration

Certificate Number : SPR23020329-1

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 : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 200300134

ID. Number : No.29

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Received Date : 17 Feb 2023Relative Humidity : $50\% \pm 15\%$ Calibration Date : 21 Feb 2023

Location of Calibration : In-Lab Recommend Due Date : 21 Feb 2024

Calibration Procedure : SP-CPE-04-01 Date of Issue : 22 Feb 2023

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.

All calibrations are performed within manufacture's specifications. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr. Karoon Pengsalung

Approved by :

Calibration Officer

(Mr. Nirut Loha)

Authorized Signatory

SP-FM-04-15 rev.0



Calibration Report

Certificate Number : SPR23020329-1

Page : 2 of 3

69/29 Moo 1 Klongsi Klongluang Pathumthani 12120 (Thailand) Tel: (662) 193-2220 5 คลังสาย www.สอบเทียบเครื่องวัด.com

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due Date
Sound Level Calibrator	ST-120	211203773	EEL-BP. 114/0166	17 Jan 2024

Traceability

This certification is traceable to the International System of Unit maintained at:
TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate No. : SPR23020329-1

Page : 3 of 3

Range : 94 to 114 dB Function : @ 1kHz

Select A	Standard Setting	UUC Reading		Error		Uncertainty (±)
		Fast	Slow	Fast	Slow	
94		94.0	94.0	0.0	0.0	0.15
114		113.9	113.9	-0.1	-0.1	0.15

Select C	Standard Setting	UUC Reading		Error		Uncertainty (±)
		Fast	Slow	Fast	Slow	
94		94.0	94.0	0.0	0.0	0.15
114		113.8	113.8	-0.2	-0.2	0.15

Select Z	Standard Setting	UUC Reading		Error		Uncertainty (±)
		Fast	Slow	Fast	Slow	
94		94.0	94.0	0.0	0.0	0.15
114		113.8	113.8	-0.2	-0.2	0.15

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 -




Certificate of Calibration

Certificate Number : SPR23020181-30 Page : 1 of 3
Customer : Thai Environmental Technic Limited.
1/6 Soi Rankhamhaeng 145, Khwaeng Saphan Sung, Khet Saphan
Sung, Bangkok 10240, Thailand.

Equipment Name : Noise Dose Meter
Manufacturer : Tenmars
Model : ST-130
Serial Number : 200300133
ID. Number : No.28

Environmental Conditions
Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Received Date : 10 Feb 2023
Relative Humidity : $50\% \pm 15\%$ Calibration Date : 13 Feb 2023
Location of Calibration : In-Lab Recommend Due Date : 13 Feb 2024
Calibration Procedure : SP-CPE-04-01 Date of Issue : 14 Feb 2023

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.
All calibrations are performed within manufacture's specifications. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Chumpon Dokpikul Approved by : 
Calibration Officer (Mr.Nirut Loha)
Authorized Signatory



Calibration Report

Certificate Number : SPR23020181-30 Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Jan 2024

Traceability
This certification is traceable to the International System of Unit maintained at :
TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate No. : SPR23020181-30

Page : 3 of 3

Range: 94 to 114 dB Function: @1kHz

Select A	Standard Setting	UUC Reading		Error		Uncertainty (±)	Unit : dB
		Fast	Slow	Fast	Slow		
	94	94.0	94.0	0.0	0.0	0.15	
	114	114.1	114.1	0.1	0.1	0.15	

Select C	Standard Setting	UUC Reading		Error		Uncertainty (±)	Unit : dB
		Fast	Slow	Fast	Slow		
	94	94.0	94.0	0.0	0.0	0.15	
	114	114.0	114.0	0.0	0.0	0.15	

Select	Z	Standard Setting	UUC Reading		Error		Uncertainty { \pm }	Unit : dB
			Fast	Slow	Fast	Slow		
	94		94.0	94.0	0.0	0.0	0.15	
	114		114.0	114.0	0.0	0.0	0.15	

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 --



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

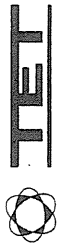
Equipment Type	Calibrator	Standard	Accuracy	Frequency	Calibrator	Serial NO.
----------------	------------	----------	----------	-----------	------------	------------

Calibration Date	:	24-May-2023
Barometric pressure (mmHg)	:	759.0 mmHg
Temperature (23±3)°C	:	25 °C
Relative Humidity(50±15 %)	:	50.0 % RH
Due Date of Calibrate	:	30-June-2023

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		035001	035002	035003	035004			
31	ACO	6226	110098	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
32	ACO	6226	110105	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			
33	ACO	6226	110096	94.0	93.9	93.9	93.9	93.9	94.0	0.2	PASS
34	ACO	6226	110099	114.0	113.8	113.8	113.8	113.8	94.0	0.1	PASS
				94.0	94.1	94.1	94.1	94.1			
35	ACO	6226	110097	114.0	114.0	114.0	114.0	114.0	94.0	0.2	PASS
				94.0	93.8	93.8	93.8	93.8			
36	ACO	6226	110102	114.0	113.9	113.9	113.9	113.9	94.0	0.1	PASS
37	ACO	6226	110101	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
38	ACO	6226	110106	94.0	96.9	96.9	96.9	96.9	94.0	0.1	PASS
				114.0	113.8	113.8	113.8	113.8			
39	ACO	6226	110104	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			
40	ACO	6226	110100	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			

Calibration By :

Approve by : _____




Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย 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 ±1%
Calibrator Serial NO. : 181203570
Calibration Date : 24-May-2023
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25 °C
Relative Humidity (50±15 %) : 50.0 % RH
Dued Date of Calibrate : 30-June-2023

Item	Instrument Calibrated		Reference Acosmic dB	Before Adjust			After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3			
41	ACO	6226	130127	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0			
42	ACO	6226	130128	93.8	93.8	93.8	94.0	0.2	PASS
				114.0	113.7	113.7			
43	ACO	6226	130129	93.7	93.7	93.7	94.0	0.3	PASS
				114.0	113.7	113.7			
44	ACO	6226	130130	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1			
45	ACO	6226	130131	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1			
46	ACO	6236	112029	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.8	113.8			
47	ACO	6236	152073	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.1	114.1			
48	ACO	6236	152074	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	114.0	114.0			
49	ACO	6236	152075	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0			
50	ACO	6236	152076	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0			

Calibration By : 
Approve by : 