

Result of Calibration

This Instrument was Connected with Thermister Probe

Stem Diameter : 3 mm

Immersion Depth : 100 mm

Resolution : 0.1 ($^{\circ}\text{C}$)

Sheath material : Stainless Steel

Without Adjustment

STD Reading ($^{\circ}\text{C}$)	UUC Reading ($^{\circ}\text{C}$)	UUC Error ($^{\circ}\text{C}$)	Measurement Uncertainty ($\pm^{\circ}\text{C}$)
0.008	0.2	0.192	0.15
25.015	25.1	0.085	0.15

STD= Standard

UUC= Unit Under Calibration

** End of Calibration Report **



www.accl-calibration.com
www.accl-cal.com
www.aouffoun8008a.com

ADVANTAGE CENTER CO., LTD.

59/494 M.6, Frakham Road, T.Kukhot, Lumlookkar, Pathumthani 12130 Thailand.
Tel. (66-2) 9873248-50 Fax: (66-2) 9873252 E-mail: info.accl2662@gmail.com
pornsak2008@yahoo.co.th



CALIBRATION LABORATORY

Certificate No. RA-2310046-1

Job No. RA-2310046

Certificate of Calibration

FOR

Equipment Name : Incubator

Manufacturer : Biochemical Incubator

Model : SPX-150B

Serial Number : ZQ23090915

Customer Code : SMBOD001

Calibration Procedure : CPT-04-01

Received Date : Oct 19, 2023

Calibration Date : Oct 20, 2023

Recommended Due Date : N/A

Location of Calibration : On Site

Customer Name : SMART ENVIRONMENTAL CONSULTANTS CO.,LTD.

225/6 Moo. 3 Ban Chang, Mueang Pathum Thani, Pathum Thani 12000

CONDITION AS RECEIVED : Normal

Environmental Conditions

Ambient Temperature : $(25 \pm 10) ^\circ\text{C}$

Relative Humidity : $(50 \pm 30) \% \text{RH}$

Result : No Adjustment (See data attached in page 3 to the end of certificate)

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Advantage Center Co., Ltd.

Calibrated by : P. Aekkachai

Approved by :

(Pornsak Suksawaeng)

Date of Issue : Oct 31, 2023

Laboratory Management

Certificate No.: RA-2310046-1

Reference Standards

Equipment Name	Serial No.	Certificate No.	Due Date	Traceability to
Data Acquisition	MY44021037	5523631030249563	Aug 4, 2024	Micro Precision

Traceability

This calibration is traceable to the International System of Unit via :

- Micro Precision : Micro Precision Calibration Laboratory (Thailand) Co.,Ltd



Result of Calibration

Certificate No. : RA-2310046-1

Result of Chamber Performance.

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
20	20	20.0	0.21	0.58	0.57

Result of temperature distribution.

Calibration Temperature (°C)	Standard Reading (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ⁴ (±°C)
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	
20	20.44	20.39	20.34	20.32	20.25	20.27	19.91	19.88	20.45	0.25

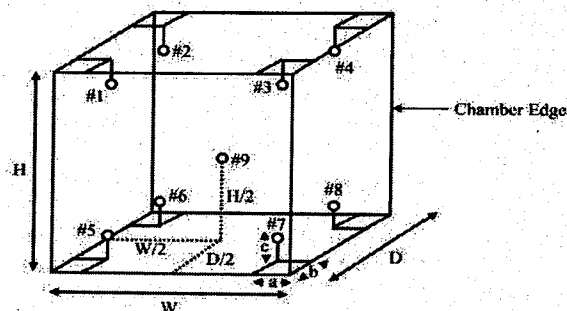
Sensor Installation Locations

Sensor No. 1 to 8

a x b x c = 5 cm x 5 cm x 5 cm

Sensor No. 9 is Reference

D / 2 x W / 2 x H / 2



Notes :

1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.
3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
4. The uncertainty of measurement is included temperature stability.

- End of Certificate -





S K SALES AND SERVICE CO.,LTD.

194/56, 194/57 Thakham Rd. Samae Dam

Bang Khun Thian Bangkok 10150

Tel : 02-417-2144 Fax : 02-417-2155



Certificate of Calibration

Reference No. : C05073/2305-022
Customer : Smart Environmental Consultants Co.,Ltd
: 225/6 Moo3 Banchang, Mueang Pathumthani,
: Pathumthani 12000
Equipment : Hot Air Oven
Manufacturer : Memmert
Model : UF55
Serial No. : B222.3378
ID No. : -
Received Date : 11 May 2023
Calibrated Date : 11 May 2023
Issued Date : 15 May 2023
Environment

Certificate No. : S2305-2181

Page 1 of 2

	Minimum Value	Maximum Value
Ambient Temperature (°C)	24.5	25.1
Relative Humidity (% RH)	51	52
AC Line Voltage (VAC)	224	229

Place Of Calibration : Temperature Calibration Room

Calibrated by : Mr. Thanapop Klaikaew

Calibration Method

In-house method : SK-WI-23 base on Thai Laboratory Accreditation Scheme Publication Reference G-20

Condition of this result of calibration


1. Reference standard instrument

	Instrument	Model	Serial No.	Certificate No.	Due Date
1)	Data acquisition/Switch unit	34972A	MY49003278	L2211-1253	26 May 23
2)	Multiplexer Module	34901A	MY41082447	L2211-1253	26 May 23

2. This result of calibration was found accurate as shown on date and place of calibration only

3. This certificate can be traceable to International System of Unit :

- Through Thailand Institute of Scientific And Technological Research (TISTR)

Approved by : 

☐ Mr.Suphachai Saksri

☒ Mr.Phayak Tootit

☐ Miss Tantaraporn Pettong

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

Table1 General Information

Working Area (W*L*H)	40 *33 *40 cm
Fresh Air	OFF

Table2 Chamber Performance

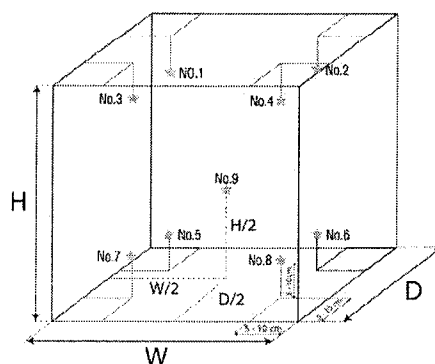
Setting Temperature (°C)	Average Indicating Temperature (°C)	Measured Stability (± °C)	Measured Uniformity (°C)	Overall Variation (°C)
104.0	104.0	0.14	0.60	0.71
180.0	180.0	0.20	0.46	0.68

Table3 Temperature Distribution

Setting Temperature (°C)	Average Standard Reading (°C)									Uncertainty (± °C)
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	
104.0	104.45	104.42	104.18	104.21	104.10	104.11	103.97	104.28	104.01	0.65
180.0	180.42	180.42	180.44	180.22	180.24	180.46	180.35	180.15	180.35	0.80

Resolution : 0.1 (°C)

* Probe No. 9 is Reference Probe



- Notes :
1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
 2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time
 3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
 4. The reported uncertainty of measurement were excluded Uniformity and Stability

** End of Calibration Report **

TSP High Volume Sampler Calibration

Project Name	โครงการก่อสร้างอาคารที่พักกองบัญชาการกองทัพไทย	Location	กรุงเทพ	Date	April 27, 2024
Sampler Location	พื้นที่โครงการ	Sampler Number	TSP No.2	Person	Mr.Atrat Thaipradit

CALIBRATION ORIFICE

Date Certified	September 9, 2023	Make	Tisch Environmental, Inc	Intercept (b)	-0.01612
Calibration Mode	TE-5025A	Calibrator Serial	0438	Slope (m)	1.18584

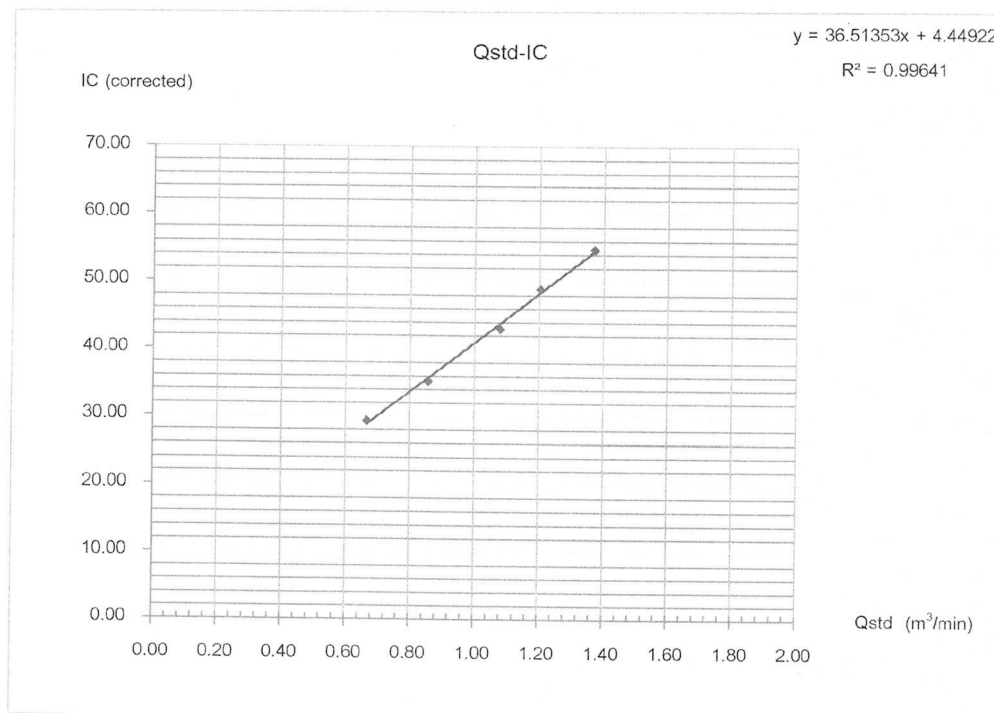
CONDITIONS

Actual Temperature (Ta) (deg C)	38	Corrected Temperature (Ta) (deg K)	311
Actual pressure (Pa)(mm Hg)	758.5	Corrected pressure (Pa)(mm Hg)	758.5
Average Temp: (Deg K)	291	Temperature (Tstd)(deg K)	298.15
Corrected Average (mm Hg)	748.8	Pressure (Pstd)(mm Hg)	760

TEST

Plate No.	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)
5	0.6	0.66599	30.00	29.34
7	1	0.85583	36.00	35.21
10	1.6	1.07895	44.00	43.04
13	2	1.20470	50.00	48.91
18	2.6	1.37166	56.00	54.78

LINEAR REGRESSION	
Slope	36.51353
Intercept	4.44922
Corr. Coeff (r)	0.99820
# of Observatio	5
Corr. Coeff (r ²)	0.99641



Test by :

 (Mr.Pakawat Pratoomchat)
 Environmental Scientist


Smart Envir
 Smart Environmental Consultants Co.,Ltd.

Approved by :

 (Mr.Atrat Thaipradit)
 Environmental Monitoring Manager

PM10 High Volume Sampler Calibration

Project Name	โครงการก่อสร้างอาคารที่พักกองบัญชาการกองทัพไทย	Location	กรุงเทพ	Date	April 27, 2024
Sampler Location	พื้นที่โครงการ	Sampler Number	PM10 No.2	Person	Mr.Atrat Thaipradit

CALIBRATION ORIFICE

Date Certified	September 9, 2023	Make	Tisch Environmental, Inc	Intercept (b)	-0.01612
Calibration Model	TE-5025A	Calibrator Serial	0438	Slope (m)	1.18584

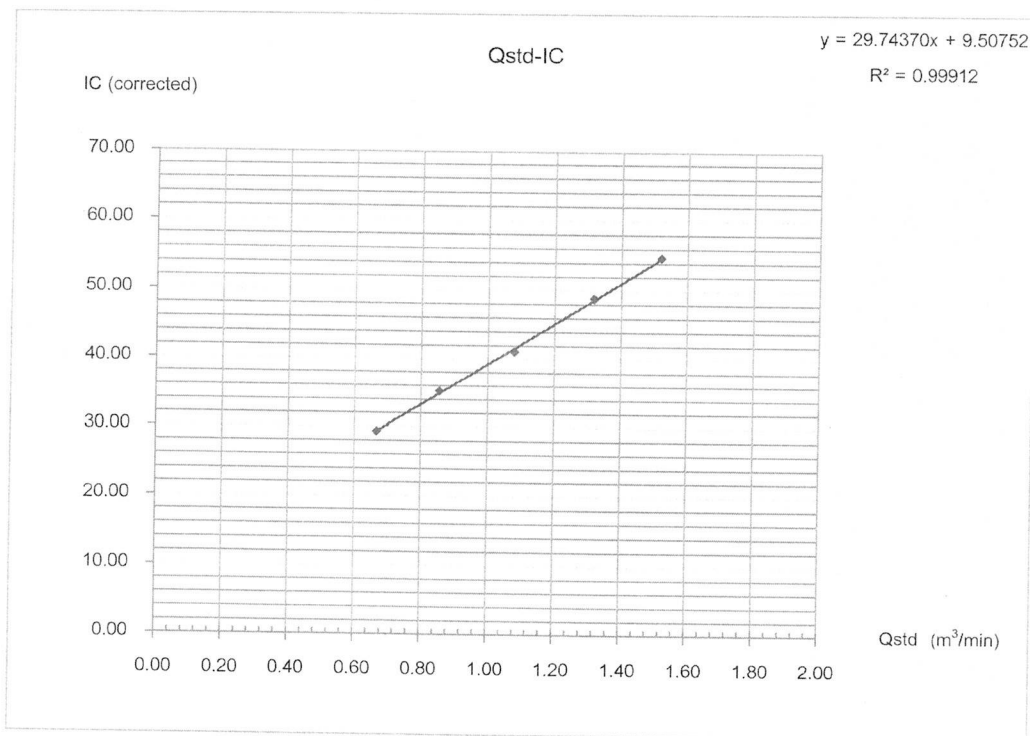
CONDITIONS

Actual Temperature (Ta) (deg C)	38	Corrected Temperature (Ta) (deg K)	311
Actual pressure (Pa)(mm Hg)	758.5	Corrected pressure (Pa)(mm Hg)	758.5
Average Temp: (Deg K)	291	Temperature (Tstd)(deg K)	298.15
Corrected Average (mm Hg)	748.8	Pressure (Pstd)(mm Hg)	760

TEST

Plate No.	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)
5	0.6	0.66599	30.00	29.34
7	1	0.85583	36.00	35.21
10	1.6	1.07895	42.00	41.08
13	2.4	1.31839	50.00	48.91
18	3.2	1.52024	56.00	54.78

LINEAR REGRESSION	
Slope	29.74370
Intercept	9.50752
Corr. Coeff (r)	0.99956
# of Observation	5
Corr. Coeff (r ²)	0.99912



Test by : P. Pakawat
 (Mr.Pakawat Pratoomchat)
 Environmental Scientist

Approved by : T. Atirat
 (Mr.Atirat Thaipradit)
 Environmental Monitoring Manager

TSP High Volume Sampler Calibration

Project Name	โครงการก่อสร้างอาคารที่พักกึ่งบัญชาการกองทัพไทย	Location	กรุงเทพ	Date	April 27, 2024
Sampler Location	บริเวณศูนย์รักษาความปลอดภัย	Sampler Number	TSP No.1	Person	Mr.Atrat Thaipradit

CALIBRATION ORIFICE

Date Certified	September 9, 2023	Make	Tisch Environmental, Inc	Intercept (b)	-0.01612
Calibration Model	TE-5025A	Calibrator Serial	0438	Slope (m)	1.18584

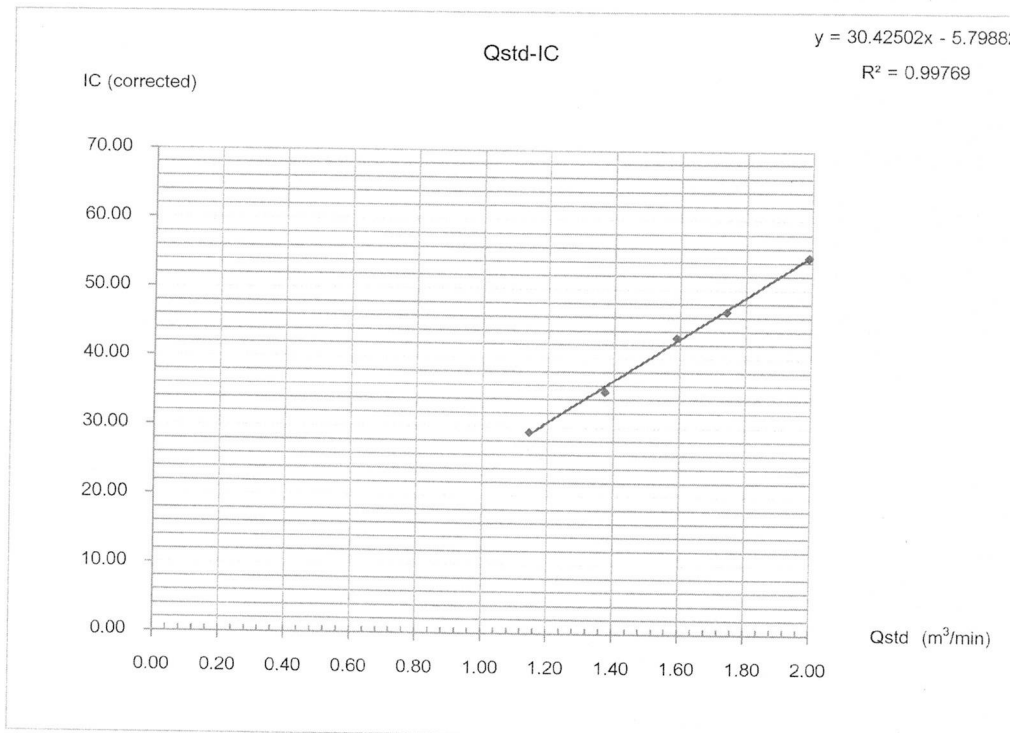
CONDITIONS


Actual Temperature (Ta) (deg C)	38	Corrected Temperature (Ta) (deg K)	311
Actual pressure (Pa)(mm Hg)	758.5	Corrected pressure (Pa)(mm Hg)	758.5
Average Temp: (Deg K)	291	Temperature (Tstd)(deg K)	298.15
Corrected Average (mm Hg)	748.8	Pressure (Pstd)(mm Hg)	760

TEST


Plate No.	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)
5	1.8	1.14358	30.00	29.34
7	2.6	1.37166	36.00	35.21
10	3.5	1.58928	44.00	43.04
13	4.2	1.73967	48.00	46.95
18	5.5	1.98882	56.00	54.78

LINEAR REGRESSION	
Slope	30.42502
Intercept	-5.79882
Corr. Coeff (r)	0.99884
# of Observation	5
Corr. Coeff (r ²)	0.99769



Test by : 
 (Mr.Pakawat Pratoomchat)
 Environmental Scientist

Approved by


 (Mr.Atrat Thaipradit)
 Environmental Monitoring Manager

PM10 High Volume Sampler Calibration

Project Name	โครงการก่อสร้างอาคารที่พักกึ่งบัญชาการกองทัพไทย	Location	กรุงเทพ	Date	April 27, 2024
Sampler Location	บริเวณศูนย์รักษาความปลอดภัย	Sampler Number	PM10 No.1	Person	Mr.Atrat Thaipradit

CALIBRATION ORIFICE

Date Certified	September 9, 2023	Make	Tisch Environmental, Inc	Intercept (b)	-0.01612
Calibration Mode	TE-5025A	Calibrator Serial	0438	Slope (m)	1.18584

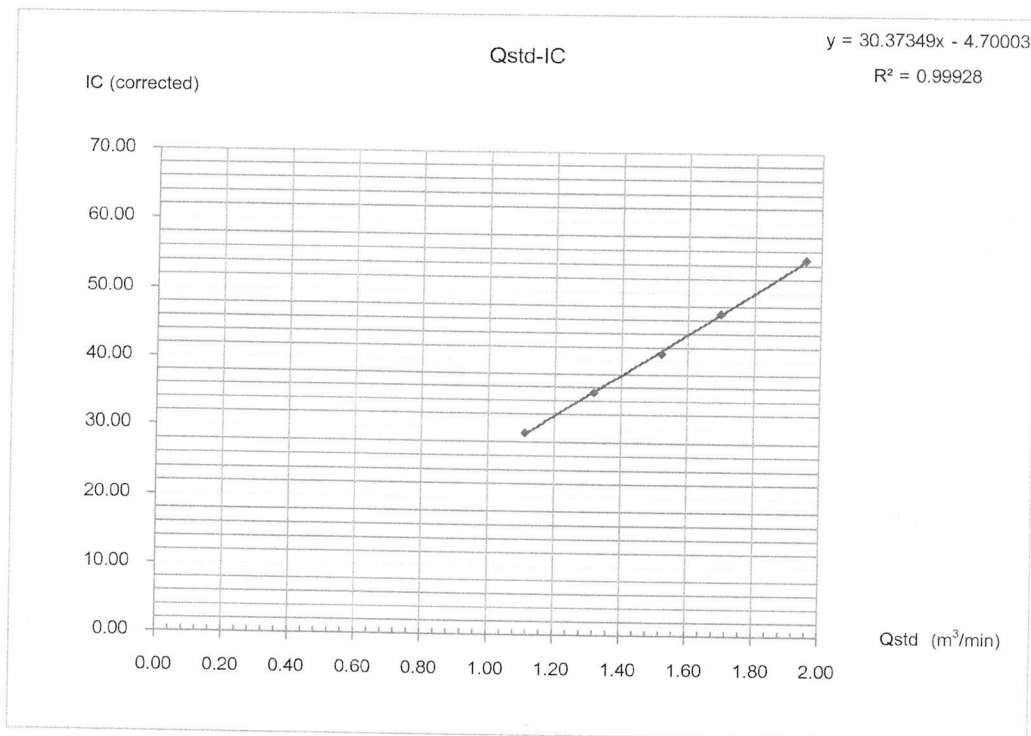
CONDITIONS

Actual Temperature (Ta) (deg C)	38	Corrected Temperature (Ta) (deg K)	311
Actual pressure (Pa)(mm Hg)	758.5	Corrected pressure (Pa)(mm Hg)	758.5
Average Temp: (Deg K)	291	Temperature (Tstd)(deg K)	298.15
Corrected Average (mm Hg)	748.8	Pressure (Pstd)(mm Hg)	760

TEST

Plate No.	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)
5	1.7	1.11174	30.00	29.34
7	2.4	1.31839	36.00	35.21
10	3.2	1.52024	42.00	41.08
13	4	1.69807	48.00	46.95
18	5.3	1.95257	56.00	54.78

LINEAR REGRESSION	
Slope	30.37349
Intercept	-4.70003
Corr. Coeff (r)	0.99964
# of Observation	5
Corr. Coeff (r ²)	0.99928



Test by :



 (Mr.Pakawat Pratoomchat)
 Environmental Scientist

Smart Envir
 Smart Environmental Consultants Co.,Ltd.

Approved by :



 (Mr.Atirat Thaipradit)
 Environmental Monitoring Manager

Certificate of Calibration

Calibration Certification Information

Cal. Date: September 11, 2023

Rootsmeter S/N: 438320

Ta: 296

°K

Operator: Jim Tisch

Pa: 752.6

mm Hg

Calibration Model #: TE-5025A

Calibrator S/N: 0438

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3100	3.2	2.00
2	3	4	1	0.9240	6.4	4.00
3	5	6	1	0.8270	7.8	5.00
4	7	8	1	0.7880	8.7	5.50
5	9	10	1	0.6520	12.6	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
0.9927	0.7578	1.4121	0.9957	0.7601	0.8869
0.9885	1.0698	1.9970	0.9915	1.0730	1.2543
0.9866	1.1930	2.2327	0.9896	1.1967	1.4023
0.9854	1.2505	2.3416	0.9884	1.2544	1.4708
0.9803	1.5035	2.8241	0.9833	1.5081	1.7738
QSTD	m=	1.89377	QA	m=	1.18584
	b=	-0.02567		b=	-0.01612
	r=	0.99999		r=	0.99999

Calculations

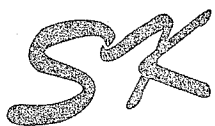
Vstd= $\Delta Vol((Pa-\Delta P)/Pstd)(Tstd/Ta)$	Va= $\Delta Vol((Pa-\Delta P)/Pa)$
Qstd= $Vstd/\Delta Time$	Qa= $Va/\Delta Time$
For subsequent flow rate calculations:	
Qstd= $1/m \left(\left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} \right) - b \right)$	Qa= $1/m \left(\left(\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)} \right) - b \right)$

Standard Conditions

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

RECALIBRATION

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



S K SALES AND SERVICE CO.,LTD.

194/56, 194/57 Thakham Rd. Samae Dam

Bang Khun Thian Bangkok 10150

Tel. : 02-417-2144 Fax : 02-417-2155



Certificate of Calibration

Reference No. : C05073/2305-022 Certificate No. : S2305-2978
Customer : Smart Environmental Consultants Co.,Ltd
: 225/6 Moo3 Banchang, Mueang Pathumthani,
: Pathumthani 12000
Equipment : Electronic Balance
Manufacturer : JOANLAB
Model : FA2204
Serial No. : 1032301082
ID No. : BL001
Received Date : 16 May 2023
Calibrated Date : 16 May 2023
Issued Date : 19 May 2023

Environment	Minimum Value	Maximum Value
Ambient Temperature (°C)	30.9	31.2
Relative Humidity (% RH)	52	53
Atmospheric Pressure (mbar)	1010	1010

Place of Calibration : Production Line
Calibrated by : Mr. Kittichart Wannaros

Calibration Method

In-house method : SK-WI-08 base on UKAS Lab 14 Edition 6, July 2019

Guidance on the calibration of weighing machines used in testing and calibration laboratories

Reference standard instrument

<u>Instrument</u>	<u>ID No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
Standard Weight Set E2	MASS-WE-01	M2106171S/M2106175S	25 June 2023

Condition of this result of calibration

1. This result of calibration was found accurate as shown on date and place of calibration for this item only
2. This certificate can be traceable to International System of Unit :
 - Through Mass and scale calibration laboratory of Thai scale Co.,Ltd.

Approved by :

☒ Mr.Suphachai Saksri

☐ Mr.Phayak Tootit

☐ Miss Tantaraporn Pettong

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

Description of UUC

Capacity : 220 g

Resolution : 0.0001 g

Calibration Result

1.Repeatability of reading

Applied weight (g)	Standard Deviation of reading (g)
20	0.000053
200	0.000052

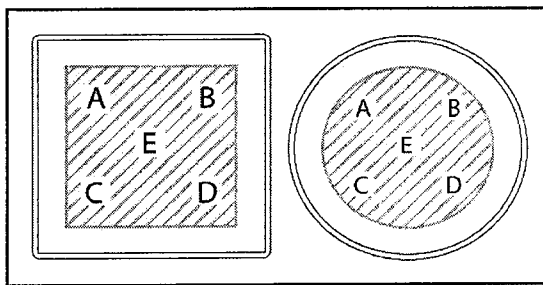
2.Departure from nominal value

Without adjustment

Applied weight (g)	Balance reading (g)	Correction (g)	Uncertainty (\pm g)
Zero setting	0.0000	0.0000	0.00010
1	1.0000	0.0000	0.00010
20	20.0001	-0.0001	0.00011
40	40.0000	0.0000	0.00013
60	60.0000	0.0000	0.00019
80	80.0001	-0.0001	0.00022
100	100.0000	0.0000	0.00018
120	120.0000	0.0000	0.00030
140	140.0000	0.0000	0.00030
160	160.0001	-0.0001	0.00031
180	180.0001	-0.0001	0.00034
200	200.0001	-0.0001	0.00039

3.Effect of off-center loading : Used weight 100 g was place to various position on the pan

Position	Balance reading (g)
E	100.0000
A	100.0001
B	100.0000
C	100.0001
D	100.0000
Maximum Difference	0.0001



** End of Calibration Report **

Personal Pump Calibration Report

Equipment Type	:	Personal Pump
Manufacturer	:	Bios
Model	:	DCL-M
Serial No.	:	107697
Equipment Range	:	0.05 – 5.0 L/min
Calibration Range	:	0.05 L/min
Calibration date	:	26 เมษายน พ.ศ. 2567
Customer Name	:	บริษัท มิตรสิ่งแวดล้อมไทย จำกัด
Project Name	:	โครงการก่อสร้างอาคารที่พักข้าราชการกองบัญชาการกองทัพไทย พื้นที่ศูนย์รักษาความปลอดภัยของกองบัญชาการกองทัพไทย

No.	Personal Pump Serial Number	High Flow/ Low Flow	Flow (Liter per min)				Uncertainty
			1 st	2 nd	3 rd	Average	
1	QCD-1500 : 233147	0.05 L/min	0.04	0.03	0.07	0.05	±0.0208


Smart Envir
 Smart Environmental Consultants Co.,Ltd.

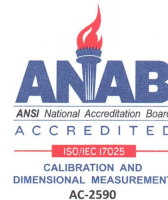
P. Pakawat
 (Mr.Pakawat Pratoomchat)
 Environmental Scientist

T. Atirat
 (Mr.Atirat Thaipradit)
 Environmental Monitoring Manager



Professional Calibration & Services Co., Ltd.

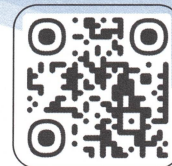
50/888, 50/889 Moo 2, Rungsit-Nakornnayok Rd., Bungyeetho, Thunyaburi,
Pathumthani 12130 Thailand
Tel : (+66)2150-6641 (Autoline), (+66)2569-5158
Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : PL27851/23
Control Number : PCAL149790
Customer Control : -
Description : Primary Flow Meter
Manufacturer : Bios
Model : DCL-M
Serial Number : 107697
Customer : Smart Environmental Consultants Co.,Ltd

Page 1 of 3



เลขที่ 225/6 หมู่ 3 ต.บ้านฉาง อ.เมืองปทุมธานี จ.ปทุมธานี 12000

Date of Receipt : 20-Jun-23
Date of Calibration : 24-Jun-23
Environment : Temperature $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$
: Relative Humidity $50\% \pm 20\%$
Calibration Method : Calibration Procedure Number CP-PL78
Calibration Results : See data attached

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

This certificate is issued in accordance with ISO/IEC17025 and the conditions of accreditation granted by the Accreditation Body which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. The results relate only to the item calibrated.

This certificate shall not be reproduced other than in full except without the prior written approval of the Head of Calibration Laboratory of Professional Calibration & Services Co., Ltd.

Calibrated By

Mr. Ruttapol Thammalee

Authorized Signature

(Mr. Direk Sriphet)

27-Jun-23

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : PL27851/23

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Primary Flow Calibrator	20307-S	ANAB : AC-2487	WK2208-205-1	31-Aug-23

Condition as received : Normal

Definitions :-

* ANAB - The ANSI National Accreditation Board

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No. : PL27851/23

Page 3 of 3

Calibration Result

Appearance and function of use : Good

Results of Calibration: ☒ Without adjustment ☐ With adjustment

Details of Equipment: Measuring Range: 0.05 to 5 L/min Resolution: 0.0001, 0.001 L/min

Standard Value (L/min)	UUC Reading (L/min)	UUC Error (L/min)	Uncertainty (± L/min)
0.0500	0.0489	-0.0011	0.06
1.250	1.243	-0.007	0.06
2.500	2.489	-0.011	0.06
3.700	3.685	-0.015	0.06
5.000	4.981	-0.019	0.06

...End...

Analyzer Performance Test

Calibrated Date: 01 June 2023

Instruments Information

Analyzer Type : NO-NO₂-NO_x Analyzer

Manufacturer : Thermo Environmental

Model : 42C

Serial Number : 42CLS-75458-380

Calibrator Unit

Dilutor Model : Dasibi Model 5008

Serial Number : 705

ZERO AIR Generator : API MODEL 701

Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM

Sulphur Dioxide (SO₂) 55.11 PPM

Carbon Monoxide (CO) 4,535 PPM

Cylinder number EB0129027

Expire Date: 29 Oct. 2027

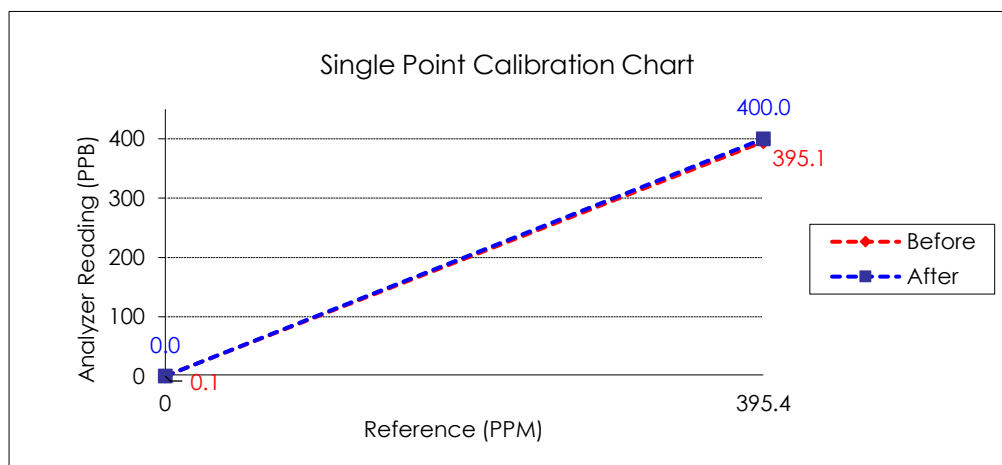
Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report (Before Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	395.1	-1.2
NO _x	0.0	0.0	0.0	400.0	395.4	-1.2

Calibration Report (After Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	400.0	0.0
NO _x	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : 

MR. KITTISAK JANSANGWATTANA

Approve by :



MR. PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 01 August 2023

Instruments Information

Analyzer Type : SO2 Analyzer

Manufacturer : Thermo Environmental

Model : 43C

Serial Number : 43C-71080-367

Calibrator Unit

Dilutor Model : Dasibi Model 5008

Serial Number : 705

ZERO AIR Generator : API MODEL 701

Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM

Sulphur Dioxide (SO₂) 55.11 PPM

Carbon Monoxide (CO) 4,535 PPM

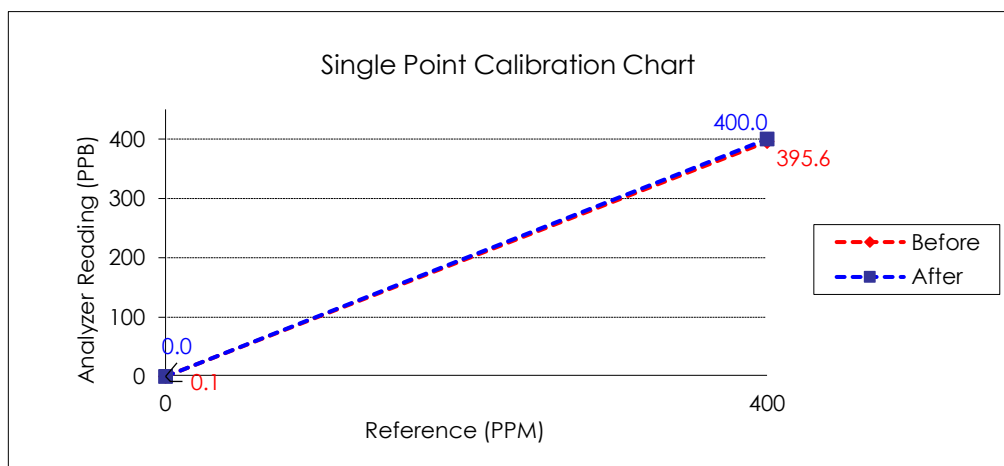
Cylinder number EB0129027

Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	395.6	-1.1
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทะวงษ์
MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type : CO Analyzer
Model : 300E

Manufacturer : API
Serial Number : 597

Calibrator Unit

Dilutor Model : Dasibi Model 5008
Serial Number : 705
ZERO AIR Generator : API MODEL 701
Serial Number : 1924

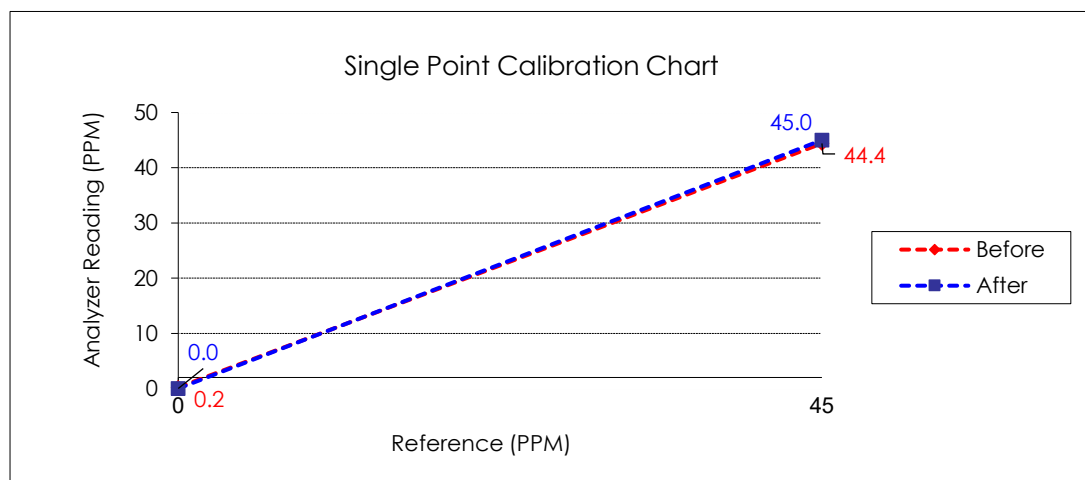
Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM
Sulphur Dioxide (SO₂) 55.11 PPM
Carbon Monoxide (CO) 4,535 PPM
Cylinder number EB0129027
Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

	Zero			Span		
	Reference (PPM)	Reading (PPM)	Drift (PPM)	Reference (PPM)	Reading (PPM)	Drift%
Before	0.0	0.2	0.2	45.0	44.4	-1.3
After	0.0	0.0	0.0	45.0	45.0	0.0



Calibrate By : กิตติศักดิ์ จันทะวงษ์วัฒนา
MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL

ENVIR SERVICE CO., LTD.

42 Ramintra 14 Yeak 9, Tha Raeng, Bang Khen, Bangkok 10230
Tel. 02-9435814-5 Fax. 02-9438201 www.envirservice.co.th

Analyzer Performance Test

Calibrated Date: 16 September 2023

Instruments Information

Analyzer Type : SO2 Analyzer

Model : 43C

Manufacturer :

Thermo Environmental

Serial Number :

43C-57533-317

Calibrator Unit

Dilutor Model : Dasibi Model 5008

Serial Number : 705

ZERO AIR Generator : API MODEL 701

Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM

Sulphur Dioxide (SO2) 55.11 PPM

Carbon Monoxide (CO) 4,535 PPM

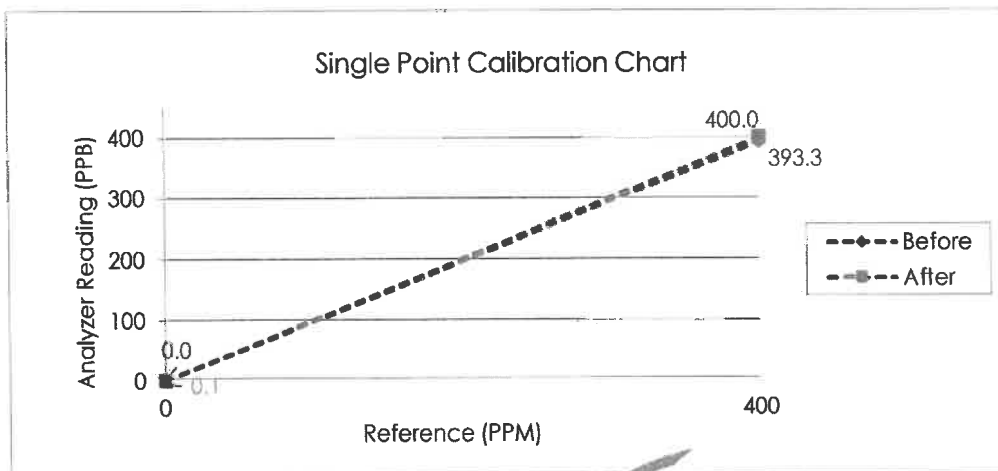
Cylinder number EB0129027

Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	393.3	-1.7
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By: กิตติศักดิ์ จันทะวงษ์

MR. KITTISAK JANSANGWATTANA บริษัท เอ็นไวร์ เซอร์วิส จำกัด

ENVIR SERVICE CO., LTD.



Approved by: MR. PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 16 September 2023

Instruments Information

Analyzer Type : CO Analyzer

Model : 48C

Manufacturer : Thermo Environmental

Serial Number : 48C-67526-357

Calibrator Unit

Dilutor Model : Dasibi Model 5008

Serial Number : 705

ZERO AIR Generator : API MODEL 701

Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM

Sulphur Dioxide (SO₂) 55.11 PPM

Carbon Monoxide (CO) 4,535 PPM

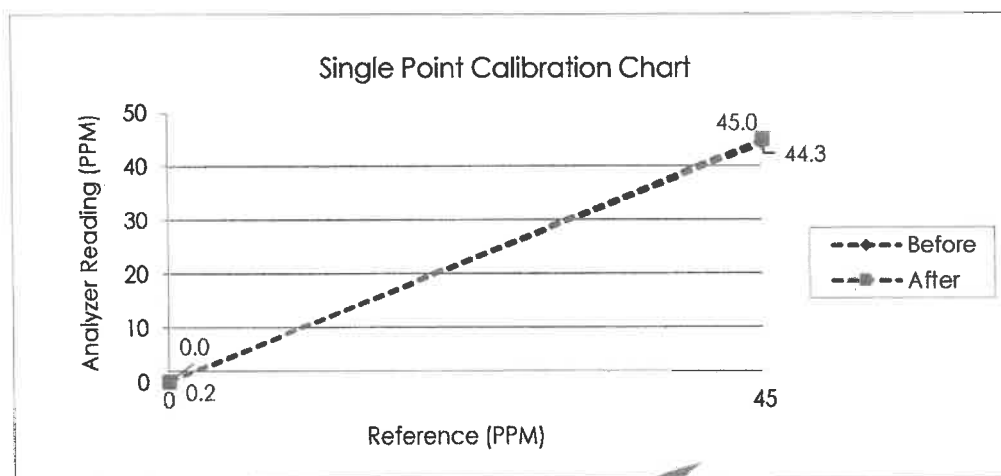
Cylinder number EB0129027

Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

	Zero			Span		
	Reference (PPM)	Reading (PPM)	Drift (PPM)	Reference (PPM)	Reading (PPM)	Drift%
Before	0.0	0.2	0.2	45.0	44.3	-1.6
After	0.0	0.0	0.0	45.0	45.0	0.0



Calibrate By: กิตติศักดิ์ จันทะนา

MR. KITTISAK JANSANGWATTANA



Approved by:

MR. PASAGORN SAMOL

บริษัท เอ็นไวร์ เซอร์วิส จำกัด
ENVIR SERVICE CO., LTD.


Sound Level Meter Calibration Report

Equipment Type	:	Sound Level Calibrator
Manufacturer	:	Hangzhon
Model	:	AWA6221A
Serial No.	:	AWA6221A0467E
Sound Output (dB(A))	:	94.0
Calibration date	:	26 เมษายน พ.ศ. 2567
Customer Name	:	บริษัท มิตรสิ่งแวดล้อมไทย จำกัด
Project Name	:	โครงการก่อสร้างอาคารที่พักข้าราชการกองบัญชาการกองทัพไทย พื้นที่ศูนย์รักษาความปลอดภัยของกองบัญชาการกองทัพไทย

No.	Sound Level Meter	Serial Number	Actual Reading (dB(A))		Status
			Before	After	
1	Scarlet Model ST-21D	821002	93.9	94.0	Pass
2	Scarlet Model ST-21D	820780	93.7	94.0	Pass



 (Mr. Pakawat Pratoomchat)
 Environmental Scientist


 (Mr. Atirat Thaipradit)
 Environmental Monitoring Manager



Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsit-Nakornnayok Rd., Bungyestha, Thunyaburi,
Pathumthani 12130 Thailand
Tel : (+66)2150-6641 (Autoline), (+66)2569-5158
Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : EL31084/23
Control Number : PCAL150226
Customer Control : SM-SC-01
Description : Sound Calibrator
Manufacturer : Hangzhon
Model : AWA6221A
Serial Number : AWA6221A0467E
Customer : Smart Environmental Consultants Co.,Ltd

Page 1 of 3



เลขที่ 225/6 หมู่ 3 ต.บ้านฉาง อ.เมืองปทุมธานี จ.ปทุมธานี 12000

Date of Receipt : 12-Jul-23
Date of Calibration : 13-Jul-23
Environment : Temperature $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$
: Relative Humidity $50\% \pm 20\%$
Calibration Method : Calibration Procedure Number CP-EL35
Calibration Results : See data attached

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

This certificate is issued in accordance with ISO/IEC17025 and the conditions of accreditation granted by the Accreditation Body which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. The results relate only to the item calibrated.

This certificate shall not be reproduced other than in full except without the prior written approval of the Head of Calibration Laboratory of Professional Calibration & Services Co., Ltd.

Calibrated By

Mr. Nattaya Iamnarm

Authorized Signature

(Mr. Songpol Nakanurak)

13-Jul-23

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL31084/23

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Meter	030606101	ANAB : AC-2590	EL09782/23	29-Mar-24
Sound Level Calibrator	141208123	NSC : Calibration 0037	EEL.BP. 16/0366	06-Mar-24

Condition as received : Normal

Definitions :-

- * ANAB - The ANSI National Accreditation Board
- * NSC - National Standardization Council of Thailand

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL31084/23

Page : 3 of 3

Calibration Results

Sound Calibration

UUC Setting	Measured Value	Uncertainty (\pm)	Tolerance Limit Values
94 dB	94.0 dB	0.2 dB	93.7 ~ 94.3 dB
114 dB	114.1 dB	0.2 dB	113.7 ~ 114.3 dB

Note:

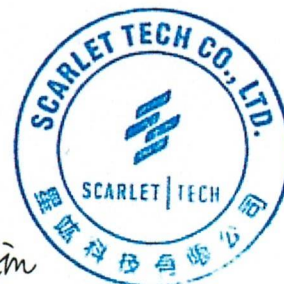
- 1). Tolerances or specifications report in table above are base on the product data sheet Sound Level Calibrator AWA6221A.

...End...

CERTIFICATE OF CALIBRATION

NO. 20230817047

Name of Product:	Sound Level Meter
Model:	ST-21D
Serial Number:	821002
Specification:	Class 2
Conclusion:	Pass
Date of calibration:	2023-08-17
Due Date:	2024-08-16

Calibrated by: *Jim Lin*

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

1. Preliminary inspection: OK

2. Type & serial No. of Microphone: AWA14421A-0005014. Measuring up limit: 138 dBA

3. Adjustments to indicated sound levels:

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

Type of Calibrator B&K 4231Sound Pressure Level 94.0 dBEquivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
20	-50.6	-6.1	-0.2	1000	0.0	0.0	0.0
31.5	-39.5	-3.2	-0.1	2000	1.3	-0.2	0.0
63	-26.2	-0.8	0.0	4000	1.2	-0.6	0.0
125	-16.2	-0.3	-0.1	8000	-1.2	-3.2	0.0
250	-8.7	-0.1	-0.1	12500	-11.0	-13.0	0.0
500	-3.3	0.0	0.0	/	/	/	/

6. Self-generated noise

Microphone replaced by electrical input signal device

25.3 dB(A)	26.1 dB(C)	35.1 dB(Z)
------------	------------	------------

7. F&S Weighting

Rate of the F weighting decrease (dB/s)	34.6
Rate of the S weighting decrease (dB/s)	4.4
Deviation of F&S	0.0

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

Reference sound level 90.0 dB

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

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

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

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

9. Tone burst response (A Weighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	$L_{AFmax}-L_A$	$L_{ASmax}-L_A$	$L_{AE}-L_A$	$L_{AeqT}-L_A$
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-16.9	-6.9	-7.0
2	-18.1	-26.9	-26.9	-7.0
0.25	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz) :

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

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 123.0 dB

Sweep amplitude: 40 dB

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

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
LAeq,T	113.3	113.4	-0.1
L5	121.0	121.0	0.0
L10	119.0	119.0	0.0
L50	103.0	103.0	0.0
L90	87.1	87.0	0.1
L95	85.1	85.0	0.1

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

Environment conditions:

Air temperature: 20 °C

Relative humidity: 50 %

Static pressure: 101.8 kPa

Reference equipment used in the calibration:

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

Test specifications:

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

References:

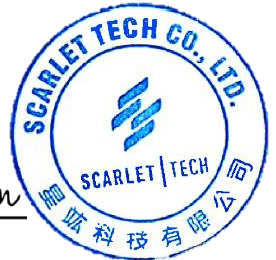
IEC 61672-3 Sound Level Meters Part 3: Periodic tests

CERTIFICATE OF CALIBRATION

NO. 20240409131

Name of Product:	Sound Level Meter
Model:	ST-21D
Serial Number:	820780
Specification:	Class 2
Conclusion:	Pass
Date of calibration:	2024-04-09
Due Date:	2025-04-10

Calibrated by: Jim Lin



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

1. Preliminary inspection: OK

2. Type & serial No. of Microphone: AWA14421A-000620

3. Adjustments to indicated sound levels:

Type of Calibrator B&K 4231

Sound Pressure Level 94.0 dB

4. Measuring up limit: 138 dBA

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

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

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
20	-50.3	-6.4	-0.2	1000	0.0	0.0	0.0
31.5	-39.5	-3.0	0.0	2000	1.3	-0.1	0.0
63	-26.2	-0.8	0.0	4000	1.3	-0.6	0.0
125	-16.1	-0.2	0.0	8000	-1.2	-3.2	0.0
250	-8.7	0.0	0.0	12500	-11.0	-13.0	0.0
500	-3.2	0.0	0.0	/	/	/	/

6. Self-generated noise

Microphone replaced by electrical input signal device

24.4 dB(A)	26.9 dB(C)	36.1 dB(Z)
------------	------------	------------

7. F&S Weighting

Rate of the F weighting decrease (dB/s)	34.6
Rate of the S weighting decrease (dB/s)	4.3
Deviation of F&S	-0.1

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

Reference sound level 90.0 dB

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

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

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

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

9. Tone burst response (A Weighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	LAFmax-LA	LASmax-LA	LAE-LA	LAeqT-LA
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
2	-18.2	-26.9	-26.9	-7.0
0.25	-27.1	/	-36.1	-7.0

10. Peak C sound level (500Hz) :

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

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 123.0 dB

Sweep amplitude: 40 dB

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

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
LAeq,T	113.3	113.4	-0.1
L5	121.0	121.0	0.0
L10	119.0	119.0	0.0
L50	103.0	103.0	0.0
L90	87.1	87.0	0.1
L95	85.1	85.0	0.1

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

Environment conditions

:

Air temperature: 20 °C

Relative humidity: 50 %

Static pressure: 101.8 kPa

Test specifications:

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

References:

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



S K SALES AND SERVICE CO.,LTD.
194/56, 194/57 Thakham Rd. Samae Dam
Bang Khun Thian Bangkok 10150
Tel. : 02-417-2144 Fax : 02-417-2155



Certificate of Calibration

Reference No. : 5228/2403-071 Certificate No. : S2404-1235
Customer : Smart Environmental Consultants Co.,Ltd. Page 1 of 2

: 225/6 Moo3 Banchang, Mueang Pathumthani,
: Pathumthani 12000

Equipment : pH Meter

Manufacturer :

Model :

Serial No. :

ID No. :

Received Date : 8 April 2024

Calibrated Date : 8 April 2024

Issued Date : 19 April 2024

pH Meter	pH Electrode
EUTECH	EUTECH
PH 700	-
3133752	ECFC7252101B
PH-001	-

Environment	Start Calibration	Stop Calibration
Ambient Temperature (°C)	25.1	25.8
Relative Humidity (% RH)	50	53

Place of Calibration : Laboratory

Calibrated by : Mr. Parinya Rodpea

Calibration Method

In-house method : WI-28 based on direct measurement by using certified reference material (CRM) and standard voltage calibrator

Condition of this result of calibration

1. Reference standard material

pH Solution	Lot No.	Exp Date
1) pH Buffer Solution 4.0	904723	10 June 2025
2) pH Buffer Solution 7.0	904725	10 June 2024
3) pH Buffer Solution 10.0	904724	10 June 2024

2. Reference standard Instrument

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Multifunction Calibrator	CA 150	23M5018	24E591	13 February 2025

3. This result of calibration was found accurate as shown on date and place of calibration for this item only

4. This certificate can be traceable to International System of Unit :

- Through Technology Promotion Association (Thailand-Japan)
- Through C.P.A.Chem LTD.

Approved by :

(Mr.Suphachai Saksri)

Authorized Signatory



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

Calibration Result

Calibration by using standard buffer solution

Performing 3 Point calibration standard curve using buffer : 4,7,10

STD Buffer Solution (pH)	UUC Reading			UUC Error (pH)	Uncertainty (± pH)	Coverage factor k
	Before Adjust	After Adjustment				
	(pH)	(pH)	(mV)			
4.008	3.84	4.02	178.3	0.012	0.017	2.10
6.985	6.88	7.01	1.4	0.025	0.017	2.05
10.010	9.93	10.02	-166.2	0.010	0.017	2.13

Calibration by using electrical signals

Performing standard curve by multifunction calibrator at pH : 4,7,10

Nominal Value (pH)	Standard Apply (mV)	Actual UUC Reading		Uncertainty (\pm mV)	Coverage factor k
		(mV)	(pH)		
0.00	414.12	415	0.02	0.58	2.00
1.00	354.96	355	1.02	0.58	2.00
2.00	295.80	296	2.02	0.58	2.00
3.00	236.64	237	3.01	0.58	2.00
4.00	177.48	177.9	4.01	0.060	2.00
5.00	118.32	118.7	5.01	0.060	2.00
6.00	59.16	59.5	6.00	0.060	2.00
7.00	0.00	0.3	7.00	0.060	2.00
8.00	-59.16	-58.8	8.00	0.060	2.00
9.00	-118.32	-117.9	9.00	0.060	2.00
10.00	-177.48	-177.1	10.01	0.060	2.00
11.00	-236.64	-236	11.01	0.58	2.00
12.00	-295.80	-295	12.02	0.58	2.00
13.00	-354.96	-355	13.02	0.58	2.00
14.00	-414.12	-414	14.02	0.58	2.00

Resolution: 0.01 For pH Function and 0.1/1 for mV Function

Slope 1 : 100 %

Slope 2 : 94.1 %

STD = Standard

UUC = Unit Under Calibration

** End of Calibration Report **

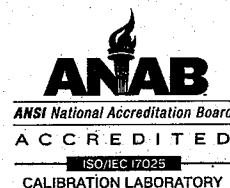




www.accl-calibration.com
www.accl-cal.com
www.aouffoun8008a.com

ADVANTAGE CENTER CO., LTD.

59/494 M.6, Frakham Road, T.Kukhot, Lumlookkar, Pathumthani 12130 Thailand.
Tel. (66-2) 9873248-50 Fax: (66-2) 9873252 E-mail: info.accl2662@gmail.com
pornsak2008@yahoo.co.th



CALIBRATION LABORATORY

Certificate No. RA-2310046-1

Job No. RA-2310046

Certificate of Calibration

FOR

Equipment Name : Incubator

Manufacturer : Biochemical Incubator

Model : SPX-150B

Serial Number : ZQ23090915

Customer Code : SMBOD001

Calibration Procedure : CPT-04-01

Received Date : Oct 19, 2023

Calibration Date : Oct 20, 2023

Recommended Due Date : N/A

Location of Calibration : On Site

Customer Name : SMART ENVIRONMENTAL CONSULTANTS CO.,LTD.

225/6 Moo. 3 Ban Chang, Mueang Pathum Thani, Pathum Thani 12000

CONDITION AS RECEIVED : Normal

Environmental Conditions

Ambient Temperature : $(25 \pm 10) ^\circ\text{C}$

Relative Humidity : $(50 \pm 30) \% \text{RH}$

Result : No Adjustment (See data attached in page 3 to the end of certificate)

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Advantage Center Co., Ltd.

Calibrated by : P. Aekkachai

Approved by :

(Pornsak Suksawaeng)

Date of Issue : Oct 31, 2023

Laboratory Management

Certificate No.: RA-2310046-1

Reference Standards

Equipment Name	Serial No.	Certificate No.	Due Date	Traceability to
Data Acquisition	MY44021037	5523631030249563	Aug 4, 2024	Micro Precision

Traceability

This calibration is traceable to the International System of Unit via :

- Micro Precision : Micro Precision Calibration Laboratory (Thailand) Co.,Ltd



Result of Calibration

Certificate No. : RA-2310046-1

Result of Chamber Performance.

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
20	20	20.0	0.21	0.58	0.57

Result of temperature distribution.

Calibration Temperature (°C)	Standard Reading (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ⁴ (±°C)
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	
20	20.44	20.39	20.34	20.32	20.25	20.27	19.91	19.88	20.45	0.25

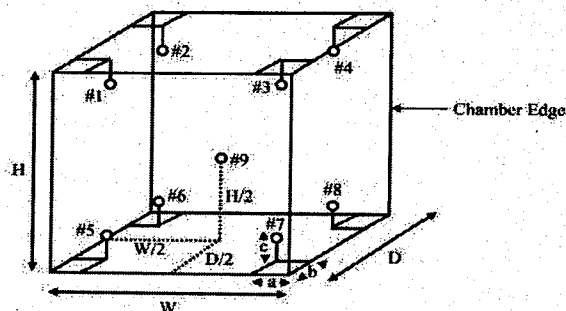
Sensor Installation Locations

Sensor No. 1 to 8

a x b x c = 5 cm x 5 cm x 5 cm

Sensor No. 9 is Reference

D / 2 x W / 2 x H / 2



Notes :

1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.
3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
4. The uncertainty of measurement is included temperature stability.

- End of Certificate -





S K SALES AND SERVICE CO.,LTD.
194/56, 194/57 Thakham Rd. Samae Dam
Bang Khun Thian Bangkok 10150
Tel. : 02-417-2144 Fax : 02-417-2155



Certificate of Calibration

Reference No. : 5228/2403-071
Customer : Smart Environmental Consultants Co.,Ltd.
: 225/6 Moo3 Banchang, Mueang Pathumthani,
: Pathumthani 12000
Equipment : Hot Air Oven
Manufacturer : Memmert
Model : UF 55
Serial No. : B222.3378
ID No. : Oven-001
Received Date : 8 April 2024
Calibrated Date : 8 April 2024
Issued Date : 18 April 2024
Environment

Certificate No. : S2404-1233

Page 1 of 2

	Minimum Value	Maximum Value
Ambient Temperature (°C)	26.8	27.6
Relative Humidity (% RH)	53	56
AC Line Voltage (VAC)	224	226

Place Of Calibration : Laboratory
Calibrated by : Mr. Parinya Rodpea

Calibration Method

In-house method : SK-WI-23 base on Thai Laboratory Accreditation Scheme Publication Reference G-20

Condition of this result of calibration

1. Reference standard instrument

	<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1)	Data acquisition/Switch unit	MY49003278	L2311-295	3 May 2024
2)	Multiplexer Module	MY41082447	L2311-295	3 May 2024

2. This result of calibration was found accurate as shown on date and place of calibration only

3. This certificate can be traceable to International System of Unit :

- Through Thailand Institute of Scientific And Technological Research (TISTR)

Approved by :

(Mr.Suphachai Saksri)
Authorized Signatory



The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2.0$,providing a level of confidence level of approximately 95 %

Table1 General Information

Working Area (W*L*H)	40 *33 *40 cm
Fresh Air	OFF

Table2 Chamber Performance

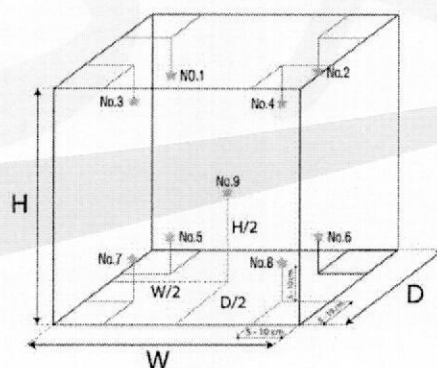
Setting Temperature (°C)	Average Indicating Temperature (°C)	Measured Stability (± °C)	Measured Uniformity (°C)	Overall Variation (°C)
104.0	104.0	0.14	0.59	0.69
180.0	180.0	0.20	1.05	1.36

Table3 Temperature Distribution

Setting Temperature (°C)	Average Standard Reading (°C)									Uncertainty (± °C)
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	
104.0	104.30	104.20	104.28	103.96	104.01	104.30	103.87	103.79	103.87	0.65
180.0	180.84	180.69	180.56	180.88	180.30	180.45	180.60	179.73	180.64	0.80

Resolution : 0.1 (°C)

* Probe No. 9 is Reference Probe



- Notes :
1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
 2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time
 3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
 4. The reported uncertainty of measurement were excluded Uniformity and Stability

** End of Calibration Report **

TSP High Volume Sampler Calibration

Project Name	บริษัท มิตรสิ่งแวดล้อมไทย จำกัด	Location	กรุงเทพ	Date	June 27, 2024
Sampler Location	พื้นที่โครงการ	Sampler Number	TSP No.1	Person	Mr.Atrat Thaipradit

CALIBRATION ORIFICE

Date Certified	September 9, 2023	Make	Tisch Environmental, Inc	Intercept (b)	-0.01612
Calibration Mode	TE-5025A	Calibrator Serial	0438	Slope (m)	1.18584

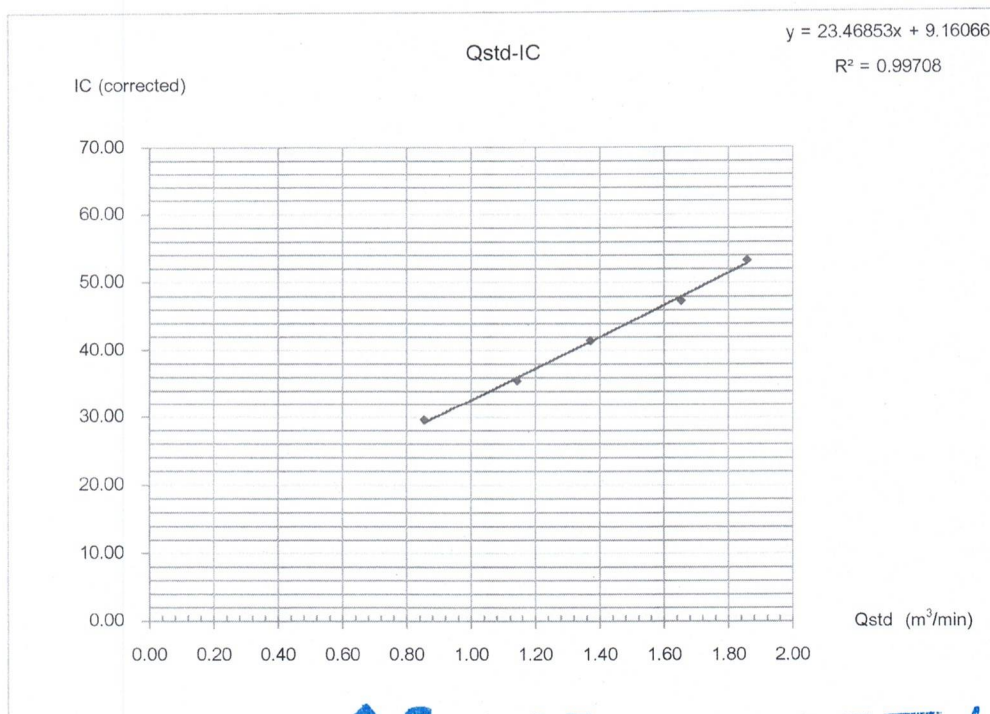
CONDITIONS

Actual Temperature (Ta) (deg C)	32	Corrected Temperature (Ta) (deg K)	305
Actual pressure (Pa)(mm Hg)	757.5	Corrected pressure (Pa)(mm Hg)	757.5
Average Temp: (Deg K)	291	Temperature (Tstd)(deg K)	298.15
Corrected Average (mm Hg)	748.8	Pressure (Pstd)(mm Hg)	760

TEST

Plate No.	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)
5	1	0.85528	30.00	29.61
7	1.8	1.14283	36.00	35.53
10	2.6	1.37077	42.00	41.46
13	3.8	1.65434	48.00	47.38
18	4.8	1.85763	54.00	53.30

LINEAR REGRESSION	
Slope	23.46853
Intercept	9.16066
Corr. Coeff (r)	0.99854
# of Observation	5
Corr. Coeff (r ²)	0.99708


 Test by : Pakawat

 (Mr.Pakawat Pratoomchat)
 Environmental Scientist


Smart Envir
 Smart Environmental Consultants Co.,Ltd.

 Approved by : T. Atirat

 (Mr.Atirat Thaipradit)
 Environmental Monitoring Manager

PM10 High Volume Sampler Calibration

Project Name	บริษัท มิตรสิ่งแวดล้อมไทย จำกัด	Location	กรุงเทพ	Date	June 27, 2024
Sampler Location	พื้นที่โครงการ	Sampler Number	PM10 No.1	Person	Mr.Atrat Thaipradit

CALIBRATION ORIFICE

Date Certified	September 9, 2023	Make	Tisch Environmental, Inc	Intercept (b)	-0.01612
Calibration Model	TE-5025A	Calibrator Serial	0438	Slope (m)	1.18584

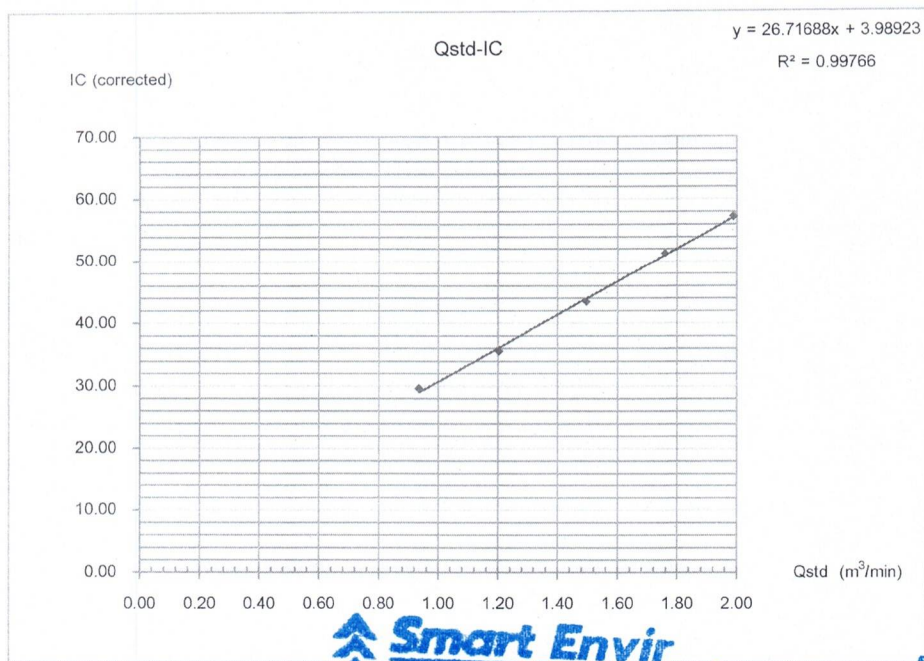
CONDITIONS

Actual Temperature (Ta) (deg C)	32	Corrected Temperature (Ta) (deg K)	305
Actual pressure (Pa)(mm Hg)	757.5	Corrected pressure (Pa)(mm Hg)	757.5
Average Temp: (Deg K)	291	Temperature (Tstd)(deg K)	298.15
Corrected Average (mm Hg)	748.8	Pressure (Pstd)(mm Hg)	760

TEST

Plate No.	H ₂ O (In)	Qstd (m ³ /min)	I (chart)	IC (corrected)
5	1.2	0.93561	30.00	29.61
7	2	1.20391	36.00	35.53
10	3.1	1.49553	44.00	43.43
13	4.3	1.75895	52.00	51.33
18	5.5	1.98752	58.00	57.25

LINEAR REGRESSION	
Slope	26.71688
Intercept	3.98923
Corr. Coeff (r)	0.99883
# of Observations	5
Corr. Coeff (r ²)	0.99766


 Test by : Pakawat

 (Mr.Pakawat Pratoomchat)
 Environmental Scientist

 Approved by : T. Atirat

 (Mr.Atirat Thaipradit)
 Environmental Monitoring Manager

TSP High Volume Sampler Calibration

Project Name	บริษัท มิตรสิ่งแวดล้อมไทย จำกัด	Location	กรุงเทพฯ	Date	June 27, 2024
Sampler Location	บริเวณศูนย์รักษาความปลอดภัย	Sampler Number	TSP No.2	Person	Mr.Atrat Thaipradit

CALIBRATION ORIFICE

Date Certified	September 9, 2023	Make	Tisch Environmental, Inc	Intercept (b)	-0.01612
Calibration Model	TE-5025A	Calibrator Serial	0438	Slope (m)	1.18584

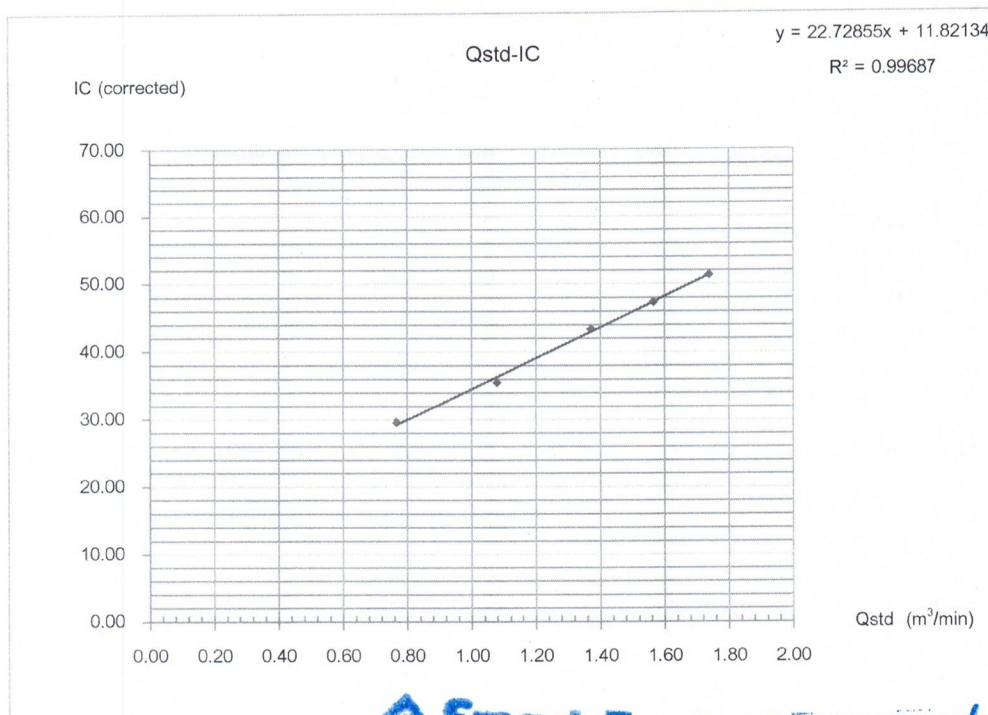
CONDITIONS

Actual Temperature (Ta) (deg C)	32	Corrected Temperature (Ta) (deg K)	305
Actual pressure (Pa)(mm Hg)	757.5	Corrected pressure (Pa)(mm Hg)	757.5
Average Temp: (Deg K)	291	Temperature (Tstd)(deg K)	298.15
Corrected Average (mm Hg)	748.8	Pressure (Pstd)(mm Hg)	760

TEST

Plate No.	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)
5	0.8	0.76642	30.00	29.61
7	1.6	1.07825	36.00	35.53
10	2.6	1.37077	44.00	43.43
13	3.4	1.56558	48.00	47.38
18	4.2	1.73853	52.00	51.33

LINEAR REGRESSION	
Slope	22.72855
Intercept	11.82134
Corr. Coeff (r)	0.99844
# of Observation	5
Corr. Coeff (r ²)	0.99687


 Test by : Pakawat

 (Mr.Pakawat Pratoomchat)
 Environmental Scientist


Smart Envir
 Smart Environmental Consultants Co.,Ltd.

 Approved by : T. Atirat

 (Mr.Atrat Thaipradit)
 Environmental Monitoring Manager

PM10 High Volume Sampler Calibration

Project Name	บริษัท มิตรสิ่งแวดล้อมไทย จำกัด	Location	กรุงเทพ	Date	June 27, 2024
Sampler Location	บริเวณพื้นที่ศูนย์รักษาความปลอดภัย	Sampler Number	PM10 No.2	Person	Mr.Atrat Thaipradit

CALIBRATION ORIFICE

Date Certified	September 9, 2023	Make	Tisch Environmental, Inc	Intercept (b)	-0.01612
Calibration Model	TE-5025A	Calibrator Serial	0438	Slope (m)	1.18584

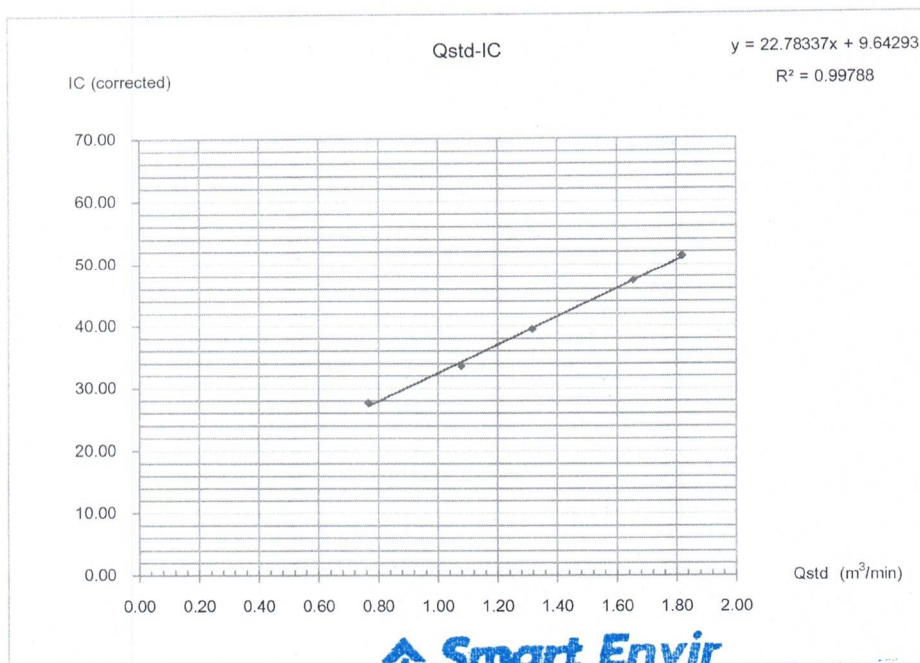
CONDITIONS

Actual Temperature (Ta) (deg C)	32	Corrected Temperature (Ta) (deg K)	305
Actual pressure (Pa)(mm Hg)	757.5	Corrected pressure (Pa)(mm Hg)	757.5
Average Temp: (Deg K)	291	Temperature (Tstd)(deg K)	298.15
Corrected Average (mm Hg)	748.8	Pressure (Pstd)(mm Hg)	760

TEST

Plate No.	H ₂ O (in)	Qstd (m ³ /min)	I (chart)	IC (corrected)
5	0.8	0.76642	28.00	27.64
7	1.6	1.07825	34.00	33.56
10	2.4	1.31753	40.00	39.48
13	3.8	1.65434	48.00	47.38
18	4.6	1.81881	52.00	51.33

LINEAR REGRESSION	
Slope	22.78337
Intercept	9.64293
Corr. Coeff (r)	0.99894
# of Observatio	5
Corr. Coeff (r ²)	0.99788


 Test by : Pakawat

 (Mr.Pakawat Pratoomchat)
 Environmental Scientist

 Approved by : T. Atirat

 (Mr.Atirat Thaipradit)
 Environmental Monitoring Manager

Certificate of Calibration

Calibration Certification Information

Cal. Date: September 11, 2023

Rootsmeter S/N: 438320

Ta: 296

°K

Operator: Jim Tisch

Pa: 752.6

mm Hg

Calibration Model #: TE-5025A

Calibrator S/N: 0438

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3100	3.2	2.00
2	3	4	1	0.9240	6.4	4.00
3	5	6	1	0.8270	7.8	5.00
4	7	8	1	0.7880	8.7	5.50
5	9	10	1	0.6520	12.6	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
0.9927	0.7578	1.4121	0.9957	0.7601	0.8869
0.9885	1.0698	1.9970	0.9915	1.0730	1.2543
0.9866	1.1930	2.2327	0.9896	1.1967	1.4023
0.9854	1.2505	2.3416	0.9884	1.2544	1.4708
0.9803	1.5035	2.8241	0.9833	1.5081	1.7738
QSTD	m=	1.89377	QA	m=	1.18584
	b=	-0.02567		b=	-0.01612
	r=	0.99999		r=	0.99999

Calculations

Vstd= $\Delta Vol((Pa-\Delta P)/Pstd)(Tstd/Ta)$	Va= $\Delta Vol((Pa-\Delta P)/Pa)$
Qstd= $Vstd/\Delta Time$	Qa= $Va/\Delta Time$
For subsequent flow rate calculations:	
Qstd= $1/m \left(\left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} \right) - b \right)$	Qa= $1/m \left(\left(\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)} \right) - b \right)$

Standard Conditions

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

RECALIBRATION

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

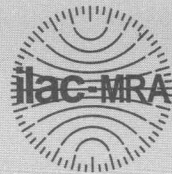


S K SALES AND SERVICE CO.,LTD.

194/56, 194/57 Thakham Rd. Samae Dam

Bang Khun Thian Bangkok 10150

Tel. : 02-417-2144 Fax : 02-417-2155



Certificate of Calibration

Reference No. : 5228/2403-071
Customer : Smart Environmental Consultants Co.,Ltd.
: 225/6 Moo3 Banchang, Mueang Pathumthani,
: Pathumthani 12000
Equipment : Electronic Balance
Manufacturer : JOAN Lab
Model : FA2204
Serial No. : 1032301082
ID No. : BL 001
Received Date : 8 April 2024
Calibrated Date : 8 April 2024
Issued Date : 19 April 2024

Certificate No. : S2404-1234

Page 1 of 2

Environment	Minimum Value	Maximum Value
Ambient Temperature (°C)	25.0	25.5
Relative Humidity (% RH)	50	51
Atmospheric Pressure (mbar)	1011	1011

Place of Calibration : Laboratory
Calibrated by : Mr. Parinya Rodpea

Calibration Method

In-house method : SK-WI-08 base on UKAS Lab 14 Edition 6, July 2019

Guidance on the calibration of weighing machines used in testing and calibration laboratories

Reference standard instrument

<u>Instrument</u>	<u>ID No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
Standard weight set	MASS-WE-37	M2304078S	21 April 2025

Condition of this result of calibration

1. This result of calibration was found accurate as shown on date and place of calibration for this item only
2. This certificate can be traceable to International System of Unit :
- Through Mass and scale calibration laboratory of Thai scale Co.,Ltd.

Approved by :

(Mr.Suphachai Saksri)
Authorized Signatory



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

Description of UUC

Capacity : 220 g

Resolution : 0.0001 g

Calibration Result

1.Repeatability of reading

Applied weight (g)	Standard Deviation of reading (g)
20.0000	0.000071
200.0002	0.000053

2.Departure from nominal value

Before adjustment

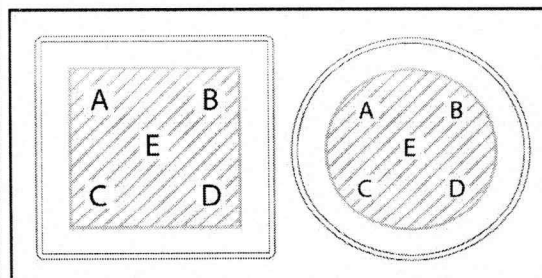
Applied weight (g)	Balance reading (g)	Correction (g)	Uncertainty (\pm g)
20.0000	20.0008	-0.0008	0.00011
100.0001	100.0013	-0.0012	0.00018
200.0002	200.0057	-0.0055	0.00030

After adjustment

Applied weight (g)	Balance reading (g)	Correction (g)	Uncertainty (\pm g)
Zero setting	0.0000	0.0000	0.00011
1.0000	1.0000	0.0000	0.00011
20.0000	20.0001	-0.0001	0.00012
40.0000	40.0001	-0.0001	0.00014
60.0001	60.0001	0.0000	0.00018
80.0000	80.0001	-0.0001	0.00018
100.0001	100.0001	0.0000	0.00018
120.0001	120.0001	0.0000	0.00030
140.0001	140.0001	0.0000	0.00030
160.0002	160.0001	0.0001	0.00030
180.0001	180.0001	0.0000	0.00030
200.0002	200.0001	0.0001	0.00030

3.Effect of off-center loading : Used weight 100 g was place to various position on the pan

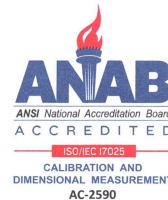
Position	Balance reading (g)
E	100.0000
A	100.0000
B	99.9999
C	100.0001
D	99.9999
Maximum Difference	0.0001





Professional Calibration & Services Co., Ltd.

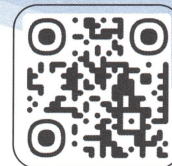
50/888, 50/889 Moo 2, Rungsi-Nakornnayok Rd., Bungyeetho, Thunyaburi,
Pathumthani 12130 Thailand
Tel : (+66)2150-6641 (Autoline), (+66)2569-5158
Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : PL27851/23
Control Number : PCAL149790
Customer Control : -
Description : Primary Flow Meter
Manufacturer : Bios
Model : DCL-M
Serial Number : 107697
Customer : Smart Environmental Consultants Co.,Ltd

Page 1 of 3



เลขที่ 225/6 หมู่ 3 ต.บ้านฉาง อ.เมืองปทุมธานี จ.ปทุมธานี 12000

Date of Receipt : 20-Jun-23
Date of Calibration : 24-Jun-23
Environment : Temperature $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$
: Relative Humidity $50\% \pm 20\%$
Calibration Method : Calibration Procedure Number CP-PL78
Calibration Results : See data attached

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

This certificate is issued in accordance with ISO/IEC17025 and the conditions of accreditation granted by the Accreditation Body which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. The results relate only to the item calibrated.

This certificate shall not be reproduced other than in full except without the prior written approval of the Head of Calibration Laboratory of Professional Calibration & Services Co., Ltd.

Calibrated By

Mr. Ruttapol Thammalee

Authorized Signature

(Mr. Direk Sriphet)

27-Jun-23

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : PL27851/23

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Primary Flow Calibrator	20307-S	ANAB : AC-2487	WK2208-205-1	31-Aug-23

Condition as received : Normal

Definitions :-

* ANAB - The ANSI National Accreditation Board

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No. : PL27851/23

Page 3 of 3

Calibration Result

Appearance and function of use : Good

Results of Calibration: ☒ Without adjustment ☐ With adjustment

Details of Equipment: Measuring Range: 0.05 to 5 L/min Resolution: 0.0001, 0.001 L/min

Standard Value (L/min)	UUC Reading (L/min)	UUC Error (L/min)	Uncertainty (± L/min)
0.0500	0.0489	-0.0011	0.06
1.250	1.243	-0.007	0.06
2.500	2.489	-0.011	0.06
3.700	3.685	-0.015	0.06
5.000	4.981	-0.019	0.06

...End...

Analyzer Performance Test

Calibrated Date: 02 June 2024

Instruments Information

Analyzer Type : NO-NO2-NOx Analyzer

Manufacturer : Thermo Environmental

Model : 42C

Serial Number : 42CLS-78439-389

Calibrator Unit

Dilutor Model : Dasibi Model 5008

Serial Number : 705

ZERO AIR Generator : API MODEL 701

Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM

Sulphur Dioxide (SO2) 55.11 PPM

Carbon Monoxide (CO) 4,535 PPM

Cylinder number EB0129027

Expire Date: 29 Oct. 2027

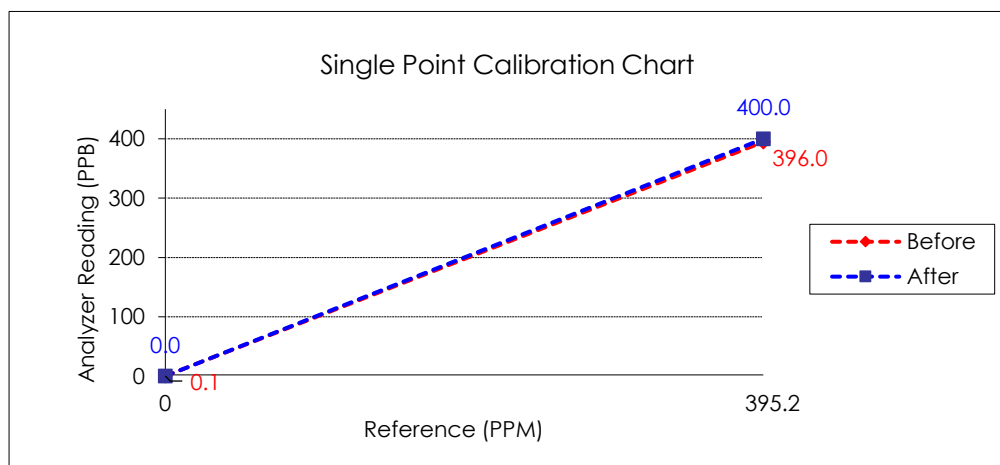
Environment : Temperature 25.4 °C Humidity: 51 %RH

Calibration Report (Before Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	396.0	-1.0
NOx	0.0	0.0	0.0	400.0	395.2	-1.2

Calibration Report (After Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	400.0	0.0
NOx	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : 

MR. KITTISAK JANSANGWATTANA

Approve by :



MR. PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 01 August 2023

Instruments Information

Analyzer Type : SO2 Analyzer

Manufacturer : Thermo Environmental

Model : 43C

Serial Number : 43C-71080-367

Calibrator Unit

Dilutor Model : Dasibi Model 5008

Serial Number : 705

ZERO AIR Generator : API MODEL 701

Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM

Sulphur Dioxide (SO₂) 55.11 PPM

Carbon Monoxide (CO) 4,535 PPM

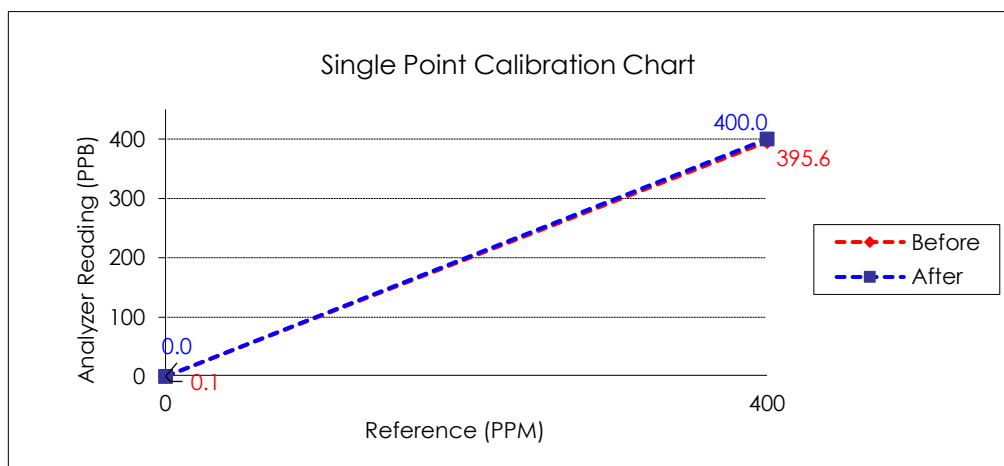
Cylinder number EB0129027

Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	395.6	-1.1
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทรกุลวัฒนา
MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type : CO Analyzer
Model : 300E

Manufacturer : API
Serial Number : 597

Calibrator Unit

Dilutor Model : Dasibi Model 5008
Serial Number : 705
ZERO AIR Generator : API MODEL 701
Serial Number : 1924

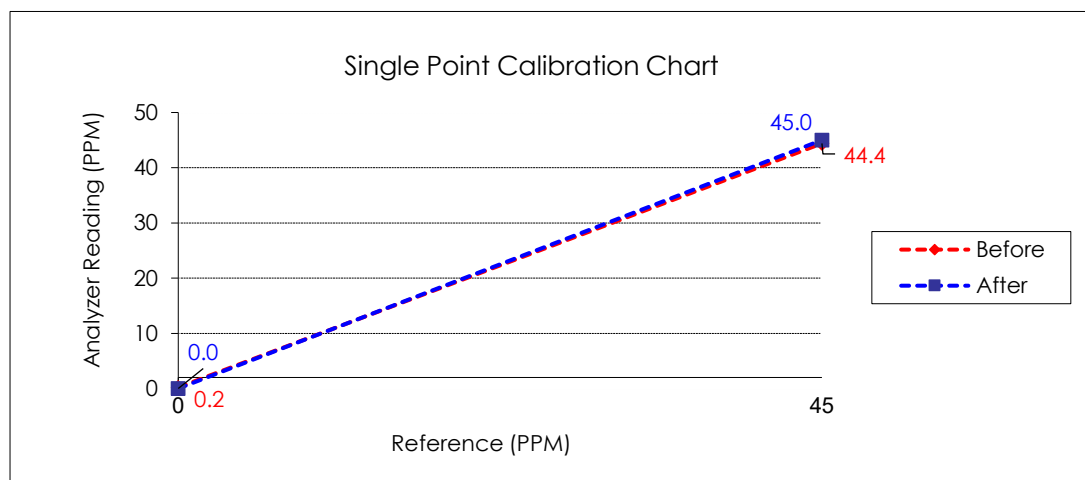
Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM
Sulphur Dioxide (SO₂) 55.11 PPM
Carbon Monoxide (CO) 4,535 PPM
Cylinder number EB0129027
Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

	Zero			Span		
	Reference (PPM)	Reading (PPM)	Drift (PPM)	Reference (PPM)	Reading (PPM)	Drift%
Before	0.0	0.2	0.2	45.0	44.4	-1.3
After	0.0	0.0	0.0	45.0	45.0	0.0



Calibrate By : กิตติศักดิ์ จันทะวงษ์วัฒนา
MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 02 June 2024

Instruments Information

Analyzer Type : NO-NO₂-NO_x Analyzer

Manufacturer : Thermo Environmental

Model : 42C

Serial Number : 42CLS-75458-380

Calibrator Unit

Dilutor Model : Dasibi Model 5008

Serial Number : 705

ZERO AIR Generator : API MODEL 701

Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM

Sulphur Dioxide (SO₂) 55.11 PPM

Carbon Monoxide (CO) 4,535 PPM

Cylinder number EB0129027

Expire Date: 29 Oct. 2027

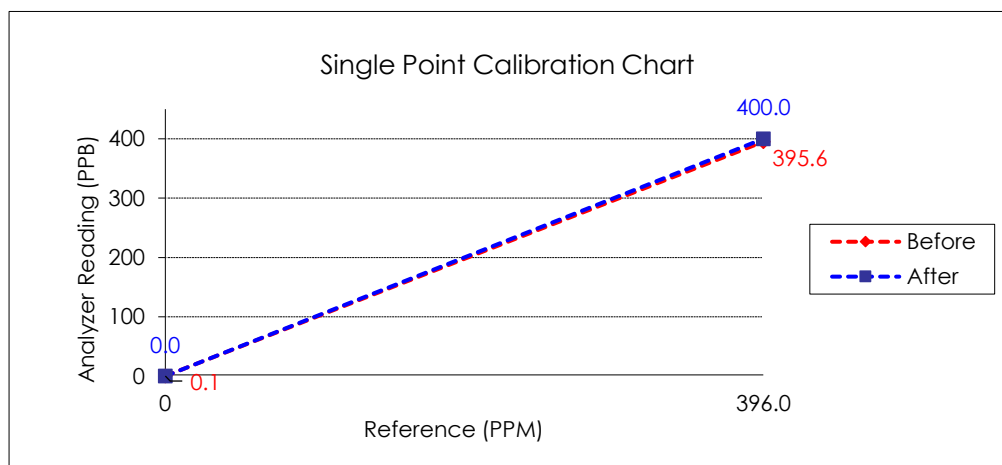
Environment : Temperature 25.4 °C Humidity: 51 %RH

Calibration Report (Before Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	395.6	-1.1
NO _x	0.0	0.0	0.0	400.0	396.0	-1.0

Calibration Report (After Adjust)

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
NO	0.0	0.1	0.1	400.0	400.0	0.0
NO _x	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : 

MR. KITTISAK JANSANGWATTANA

Approve by : 

MR. PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 01 August 2023

Instruments Information

Analyzer Type : SO2 Analyzer

Manufacturer : Thermo Environmental

Model : 43C

Serial Number : 0509111147

Calibrator Unit

Dilutor Model : Dasibi Model 5008

Serial Number : 705

ZERO AIR Generator : API MODEL 701

Serial Number : 1924

Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM

Sulphur Dioxide (SO2) 55.11 PPM

Carbon Monoxide (CO) 4,535 PPM

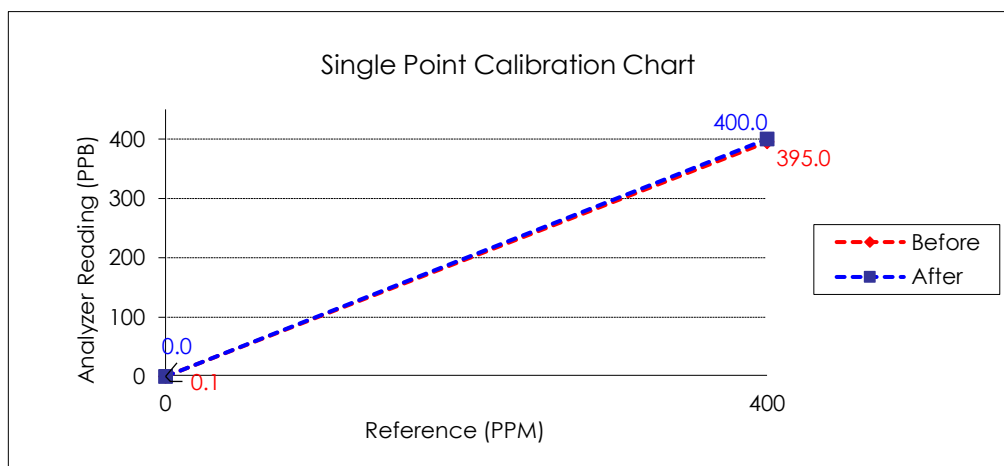
Cylinder number EB0129027

Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

Status	Zero			Span		
	Reference (PPB)	Reading (PPB)	Drift (PPB)	Reference (PPB)	Reading (PPB)	Drift%
Before	0.0	0.1	0.1	400.0	395.0	-1.3
After	0.0	0.0	0.0	400.0	400.0	0.0



Calibrate By : กิตติศักดิ์ จันทะวงษ์
MR. KITTISAK JANSANGWATTANA

Approve by : MR. PASAGORN SAMOL

Analyzer Performance Test

Calibrated Date: 01 March 2024

Instruments Information

Analyzer Type : CO Analyzer
Model : 48C

Manufacturer : Thermo Environmental
Serial Number : 48C-66729-353

Calibrator Unit

Dilutor Model : Dasibi Model 5008
Serial Number : 705
ZERO AIR Generator : API MODEL 701
Serial Number : 1924

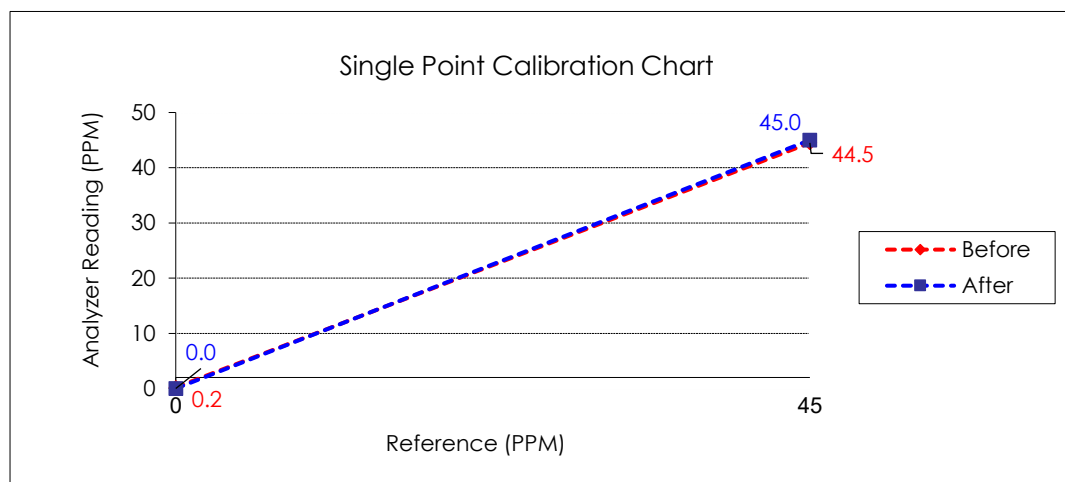
Standard Gas Concentration

Nitric Oxide (NO) 55.47 PPM
Sulphur Dioxide (SO₂) 55.11 PPM
Carbon Monoxide (CO) 4,535 PPM
Cylinder number EB0129027
Expire Date: 29 Oct. 2027

Environment : Temperature 25.5 °C Humidity: 51 %RH

Calibration Report

	Zero			Span		
	Reference (PPM)	Reading (PPM)	Drift (PPM)	Reference (PPM)	Reading (PPM)	Drift%
Before	0.0	0.2	0.2	45.0	44.5	-1.1
After	0.0	0.0	0.0	45.0	45.0	0.0



Calibrate By :

กิตติศักดิ์ จันทะวงษ์วัฒนา

MR. KITTISAK JANSANGWATTANA

Approve by :

MR. PASAGORN SAMOL

MR. PASAGORN SAMOL

Personal Pump Calibration Report

Equipment Type	:	Personal Pump
Manufacturer	:	Bios
Model	:	DCL-M
Serial No.	:	107697
Equipment Range	:	0.05 – 5.0 L/min
Calibration Range	:	0.05 L/min
Calibration date	:	12 กรกฎาคม พ.ศ. 2567
Customer Name	:	บริษัท มิตรสิ่งแวดล้อมไทย จำกัด
Project Name	:	โครงการก่อสร้างอาคารที่พักข้าราชการกองบัญชาการกองทัพไทย พื้นที่ศูนย์รักษาความปลอดภัยของกองบัญชาการกองทัพไทย

No.	Personal Pump Serial Number	High Flow/ Low Flow	Flow (Liter per min)				Uncertainty
			1 st	2 nd	3 rd	Average	
1	QCD-1500 : 233147	0.05 L/min	0.02	0.06	0.07	0.050	±0.0265



(Mr.Pakawat Pratoomchat)
Environmental Scientist




(Mr.Atirat Thaipradit)
Environmental Monitoring Manager

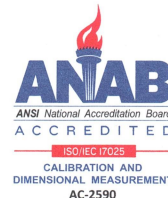


Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsit-Nakornnayok Rd., Bungyeetho, Thunyaburi,
Pathumthani 12130 Thailand

Tel : (+66)2150-6641 (Autoline), (+66)2569-5158

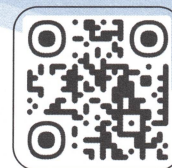
Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : PL27851/23
Control Number : PCAL149790
Customer Control : -
Description : Primary Flow Meter
Manufacturer : Bios
Model : DCL-M
Serial Number : 107697
Customer : Smart Environmental Consultants Co.,Ltd

Page 1 of 3



เลขที่ 225/6 หมู่ 3 ต.บ้านฉาง อ.เมืองปทุมธานี จ.ปทุมธานี 12000

Date of Receipt : 20-Jun-23
Date of Calibration : 24-Jun-23
Environment : Temperature $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$
: Relative Humidity $50\% \pm 20\%$
Calibration Method : Calibration Procedure Number CP-PL78
Calibration Results : See data attached

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

This certificate is issued in accordance with ISO/IEC17025 and the conditions of accreditation granted by the Accreditation Body which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. The results relate only to the item calibrated.

This certificate shall not be reproduced other than in full except without the prior written approval of the Head of Calibration Laboratory of Professional Calibration & Services Co., Ltd.

Calibrated By

Mr. Ruttapol Thammalee

Authorized Signature

(Mr. Direk Sriphet)

27-Jun-23

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : PL27851/23

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Primary Flow Calibrator	20307-S	ANAB : AC-2487	WK2208-205-1	31-Aug-23

Condition as received : Normal

Definitions :-

* ANAB - The ANSI National Accreditation Board

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No. : PL27851/23

Page 3 of 3

Calibration Result

Appearance and function of use : Good

Results of Calibration: ☒ Without adjustment ☐ With adjustment

Details of Equipment: Measuring Range: 0.05 to 5 L/min Resolution: 0.0001, 0.001 L/min

Standard Value (L/min)	UUC Reading (L/min)	UUC Error (L/min)	Uncertainty (± L/min)
0.0500	0.0489	-0.0011	0.06
1.250	1.243	-0.007	0.06
2.500	2.489	-0.011	0.06
3.700	3.685	-0.015	0.06
5.000	4.981	-0.019	0.06

...End...

Sound Level Meter Calibration Report

Equipment Type	:	Sound Level Calibrator
Manufacturer	:	Hangzhon
Model	:	AWA6221A
Serial No.	:	AWA6221A0467E
Sound Output (dB(A))	:	94.0
Calibration date	:	26 มิถุนายน พ.ศ. 2567
Customer Name	:	บริษัท มิตรสิ่งแวดล้อมไทย จำกัด
Project Name	:	โครงการก่อสร้างอาคารที่พักข้าราชการกองบัญชาการกองทัพไทย พื้นที่ศูนย์รักษาความปลอดภัยของกองบัญชาการกองทัพไทย

No.	Sound Level Meter	Serial Number	Actual Reading (dB(A))		Status
			Before	After	
1	Scarlet Model ST-21D	821002	93.5	94.0	Pass
2	Scarlet Model ST-21D	820778	93.6	94.0	Pass



Pakawat

(Mr.Pakawat Pratoomchat)
Environmental Scientist

T. Atirat

(Mr.Atirat Thaipradit)
Environmental Monitoring Manager



Professional Calibration & Services Co., Ltd.

50/888, 50/889 Moo 2, Rungsit-Nakornnayok Rd., Bungyestha, Thunyaburi,
Pathumthani 12130 Thailand
Tel : (+66)2150-6641 (Autoline), (+66)2569-5158
Email : info@p-cal.com www.p-cal.com



Certificate of Calibration

Certificate Number : EL31084/23
Control Number : PCAL150226
Customer Control : SM-SC-01
Description : Sound Calibrator
Manufacturer : Hangzhon
Model : AWA6221A
Serial Number : AWA6221A0467E
Customer : Smart Environmental Consultants Co.,Ltd

Page 1 of 3



เลขที่ 225/6 หมู่ 3 ต.บ้านฉาง อ.เมืองปทุมธานี จ.ปทุมธานี 12000

Date of Receipt : 12-Jul-23
Date of Calibration : 13-Jul-23
Environment : Temperature $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$
: Relative Humidity $50\% \pm 20\%$
Calibration Method : Calibration Procedure Number CP-EL35
Calibration Results : See data attached

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

This certificate is issued in accordance with ISO/IEC17025 and the conditions of accreditation granted by the Accreditation Body which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. The results relate only to the item calibrated.

This certificate shall not be reproduced other than in full except without the prior written approval of the Head of Calibration Laboratory of Professional Calibration & Services Co., Ltd.

Calibrated By

Mr. Nattaya Iamnarm

Authorized Signature

(Mr. Songpol Nakanurak)

13-Jul-23

Issued Date

CALIBRATION REPORT

Professional Calibration & Services Co.,Ltd.

Certificate Number : EL31084/23

Page 2 of 3

Equipment Standards Used

Description	Serial No.	Traceability to	Certificate No.	Cal. Due Date
Sound Level Meter	030606101	ANAB : AC-2590	EL09782/23	29-Mar-24
Sound Level Calibrator	141208123	NSC : Calibration 0037	EEL.BP. 16/0366	06-Mar-24

Condition as received : Normal

Definitions :-

- * ANAB - The ANSI National Accreditation Board
- * NSC - National Standardization Council of Thailand

CALIBRATION REPORT

Professional Calibration & Services Co., Ltd.

Certificate No.: EL31084/23

Page : 3 of 3

Calibration Results

Sound Calibration

UUC Setting	Measured Value	Uncertainty (\pm)	Tolerance Limit Values
94 dB	94.0 dB	0.2 dB	93.7 ~ 94.3 dB
114 dB	114.1 dB	0.2 dB	113.7 ~ 114.3 dB

Note:

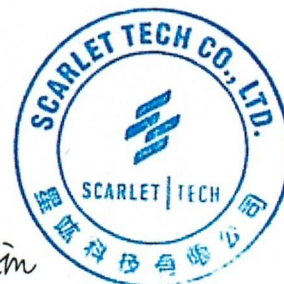
- 1). Tolerances or specifications report in table above are base on the product data sheet Sound Level Calibrator AWA6221A.

...End...

CERTIFICATE OF CALIBRATION

NO. 20230817047

Name of Product:	Sound Level Meter
Model:	ST-21D
Serial Number:	821002
Specification:	Class 2
Conclusion:	Pass
Date of calibration:	2023-08-17
Due Date:	2024-08-16

Calibrated by: *Jim Lin*

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

1. Preliminary inspection: OK

2. Type & serial No. of Microphone: AWA14421A-0005014. Measuring up limit: 138 dBA

3. Adjustments to indicated sound levels:

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

Type of Calibrator B&K 4231Sound Pressure Level 94.0 dBEquivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
20	-50.6	-6.1	-0.2	1000	0.0	0.0	0.0
31.5	-39.5	-3.2	-0.1	2000	1.3	-0.2	0.0
63	-26.2	-0.8	0.0	4000	1.2	-0.6	0.0
125	-16.2	-0.3	-0.1	8000	-1.2	-3.2	0.0
250	-8.7	-0.1	-0.1	12500	-11.0	-13.0	0.0
500	-3.3	0.0	0.0	/	/	/	/

6. Self-generated noise

Microphone replaced by electrical input signal device

25.3 dB(A)	26.1 dB(C)	35.1 dB(Z)
------------	------------	------------

7. F&S Weighting

Rate of the F weighting decrease (dB/s)	34.6
Rate of the S weighting decrease (dB/s)	4.4
Deviation of F&S	0.0

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

Reference sound level 90.0 dB

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

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

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

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

9. Tone burst response (A Weighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	$L_{AFmax}-L_A$	$L_{ASmax}-L_A$	$L_{AE}-L_A$	$L_{AeqT}-L_A$
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-16.9	-6.9	-7.0
2	-18.1	-26.9	-26.9	-7.0
0.25	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz) :

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

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 123.0 dB

Sweep amplitude: 40 dB

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

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
LAeq,T	113.3	113.4	-0.1
L5	121.0	121.0	0.0
L10	119.0	119.0	0.0
L50	103.0	103.0	0.0
L90	87.1	87.0	0.1
L95	85.1	85.0	0.1

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

Environment conditions:

Air temperature: 20 °C

Relative humidity: 50 %

Static pressure: 101.8 kPa

Reference equipment used in the calibration:

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

Test specifications:

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

References:

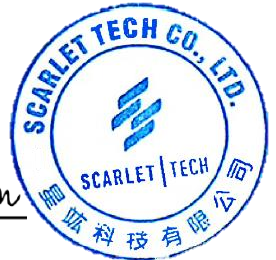
IEC 61672-3 Sound Level Meters Part 3: Periodic tests

CERTIFICATE OF CALIBRATION

NO. 20240409129

Name of Product:	Sound Level Meter
Model:	ST-21D
Serial Number:	820778
Specification:	Class 2
Conclusion:	Pass
Date of calibration:	2024-04-09
Due Date:	2025-04-10

Calibrated by: Jim Lin



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

1. Preliminary inspection: OK

2. Type & serial No. of Microphone: AWA14421A-000691

3. Adjustments to indicated sound levels:

Type of Calibrator B&K 4231

Sound Pressure Level 94.0 dB

4. Measuring up limit: 138 dBA

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

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

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
20	-50.4	-6.1	-0.1	1000	0.0	0.0	0.0
31.5	-39.6	-3.0	-0.1	2000	1.3	-0.1	0.0
63	-26.2	-0.9	0.0	4000	1.3	-0.6	0.0
125	-16.2	-0.2	0.0	8000	-1.2	-3.2	0.0
250	-8.7	0.0	0.0	12500	-11.0	-13.0	0.0
500	-3.2	0.0	0.0	/	/	/	/

6. Self-generated noise

Microphone replaced by electrical input signal device

24.5 dB(A)	26.1 dB(C)	34.8 dB(Z)
------------	------------	------------

7. F&S Weighting

Rate of the F weighting decrease (dB/s)	34.6
Rate of the S weighting decrease (dB/s)	4.2
Deviation of F&S	-0.1

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

Reference sound level 90.0 dB

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

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

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

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

9. Tone burst response (A Weighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	LAFmax-LA	LASmax-LA	LAE-LA	LAeqT-LA
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
2	-18.2	-26.9	-26.9	-7.0
0.25	-27.1	/	-36.1	-7.0

10. Peak C sound level (500Hz) :

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

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 123.0 dB

Sweep amplitude: 40 dB

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

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
LAeq,T	113.3	113.4	-0.1
L5	121.0	121.0	0.0
L10	119.0	119.0	0.0
L50	103.0	103.0	0.0
L90	87.1	87.0	0.1
L95	85.1	85.0	0.1

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

Environment conditions

:

Air temperature: 20 °C

Relative humidity: 50 %

Static pressure: 101.8 kPa

Test specifications:

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

References:

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



S K SALES AND SERVICE CO.,LTD.
194/56, 194/57 Thakham Rd. Samae Dam
Bang Khun Thian Bangkok 10150
Tel. : 02-417-2144 Fax : 02-417-2155



Certificate of Calibration

Reference No. : 5228/2403-071 Certificate No. : S2404-1235
Customer : Smart Environmental Consultants Co.,Ltd. Page 1 of 2

: 225/6 Moo3 Banchang, Mueang Pathumthani,
: Pathumthani 12000

Equipment : pH Meter

Manufacturer :

Model :

Serial No. :

ID No. :

Received Date : 8 April 2024

Calibrated Date : 8 April 2024

Issued Date : 19 April 2024

pH Meter	pH Electrode
EUTECH	EUTECH
PH 700	-
3133752	ECFC7252101B
PH-001	-

Environment	Start Calibration	Stop Calibration
Ambient Temperature (°C)	25.1	25.8
Relative Humidity (% RH)	50	53

Place of Calibration : Laboratory

Calibrated by : Mr. Parinya Rodpea

Calibration Method

In-house method : WI-28 based on direct measurement by using certified reference material (CRM) and standard voltage calibrator

Condition of this result of calibration

1. Reference standard material

pH Solution	Lot No.	Exp Date
1) pH Buffer Solution 4.0	904723	10 June 2025
2) pH Buffer Solution 7.0	904725	10 June 2024
3) pH Buffer Solution 10.0	904724	10 June 2024

2. Reference standard Instrument

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Multifunction Calibrator	CA 150	23M5018	24E591	13 February 2025

3. This result of calibration was found accurate as shown on date and place of calibration for this item only

4. This certificate can be traceable to International System of Unit :

- Through Technology Promotion Association (Thailand-Japan)
- Through C.P.A.Chem LTD.

Approved by :

(Mr.Suphachai Saksri)

Authorized Signatory



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

Calibration Result

Calibration by using standard buffer solution

Performing 3 Point calibration standard curve using buffer : 4,7,10

STD Buffer Solution (pH)	UUC Reading			UUC Error (pH)	Uncertainty (± pH)	Coverage factor k
	Before Adjust	After Adjustment				
	(pH)	(pH)	(mV)			
4.008	3.84	4.02	178.3	0.012	0.017	2.10
6.985	6.88	7.01	1.4	0.025	0.017	2.05
10.010	9.93	10.02	-166.2	0.010	0.017	2.13

Calibration by using electrical signals

Performing standard curve by multifunction calibrator at pH : 4,7,10

Nominal Value (pH)	Standard Apply (mV)	Actual UUC Reading		Uncertainty (± mV)	Coverage factor k
		(mV)	(pH)		
0.00	414.12	415	0.02	0.58	2.00
1.00	354.96	355	1.02	0.58	2.00
2.00	295.80	296	2.02	0.58	2.00
3.00	236.64	237	3.01	0.58	2.00
4.00	177.48	177.9	4.01	0.060	2.00
5.00	118.32	118.7	5.01	0.060	2.00
6.00	59.16	59.5	6.00	0.060	2.00
7.00	0.00	0.3	7.00	0.060	2.00
8.00	-59.16	-58.8	8.00	0.060	2.00
9.00	-118.32	-117.9	9.00	0.060	2.00
10.00	-177.48	-177.1	10.01	0.060	2.00
11.00	-236.64	-236	11.01	0.58	2.00
12.00	-295.80	-295	12.02	0.58	2.00
13.00	-354.96	-355	13.02	0.58	2.00
14.00	-414.12	-414	14.02	0.58	2.00

Resolution: 0.01 For pH Function and 0.1/1 for mV Function

Slope 1 : 100 %

Slope 2 : 94.1 %

STD = Standard

UUC = Unit Under Calibration

** End of Calibration Report **

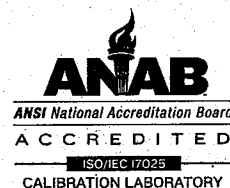




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ADVANTAGE CENTER CO., LTD.

59/494 M.6, Frakham Road, T.Kukhot, Lumlookkar, Pathumthani 12130 Thailand.
Tel. (66-2) 9873248-50 Fax: (66-2) 9873252 E-mail: info.accl2662@gmail.com
pornsak2008@yahoo.co.th



CALIBRATION LABORATORY

Certificate No. RA-2310046-1

Job No. RA-2310046

Certificate of Calibration

FOR

Equipment Name : Incubator

Manufacturer : Biochemical Incubator

Model : SPX-150B

Serial Number : ZQ23090915

Customer Code : SMBOD001

Calibration Procedure : CPT-04-01

Received Date : Oct 19, 2023

Calibration Date : Oct 20, 2023

Recommended Due Date : N/A

Location of Calibration : On Site

Customer Name : SMART ENVIRONMENTAL CONSULTANTS CO.,LTD.

225/6 Moo. 3 Ban Chang, Mueang Pathum Thani, Pathum Thani 12000

CONDITION AS RECEIVED : Normal

Environmental Conditions

Ambient Temperature : $(25 \pm 10) ^\circ\text{C}$

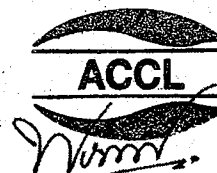
Relative Humidity : $(50 \pm 30) \% \text{RH}$

Result : No Adjustment (See data attached in page 3 to the end of certificate)

1. 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%.
2. The Unit Under Calibration (UUC) has been calibrated by using the working standard which is traceable to SI-Units. The calibration procedure documented is intended to implement the requirements of ISO/IEC 17025 : 2017
3. The working standard is indicated in page 2 of this certificate.
4. This report applies to the item calibrated and shall not be reproduced except in full, without written approval by Calibration Laboratory, Advantage Center Co., Ltd.

Calibrated by : P. Aekkachai

Approved by :



(Pornsak Suksawaeng)

Date of Issue : Oct 31, 2023

Laboratory Management



www.accl-calibration.com
www.accl-cal.com
www.asutitourisecol.com

ADVANTAGE CENTER CO., LTD.

59/494 M.6, Frakham Road, T.Kukhot, Lumlookkar, Pathumthani 12130 Thailand.
Tel. (66-2) 9873248-50 Fax: (66-2) 9873252 E-mail: info.accl2662@gmail.com
pornsak2008@yahoo.co.th

Certificate No.: RA-2310046-1

Reference Standards

Equipment Name	Serial No.	Certificate No.	Due Date	Traceability to
Data Acquisition	MY44021037	5523631030249563	Aug 4, 2024	Micro Precision

Traceability

This calibration is traceable to the International System of Unit via :

- Micro Precision : Micro Precision Calibration Laboratory (Thailand) Co.,Ltd



Result of Calibration

Certificate No. : RA-2310046-1

Result of Chamber Performance.

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
20	20	20.0	0.21	0.58	0.57

Result of temperature distribution.

Calibration Temperature (°C)	Standard Reading (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ⁴ (±°C)
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	
20	20.44	20.39	20.34	20.32	20.25	20.27	19.91	19.88	20.45	0.25

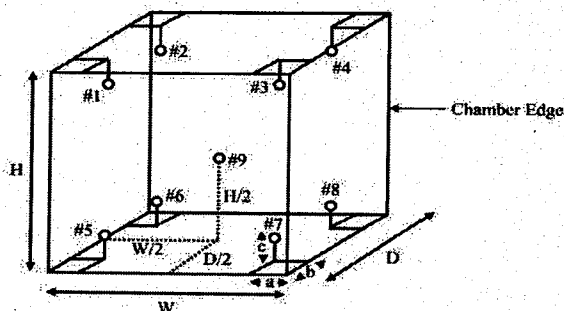
Sensor Installation Locations

Sensor No. 1 to 8

a x b x c = 5 cm x 5 cm x 5 cm

Sensor No. 9 is Reference

D / 2 x W / 2 x H / 2



Notes :

1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.
3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
4. The uncertainty of measurement is included temperature stability.

- End of Certificate -





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194/56, 194/57 Thakham Rd. Samae Dam
Bang Khun Thian Bangkok 10150
Tel. : 02-417-2144 Fax : 02-417-2155



Certificate of Calibration

Reference No. : 5228/2403-071
Customer : Smart Environmental Consultants Co.,Ltd.
: 225/6 Moo3 Banchang, Mueang Pathumthani,
: Pathumthani 12000
Equipment : Hot Air Oven
Manufacturer : Memmert
Model : UF 55
Serial No. : B222.3378
ID No. : Oven-001
Received Date : 8 April 2024
Calibrated Date : 8 April 2024
Issued Date : 18 April 2024
Environment

Certificate No. : S2404-1233

Page 1 of 2

	Minimum Value	Maximum Value
Ambient Temperature (°C)	26.8	27.6
Relative Humidity (% RH)	53	56
AC Line Voltage (VAC)	224	226

Place Of Calibration : Laboratory
Calibrated by : Mr. Parinya Rodpea

Calibration Method

In-house method : SK-WI-23 base on Thai Laboratory Accreditation Scheme Publication Reference G-20

Condition of this result of calibration

1. Reference standard instrument

	<u>Instrument</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1)	Data acquisition/Switch unit	MY49003278	L2311-295	3 May 2024
2)	Multiplexer Module	MY41082447	L2311-295	3 May 2024

2. This result of calibration was found accurate as shown on date and place of calibration only

3. This certificate can be traceable to International System of Unit :

- Through Thailand Institute of Scientific And Technological Research (TISTR)

Approved by :

(Mr.Suphachai Saksri)
Authorized Signatory



The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2.0$,providing a level of confidence level of approximately 95 %

Table1 General Information

Working Area (W*L*H)	40 *33 *40 cm
Fresh Air	OFF

Table2 Chamber Performance

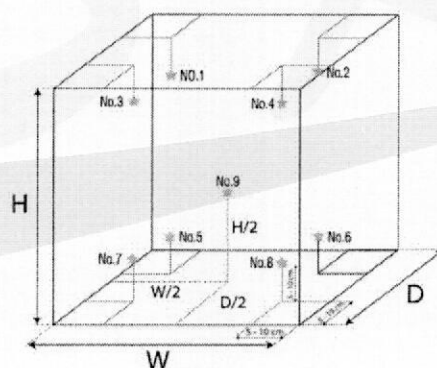
Setting Temperature (°C)	Average Indicating Temperature (°C)	Measured Stability (± °C)	Measured Uniformity (°C)	Overall Variation (°C)
104.0	104.0	0.14	0.59	0.69
180.0	180.0	0.20	1.05	1.36

Table3 Temperature Distribution

Setting Temperature (°C)	Average Standard Reading (°C)									Uncertainty (± °C)
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	
104.0	104.30	104.20	104.28	103.96	104.01	104.30	103.87	103.79	103.87	0.65
180.0	180.84	180.69	180.56	180.88	180.30	180.45	180.60	179.73	180.64	0.80

Resolution : 0.1 (°C)

* Probe No. 9 is Reference Probe



- Notes :
1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
 2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time
 3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
 4. The reported uncertainty of measurement were excluded Uniformity and Stability

** End of Calibration Report **