

ภาคผนวก ง

คำแนะนำเอกสารการสอบเทียบเครื่องมือตรวจวัด

ภาคผนวก ง-1

ใบรับรองสอบเทียบเครื่องมือตรวจวัดคุณภาพอากาศ
ในบรรยากาศ



National Institute of Metrology (Thailand)

Ministry of Higher Education, Science, Research and Innovation

Certificate of Calibration

Certificate No. : MW-0036-24
Issued by : Flow and Volume of Liquid Laboratory
Mechanical Metrology Department

Page 1 of 3 pages

MEASUREMENT ITEM : Orifice Gas Flow Device

MANUFACTURER : Tisch Environmental, Inc.

MODEL/TYPE : TE-5025A

SERIAL NUMBER : 0992

CUSTOMER : ENVIPRO CO.,LTD.
168/28,168/30,168/71 Nakniwat Rd., Lat Phrao District,
Lat Phrao District, Bangkok 10230

MEASUREMENT DATE : April 4, 2024

The reported measurement result relates only to the measurand and applies only at the time of measurement.

Reference:
MEC9734-01/24

Date:
April 5, 2024

Approved by:

(Wirun Laopornpichayanuwat)

Performed by:

(Terdsak Neadkratoke)

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ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows :

Temperature	: 23.0 ± 2.0	°C
Relative Humidity	: 55 ± 15	%RH

Calibration Condition:

Preconditioning	: 24 hours at ambient conditions.
Measurement Condition	: The average values during measurement are 23.3°C and 57 %RH.

MEASUREMENT METHOD:

The Orifice gas flow device was calibrated against NIMT's Standard Gas Meter Model DELTA S-Flow G65. The CP-MW 0009 was used as a calibration guideline.

TABULATION OF RESULTS:

The tables on the next page give the measured values.

UNCERTAINTY OF MEASUREMENT:

The stated uncertainty is the expanded uncertainty which is obtained by multiplying the standard uncertainty by the coverage factor $k = 2$. It has been determined in accordance with EA publication EA-4/02M:2013 "Evaluation of the Uncertainty of Measurement in Calibration" and "JCGM 100:2008 Evaluation of measurement data - Guide to the Expression of Uncertainty in Measurement (GUM 1995 with minor corrections)". The value of the measurand lies within the assigned range of values with a probability of 95 %.

TRACEABILITY:

This certificate provides a traceability of the measurement to recognized the national standards, and to the realization of the International System of Units (SI).



MEASUREMENT RESULTS:

The Orifice gas flow device was calibrated by direct comparison method with the Gas Meter standard. The Humid air was used as a medium in the system. The standard conditions are 25°C (298.15 K) and 760 mmHg for standard temperature and standard pressure respectively.

Table 1. The results of Q actual calibration data

Plate	Flow rate m^3/min	Pressure [Pa] mmHg	Temperature [Ta] $^{\circ}\text{C}$	Temperature [Tm] $^{\circ}\text{C}$	Δp _Meter mmHg	Δp _Orifice inH ₂ O	Y	Actual Flow [Q_a] m^3/min
1	0.696	756.770	23.61	23.64	5.663	1.866	0.855	0.691
2	0.910	756.782	23.67	23.69	9.001	3.147	1.111	0.899
3	0.993	756.792	23.74	23.70	10.500	3.731	1.210	0.979
4	1.067	756.812	23.76	23.61	11.930	4.292	1.298	1.051
5	1.164	756.799	23.74	23.46	13.921	5.077	1.411	1.143

Slope (m): 1.22951

Intercept (b): 0.00554

Correlation coefficient (r): 0.99994

Uncertainty ($k=2$): 0.015 m^3/min

Table 2. The results of Q standard calibration data

Plate	Flow rate m^3/min	Pressure [Pa] mmHg	Temperature [Ta] $^{\circ}\text{C}$	Temperature [Tm] $^{\circ}\text{C}$	Δp _Meter mmHg	Δp _Orifice inH ₂ O	Y	Standard Flow [Q_{std}] m^3/min
1	0.696	756.770	23.61	23.64	5.663	1.866	1.366	0.691
2	0.910	756.782	23.67	23.69	9.001	3.147	1.774	0.899
3	0.993	756.792	23.74	23.70	10.500	3.731	1.931	0.979
4	1.067	756.812	23.76	23.61	11.930	4.292	2.072	1.051
5	1.164	756.799	23.74	23.46	13.921	5.077	2.253	1.143

Slope (m): 1.96301

Intercept (b): 0.00885

Correlation coefficient (r): 0.99994

Uncertainty ($k=2$): 0.016 m^3/min

End of Certificate of Calibration

CERTIFICATE OF CALIBRATION

Certificate No.: B1-2602012/24

Page 1 of total 5 pages

Customer ENVIRPRO CO., LTD.
168/28 Nakniwas Rd., Ladprao, Bangkok 10230

Equipment Electronic Balance

Manufacturer AND

Model HR-202i

Serial No. 15201052

ID No. SV-TL.044/2559

Description Maximum Capacity: 50 g Resolution: 0.00001 g
Maximum Capacity: 220 g Resolution: 0.0001 g

Environmental Conditions Ambient Temperature: 27.4 °C
Relative Humidity: 44.5 %
Atmospheric Pressure: -

Calibration Location ห้องเครื่องชั่ง

Received Date 26 February 2024

Calibration Date 26 February 2024

Date of Issue 27 February 2024

Condition of Artifacts Used conditions but can be calibrated

Checked by



Act as Technical Manager

Approved by



Representative of Managing Director

() (Krisyosl K.) () (Sakda Y.)
() (Patiphan K.) () (Onnapa P.)
() (Pongsak H.) () (Nitiphong K.)
(✓) (Kanung C.) () (Nonthachai K.)
() (Pramong P.) () (Noppol P.)

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

Certificate No.: B1-2602012/24

Page 2 of total 5 pages

Reference Method:

- The calibration method used was CP-208 based on UKAS LAB 14
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Model	Serial No.	Cert. No.	Due Date	Traceability
Standard Weight Set 1 mg - 200 g	-	158841	MM-0032-22	Mar. 15, 2024	NIMT

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- NIMT, National Institute of Metrology (Thailand).

Measurement Results:

- ☒ Without Adjustment
- ☐ After Adjustment

1. Repeatability

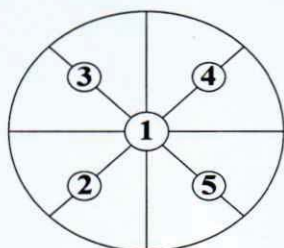
Nominal Weight	Standard Deviation of Reading (g)
200 g	0.00003

Certificate No.: B1-2602012/24

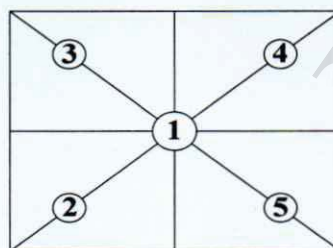
Page 3 of total 5 pages

Measurement Results (Cont.):

2. Off-Center Loading



Front



Front



Measuring Positions

Measuring Positions	Instrument Reading (g)	Max. Difference (g)
1	50.00006	0.00046
2	50.00023	
3	49.99998	
4	49.99977	
5	50.00018	
1	50.00005	

3. Error of indication from nominal value

Standard Weight (g)	Instrument Reading (g)		Correction (g)	Uncertainty of Measurement (g)
	Without Adjustment	After Adjustment		
0.00100	0.00099	-	0.00001	± 0.000043
0.00300	0.00303	-	-0.00003	± 0.000044
0.00500	0.00499	-	0.00001	± 0.000043
0.01000	0.00999	-	0.00001	± 0.000044
0.05000	0.05000	-	0.00000	± 0.000044
0.10000	0.09999	-	0.00001	± 0.000044
0.50000	0.50002	-	-0.00002	± 0.000045
1.00000	1.00004	-	-0.00004	± 0.000045
9.99998	10.00001	-	-0.00003	± 0.000052
19.99997	20.00012	-	-0.00015	± 0.000062
29.99995	30.00011	-	-0.00016	± 0.000074
40.00000	40.00014	-	-0.00014	± 0.000074

Calibrated by

Natthapong

Certificate No.: B1-2602012/24

Page 4 of total 5 pages

Measurement Results (Cont.):

3. Error of indication from nominal value (Cont.)

Standard Weight (g)	Instrument Reading (g)		Correction (g)	Uncertainty of Measurement (g)
	Without Adjustment	After Adjustment		
49.99993	50.00007	-	-0.00014	± 0.000081
59.9999	60.0001	-	-0.0002	± 0.00014
69.9999	70.0002	-	-0.0003	± 0.00014
79.9999	80.0001	-	-0.0002	± 0.00014
84.9999	85.0001	-	-0.0002	± 0.00014
89.9999	90.0000	-	-0.0001	± 0.00015
99.9999	99.9998	-	0.0001	± 0.00016
109.9999	109.9999	-	0.0000	± 0.00028
119.9999	119.9999	-	0.0000	± 0.00028
129.9998	129.9999	-	-0.0001	± 0.00028
139.9999	140.0000	-	-0.0001	± 0.00028
149.9998	149.9998	-	0.0000	± 0.00028
159.9998	159.9996	-	0.0002	± 0.00028
169.9998	169.9997	-	0.0001	± 0.00028
179.9998	179.9997	-	0.0001	± 0.00028
189.9998	189.9996	-	0.0002	± 0.00028
199.9999	199.9995	-	0.0004	± 0.00028

Calibrated by Natthapong

Certificate No.: B1-2602012/24

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Measurement Results (Cont.):

4. Effect of Tare

Nominal Tare Weight (g)	Standard Weight (g)		Instrument Reading (g)	Instrument Deviation (g)
50	Tare		0.0000	0.0000
	at 20 %	10.0000	10.0001	0.0001
	at 40 %	20.0000	20.0000	0.0000
	at 60 %	50.0000	49.9998	-0.0002
	at 80 %	100.0000	99.9996	-0.0004
	at 100 %	150.0000	149.9993	-0.0007

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

- End of Certificate -

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E06NI99E15A0003 Reference Number: 160-401615777-1
Cylinder Number: EB0128769 Cylinder Volume: 144.4 CF
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG
PGVP Number: A12019 Valve Outlet: 660
Gas Code: CH₄,CO,NO,NOX,SO₂,BALN Certification Date: Oct 29, 2019

Expiration Date: Oct 29, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	55.00 PPM	57.03 PPM	G1	+/- 0.8% NIST Traceable	10/22/2019, 10/29/2019
NITRIC OXIDE	55.00 PPM	57.03 PPM	G1	+/- 0.8% NIST Traceable	10/22/2019, 10/29/2019
SULFUR DIOXIDE	55.00 PPM	57.38 PPM	G1	+/- 0.9% NIST Traceable	10/22/2019, 10/29/2019
METHANE	180.0 PPM	181.2 PPM	G1	+/- 0.9% NIST Traceable	10/22/2019
PROPANE	180.0 PPM	181.6 PPM	G1	+/- 0.9% NIST Traceable	10/22/2019
CARBON MONOXIDE	4500 PPM	4564 PPM	G1	+/- 0.6% NIST Traceable	10/22/2019
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13010429	KAL004123	97.6 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Jul 23, 2025
NTRM	13010429	KAL004123	97.6 PPM NOx/NITROGEN	+/- 0.8%	Jul 23, 2025
NTRM	16010235	KAL004419	97.69 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Dec 23, 2021
NTRM	08011503	K002564	246.7 PPM METHANE/AIR	+/- 0.6%	May 15, 2025
NTRM	01010309	K011475	499.3 PPM PROPANE/AIR	0.60	Jul 02, 2024
NTRM	072508	KAL004522	970.0 PPM CARBON MONOXIDE/NITROGEN	0.36%	May 14, 2021

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS FTIR - CO - 000928781	FTIR	Sep 26, 2019
MKS FTIR CH ₄ 000929060	FTIR	Sep 30, 2019
MKS FTIR - NO - 000928781	FTIR	Oct 18, 2019
MKS FTIR - NO _x - 000928781	FTIR	Oct 18, 2019
MKS FTIR C ₃ H ₈ 000929060	FTIR	Oct 18, 2019
MKS FTIR - SO ₂ - 000928781	FTIR	Oct 03, 2019

Triad Data Available Upon Request

NOTES: Gross Weight: 28.9 Kg, Net Weight: 4.7 Kg.



Michael A. Jones
Approved for Release

GC Clarus 500/580 Preventive Maintenance (PM)

Company Name:	ENVIRPRO CO.,LTD		
Address (Instrument Location):	168/28 Nak Niwat road, Lad Phrao district, Bangkok 10230		
Serial Number:	650N3022702	Service Tag:	N50APSXFFX
Customer Name (if applicable):	Khun Wanlee	PM number:	1 of 2
Service Engineer Name:	Monchai Kitcharoenkeat	Service Order Number:	WO-02477837
Date PM Performed: (DD-MMM-YYYY)	17-Aug-2023	Next PM Due Date: (DD-MMM-YYYY)	17-Aug-2024

Part Number	Release	Publication Date	
TH09370050	2.2	Jan 2020	

Scope

The purpose of this PM is to ensure the continued functionality of the Clarus 500 and Clarus 580 GC by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. The customer should save their method before the PM begins.

General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM. Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files. The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer. Update the PM sticker and instrument logbook as required.

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Component List

Component / Specific Model	Serial #	Software Version	Configuration Notes
Clarus 500	650N3022702		

Parts Lists

Additional Tools Required for PM				
Part Number (if applicable)	Description	Quantity	Serial #	Calibration Due Date (MM/YY)
Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)

Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.

- ☒ Check incoming AC line voltage for proper levels and grounding.

L-N	220	Volt
L-G	220	Volt
N-G	0.37	Volt

**Neutral to ground not more than 0.5 volts peak to peak*

- ☒ Inspect all gas line filters and traps; Replace if necessary with customer supplied spares.

Carrier gas ☐ Helium ☒ Nitrogen ☐ Hydrogen

Moisture level ☒ Good ☐ Need to replace ☐ Other _____

Detector gas ☒ Air Zero ☒ Hydrogen ☐ Nitrogen ☐ Helium

Moisture level ☒ Good ☐ Need to replace ☐ Other _____

- ☒ Inspect the customer log book and make any appropriate PM entries.

- ☒ Leak check all fittings from the gas source to instrument.

Gas leakage ☒ Pass ☐ Fail Comment _____

- ☒ Perform general inspection of system for cleanliness.

- ☒ Inspect for functional and clean electronic cooling and oven vent fans

Electronic cooling fan ☒ Yes ☐ No

Oven cooling fan ☒ Yes ☐ No

2. Electronic :

- ☒ Check oven temperature. Calibrate if necessary.

Oven temperature set point 150 °C ☒ Pass ☐ Fail

- ☐ Check sub-ambient option. (If installed).

Oven temperature set point 5 °C ☐ Pass ☐ Fail

- ☒ Perform routine maintenance on detector/injector. Replace parts as necessary with customer supplied spares.

- ☒ Check flows, including split flows if applicable. Calibrate if necessary.

Carrier flow	Pass
Split flow	Pass
- ☒ Check detector gas flows and adjust if necessary.

Detector flow	N/A
---------------	-----
- ☒ Autosampler installed ☒ Yes ☐ No

Check autosampler sensor for wear and replace if necessary.	
Vial sensor	Pass
Door sensor	Pass
Tower sensor	Pass
Plunger sensor	Pass
Elevator sensor	Pass
- ☒ Remove syringe, manually flush. Replace with customer supplied spare if necessary.
- ☒ Check firmware version. Upgrade to current levels if necessary.

Firmware version	----
------------------	------
- ☒ Measure all accessible power supply voltages.

5 Volt	Pass
+15 Volt	Pass
-15 Volt	Pass
24 Volt	Pass
- ☒ Record all detector voltage signal.

Detector Channel A	1.34	mV.
Detector Channel B	----	mV.

3. Diagnostics Tests:

- ☒ Run instrument diagnostics.

BRAM	Pass
EPROM	Pass
- ☒ Run Autosampler diagnostics.

BRAM	Pass
EPROM	Pass

4. Review:

- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer-supplied materials to have on hand
- ☒ Attach PM sticker.
- ☒ Update Logbook.

Additional Comments

Additional Comments Regarding the PM

Review

<i>The preventive maintenance checks and if applicable performance tests for Clarus500/580 GC have been completed.</i>	
<i>This Clarus500/580 GC</i>	<i>Pass</i>
<i>the preventive maintenance.</i>	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative: Monchai Kitcharoenkeat	Date: 17-Aug-2023 (DD-MMM-YYYY)
Authorized Customer Representative: Wanlee	Date: 17-Aug-2023 (DD-MMM-YYYY)



THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 11 January, 2024

Certification No. 019/24

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Sensor : NRG
Basic Datalogger : Symphonie

Type : Sensor : #40C Basic Datalogger : LR20

Serial No. : Sensor : 1795-00124576 Basic Datalogger : 30906578

Customer : ENVIRPRO CO.,LTD.
168/28 Nakniwas Rd., Ladprao,
Bangkok 10230.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1010.4 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119

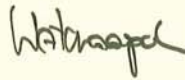
: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023

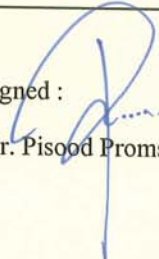
N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

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

Serial Number 110730029 (sensor 120629586)

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

Calibrated by : 
Mr. Watcharapol Subwat
Mechanical Engineer

Signed : 
Mr. Pisood Promsut





THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 019/24

11 January, 2024

Page : 2 of 2

Standard Ultrasonic Anemometer	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacumm	Velocity	Velocity	Correction
	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.85	0.15
3.02	-	-	-	2.98	0.04
5.00	-	-	-	5.07	-0.07
7.04	-	-	-	7.08	-0.04
9.02	-	-	-	9.13	-0.11
11.01	-	-	-	11.06	-0.05
13.01	-	-	-	13.11	-0.10
15.01	-	-	-	15.07	-0.06
17.02	-	-	-	16.99	0.03
20.02	-	-	-	20.08	-0.06

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

Calibrated by :

Wacharapol

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau



ภาคผนวก ง-2

ใบรับรองสอบเทียบเครื่องมือตรวจวัด
คุณภาพอากาศจากแหล่งกำเนิด



Environmental Solution Integrator Co., Ltd.

Web Site : www.esithailand.com

E-mail : info@esithailand.com

METHOD 5 CONSOLE CALIBRATION

USING REFERENCE WET TEST METER W-NK-2.5B No.545141

5-POINT METRIC UNIT

Meter Console Information	
Console Model Number	XC-572-V
Console Serial Number	0710060
DGM Model Number	SK25EX
DGM Serial Number	00006206

Calibration Conditions	
Date	4-Mar-24
Time	9:00 AM
Calibration Reference No.	SE67AP004
Barometric Pressure	760.00 mm Hg
Calibration Meter Gamma	1.010

Factors/Conversions	
Std Temp	293 K
Std Press	760 mm Hg
K ₁	0.386
Console Leak Check	
PASS	

Calibration Data									
Metering Console					Calibration Meter				
Run Time	DGM Orifice ΔH	Volume Initial (V _{mi})	Volume Final (V _{mf})	Outlet Temp Initial (t _{mi})	Outlet Temp Final (t _{mf})	Volume Initial (V _{wi})	Volume Final (V _{wf})	Outlet Temp Initial (t _{wi})	Outlet Temp Final (t _{wf})
Elapsed (θ)	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
min									
11.50	13.0	1391.4824	1391.6224	24	24	554.833860	554.963000	22	22
11.93	13.0	1391.6224	1391.7624	24	24	554.963000	555.091660	22	22
8.00	26.0	1391.7694	1391.9094	24	25	555.097780	555.226960	22	22
8.03	26.0	1391.9094	1392.0494	25	25	555.226960	555.355680	22	22
13.10	40.0	1392.0560	1392.3360	25	25	555.360740	555.617940	22	22
13.05	40.0	1392.3360	1392.6160	25	25	555.617940	555.876100	22	21
11.73	50.0	1392.6362	1392.9162	25	26	555.893540	556.150560	21	21
11.60	50.0	1392.9162	1393.1962	26	26	556.150560	556.406540	21	21
9.70	70.0	1393.2030	1393.4830	26	26	556.412500	556.668460	21	21
9.67	70.0	1393.4830	1393.7630	26	26	556.668460	556.923000	21	21





Environmental Solution Integrator Co., Ltd.

Web Site : www.esithailand.com

E-mail : info@esithailand.com

METHOD 5 CONSOLE CALIBRATION

USING REFERENCE WET TEST METER W-NK-2.5B No.545141

5-POINT METRIC UNIT

Calibration Data									
Results									
Standardized Data					Dry Gas Meter				
Dry Gas Meter		Calibration Meter			Calibration Factor		Flowrate		Variation
($V_{m(sat)}$) m^3	($Q_{m(sat)}$) m^3/min	($V_{W(sat)}$) m^3	($Q_{W(sat)}$) m^3/min	Value (Y)	Variation (ΔY)	Std & Corr ($Q_{m(sat)corr}$) m^3/min	.0212 m^3/min ($\Delta H @$) $mm\ H_2O$	Variation ($\Delta \Delta H @$)	
0.139	0.012	0.130	0.011	0.930	0.007	0.011	45.995	-0.137	
0.139	0.012	0.129	0.011	0.927	0.003	0.011	49.897	3.765	
0.139	0.017	0.130	0.016	0.930	0.006	0.016	44.601	-1.531	
0.139	0.017	0.129	0.016	0.926	0.003	0.016	45.296	-0.836	
0.279	0.021	0.258	0.020	0.924	0.001	0.020	46.539	0.407	
0.280	0.021	0.259	0.020	0.928	0.004	0.020	45.764	-0.368	
0.280	0.024	0.259	0.022	0.923	-0.001	0.022	46.666	0.534	
0.280	0.024	0.258	0.022	0.919	-0.005	0.022	45.983	-0.150	
0.281	0.029	0.258	0.027	0.917	-0.007	0.027	45.195	-0.937	
0.281	0.029	0.256	0.027	0.912	-0.012	0.027	45.387	-0.745	
				Y Average 0.924			46.132	$\Delta H @$ Average	

esi

บริษัท อีเอสไอ โซลูชัน อินทิเกรเตอร์ จำกัด
Environmental Solution Integrator Co., Ltd.

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ± 0.02 .
Note: For $\Delta H @$, orifice pressure differential that equates to 0.75cfm (0.0212 m^3/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ± 0.2 inches (5.1mm) H_2O .

Calibrated by : *Kiatbawin*

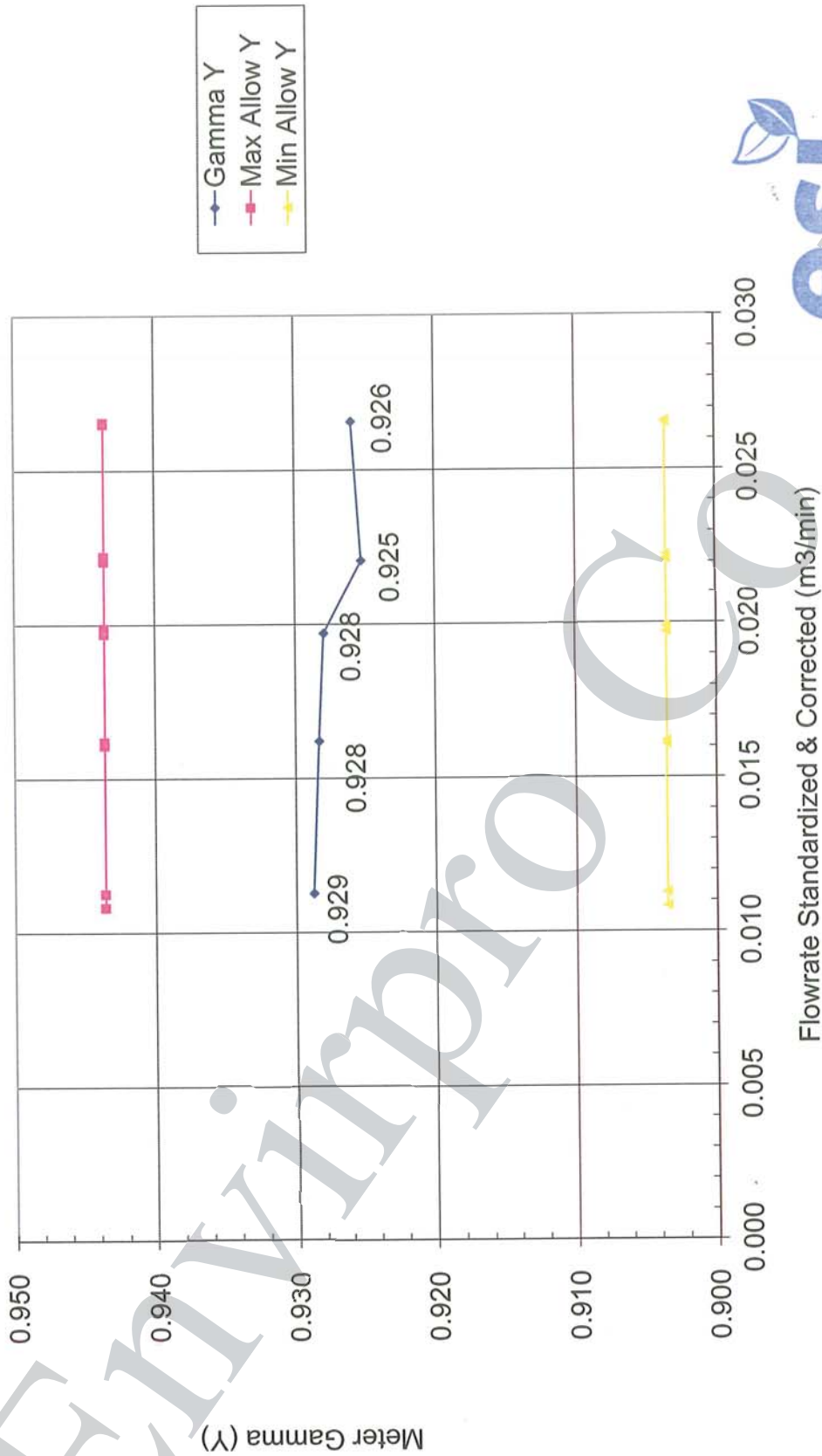
Approved by :

Terdong Samkhon

Date

4-Mar-24

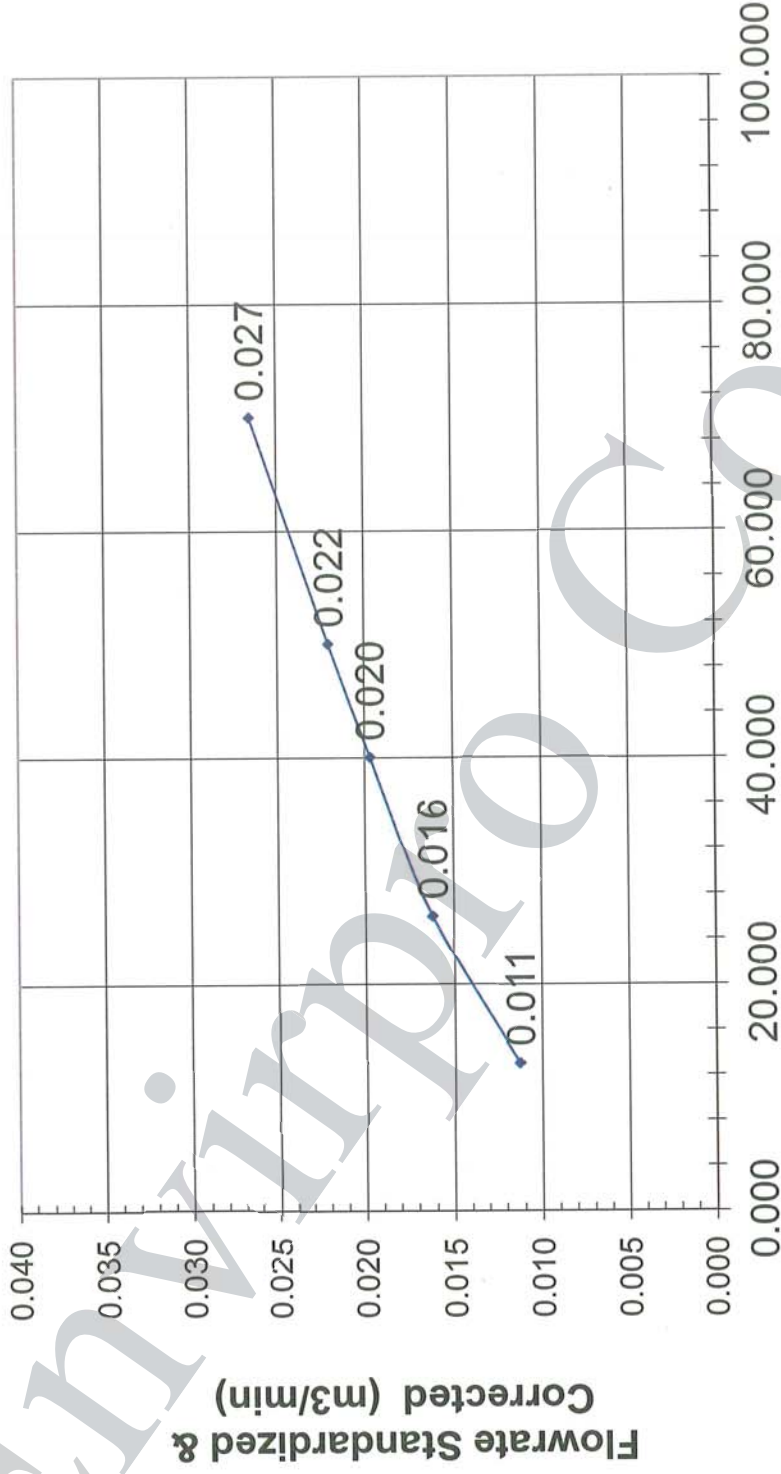
Meter Gamma vs Flowrate



Console Serial: 0710060

Console Model: XC-572-V

Meter Pressure vs Flowrate



DGM Orifice ΔH (mm H₂O)



Environmental Solution Integrator Co., Ltd.
Web Site : www.esithailand.com
E-mail : info@esithailand.com

NOZZLE CALIBRATION

Sampling System Equipment Information		Calibration Conditions			
Console Model Number	XC-572-V	Date	SE67AP004	04-Mar-24	9:00 AM
Console Serial Number	0710060	Calibration Reference No.	SE67AP004		
DGM Model Number	SK25EX	Barometric Pressure	755	mm Hg	
DGM Serial Number	00006206	Calibration	Vernier ,0-150mm	0.01 mm increments	
Nozzle Types	Stainless	Method Reference	US.EPA Method		

Calibration Data					Results	
Nozzle ID	Nozzle Diameter				Different	$(D_1 + D_2 + D_3) / 3$
Sizes		D ₁	D ₂	D ₃	ΔD	Davg
	mm	mm	mm	mm	mm	mm
NS-4	3.2	2.90	2.89	2.91	0.010	2.900
NS-6	4.8	4.44	4.45	4.44	0.006	4.443
NS-8	6.4	6.12	6.12	6.13	0.006	6.123
NS-10	8.0	7.87	7.86	7.84	0.015	7.857
NS-12	9.5	9.53	9.51	9.52	0.010	9.520
NS-14	11.1	10.90	10.88	10.91	0.015	10.897
NS-16	12.7	12.73	12.71	12.74	0.015	12.727

Where :

D₁, D₂, D₃ = There difference nozzle diameters , mm ; diameter must be within 0.025 mm

ΔD = Maximum difference between any two diameters, must be ≤ 0.100 mm

Davg = $(D_1 + D_2 + D_3) / 3$



บริษัท เอ็นวิรอสอลูชั่น อินทิเกรเตอร์ จำกัด
Environmental Solution Integrator Co., Ltd.

Calibrated by :

Kiatka win

Approved by :

Pasadi Sangthong



Environmental Solution Integrator Co., Ltd.
Web Site : www.esithailand.com
E-mail : info@esithailand.com

THERMOCOUPLES SYSTEM CALIBRATION

Samplig System Equipment Information

Console Model Number	XC-572-V
Console Serial Number	0710060
DGM Model Number	SK25EX
DGM Serial Number	00006206
Meter Box Model Number	JENCO 765
Meter Box Serial Number	JC17919

Calibration Conditions

Date	Time	04-Mar-24	10:30 AM
Calibration Reference No.	SE67AP004		
Reference Thermometer	FLUKE 714		
Serial Number	1812153		
Dry Box Calibrator	Pyros 650		
Serial Number	K38111		

Results

Console Thermocouple Simulator

Channal and test point	Meter Box Channal Temperature Reading (°C)											
	-18.0	25.0	38.0	93.0	149.0	260.0	371.0	482.0	593.0	816.0	1038.0	
Stack	-17	25	38	93	150	260	372	483	564	817	1038	
Aux	-17	25	38	93	150							
Probe	-17	25	38	93	150							
Filter	-17	25	38	93	150							
Exit	-17	25	38									

OUTLET DGM Thermocouple

Set Point	Reference Thermocouple	Probe Thermocouple	Difference
30	30.0	29	0.33
40	40.0	38	0.64
50	50.0	48	0.62

Probe Thermocouple

Set Point	Reference Thermocouple	Probe Thermocouple	Difference
100	100.0	98	0.54
250	250.0	246	0.76
300	300.0	298	0.35
350	350.0	347	0.48

Tolerances Range

Stack $\pm 1.50\%$ Absolute
DGM $\pm 3.0\text{ }^{\circ}\text{C}$
Probe $\pm 3.0\text{ }^{\circ}\text{C}$

esi
Meter $\pm 3.0\text{ }^{\circ}\text{C}$
Filter $\pm 3.0\text{ }^{\circ}\text{C}$
Exit $\pm 2.0\text{ }^{\circ}\text{C}$
Environmental Solution Integrator Co., Ltd.

Calibrated by : Kiatkawin

Approved by : Tanad' Sang Hong



Environmental Solution Integrator Co., Ltd.
Web Site : www.esithailand.com
E-mail : info@esithailand.com

PITOT TUBE CALIBRATION

Sampling System Equipment Information	
Console Model Number	XC-572-V
Console Serial Number	0710060
DGM Model Number	SK25EX
DGM Serial Number	00006206
Pitot tube Number	A10947

Calibration Conditions			
Date	3/4/2024	Time	05-Mar-24 9:00 AM
Calibration	SE67AP004	SE67AP004	
Barometric Pressure	759	mm Hg	
Pitot Tube Type	S		
size (OD)	3/8	inch	
Standard Pitot Tube ID Number	160-12		
C _p (std)	0.99		

Results				
"A" SIDE CALIBRATION				
RUN No.	Δp std	Δp (s)	C _p (s)	DEVIATION
	mm H ₂ O	mm H ₂ O		C _p (s)-C _p (A)
1	6.4	8.8	0.844	-0.005
2	16.4	22.2	0.851	0.001
3	30.8	41.4	0.854	0.004
	AVERAGE	C _p (SIDE A)	0.850	-0.003

Results				
"B" SIDE CALIBRATION				
RUN No.	Δp std	Δp (s)	C _p (s)	DEVIATION
	mm H ₂ O	mm H ₂ O		C _p (s)-C _p (B)
1	6.4	8.8	0.844	-0.003
2	16.4	22.4	0.847	-0.001
3	30.8	41.6	0.852	0.004
	AVERAGE	C _p (SIDE B)	0.848	-0.003

$$[C_p(\text{SIDE A}) - C_p(\text{SIDE B})] = 0.002 \quad (\text{must be } \leq 0.01)$$

Note: Average deviation must be < 0.01

บริษัท อีเอสไอ โซลูชัน จำกัด
Environmental Solution Integrator Co., Ltd.

Calibrated by :

Kiatkavin

Approved by :

Terdang Samthong

CERTIFICATE OF CALIBRATION

Certificate No.: B1-0707019/23

Page 1 **of total** 4 **pages**

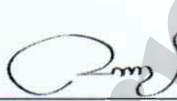
Customer ENVIRPRO CO., LTD.
168/28 Nakniwas Rd., Ladprao, Bangkok 10230

Equipment Electronic Balance
Manufacturer METTLER TOLEDO
Model PL1501-S
Serial No. 1203420225
ID No. SV-TL.081/2259
Description Maximum Capacity: 1510 g Resolution: 0.1 g

Environmental Conditions
Ambient Temperature: 24.6 °C
Relative Humidity: 58 %
Atmospheric Pressure: -

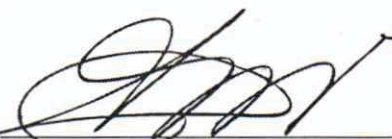
Calibration Location Balance Room
Received Date 7 July 2023
Calibration Date 7 July 2023
Date of Issue 8 July 2023
Condition of Artifacts Used conditions but can be calibrated

Checked by



Act as Technical Manager

Approved by



Representative of Managing Director

() (Krisyosl K.) () (Sakda Y.)
() (Patiphan K.) () (Onnapa P.)
() (Pongsak H.) () (Nitiphong K.)
(✓) (Kanung C.) () (Nonthachai K.)
() (Pramong P.) () (Noppol P.)

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

Certificate No.: B1-0707019/23

Page 2 of total 4 pages
Reference Method:

- The calibration method used was CP-208 based on UKAS LAB 14
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Model	Serial No.	Cert. No.	Due Date	Traceability
Standard Weight Set 1 mg - 5 kg	-	11119515-2	I0-2304003/23	Apr. 23, 2025	THC

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

- ☒ Without Adjustment
☐ After Adjustment

1. Repeatability

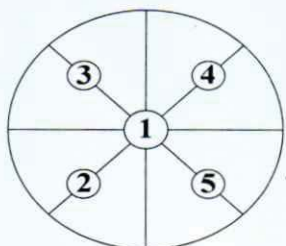
Nominal Weight	Standard Deviation of Reading (g)
1300 g	0.00

Certificate No.: B1-0707019/23

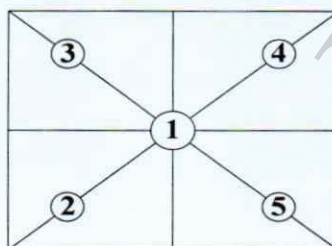
Page 3 of total 4 pages

Measurement Results (Cont.):

2. Off-Center Loading



Front



Front



Measuring Positions

Measuring Positions	Instrument Reading (g)	Max. Difference (g)
1	200.0	0.0
2	200.0	
3	200.0	
4	200.0	
5	200.0	
1	200.0	

3. Error of indication from nominal value

Standard Weight (g)	Instrument Reading (g)		Correction (g)	Uncertainty of Measurement (g)
	Without Adjustment	After Adjustment		
1.0	1.0	-	0.0	± 0.082
5.0	5.0	-	0.0	± 0.082
10.0	10.0	-	0.0	± 0.082
50.0	50.0	-	0.0	± 0.082
100.0	100.0	-	0.0	± 0.082
200.0	200.0	-	0.0	± 0.082
500.0	500.0	-	0.0	± 0.082
700.0	700.0	-	0.0	± 0.082
1000.0	1000.0	-	0.0	± 0.082
1200.0	1200.0	-	0.0	± 0.082
1300.0	1300.0	-	0.0	± 0.082

Calibrated by

Vinit

Certificate No.: B1-0707019/23

Page 4 of total 4 pages

Measurement Results (Cont.):

4. Effect of Tare

Nominal Tare Weight (g)	Standard Weight (g)		Instrument Reading (g)	Instrument Deviation (g)
300	Tare		0.0	0.0
	at 20 %	200.0	200.0	0.0
	at 40 %	400.0	400.0	0.0
	at 60 %	600.0	600.0	0.0
	at 80 %	800.0	800.0	0.0
	at 100 %	1000.0	1000.0	0.0

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

- End of Certificate -

Calibrated by

Vinit

Certificate No: G 670258

Date of issue : 11-Apr-24

Instrument description : Flue Gas Analyzer
Instrument model : Testo 310
Control unit serial no. : -
Instrument serial no. : 42824262
ID no. or control no. : -
Manufacturer : Testo SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial no. : -
Customer name : ENVIRPRO CO., LTD.
Customer address : 168/28 Nakniwas Rd, Ladprao, Bangkok 10230

Total pages of certificate : 2 Pages
Receiving no. : L-241458
Receiving date. : 11-Apr-24
Parameter of calibration : Gas Calibration(Oxygen 2.50,10.04,21.02 %vol, Carbon Monoxide 80.14,302,1003 ppm)

Condition of UUC. : Used
Ambient condition : All of the Measurement were carried out the stabilized laboratory
Temperature : 23 ± 5 °C
Humidity : 55 ± 15 %RH

Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210

Calibration procedure no. : This instrument was calibrated by comparison with Standard gas mixture according to calibration Work Instruction no. WI-CL-28-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement Multiplied by coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

This certificate is applied only to item under test Environmental condition.

This Calibration Certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature and seal not valid and The results relate only to the items tested/calibrated.

This calibration certificate documents are traceability to national standards, which realize measurement according to the International System of Units (SI).

Date of calibration : 11-Apr-24

Mr. Sedtawut Nueathong
Calibration Engineer

Mrs. Nongluck Wongsettee
Technical Manager

Certificate No.: G 670258

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.50 % Vol	2412/23	Linde	27-Aug-27
Oxygen (O ₂) 10.04 % Vol	CG-0153-21	Nimt	18-Nov-26
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0040-22	Nimt	14-Feb-27
Carbon monoxide (CO) 302 ppm	1915/23	Linde	16-Jun-25
Carbon monoxide (CO) 1003 ppm	2584/23	Linde	10-Sep-25

Measured room conditions

Temperature : 23.7 °C Humidity : 65.3 %RH Pressure : 1010.4 mbar

Calibration conditions

Gas Temperature : 24 °C Flow rate : 600 ml/min Gas pressure : 1013.7 mbar

Calibration Results (before adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.50	2.5	0.00	0.15
O ₂ (%Vol)	10.04	10.0	-0.04	0.20
O ₂ (%Vol)	21.02	21.0	-0.02	0.30
CO (ppm)	80.14	76	-4.14	3.0
CO (ppm)	302	292	-10	6.0
CO (ppm)	1003	959	-44	12

Calibration Results (after adjustment) (Table 3)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.50	2.5	0.00	0.15
O ₂ (%Vol)	10.04	10.0	-0.04	0.20
O ₂ (%Vol)	21.02	21.0	-0.02	0.30
CO (ppm)	80.14	79	-1.14	3.0
CO (ppm)	302	303	1	6.0
CO (ppm)	1003	1006	3	12

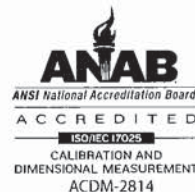
Remark : 1 cmol/mol = 1 %vol, 1 μmol/mol = 1 ppm.

End of Report



CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : BAROMETER
MANUFACTURER : BARIGO
MODEL / TYPE : N/A
SERIAL NO. : N/A[SV-TL.019/2550]
CLID. NO. : 212100899
JOB CONTROL NO. : 230711075583

CUSTOMER : ENVIRPRO CO., LTD.
168/28 NAKNIWAS RD., LADPRAO,
BANGKOK 10230 THAILAND

DATE OF RECEIVED : 11 July 2023

DATE OF ISSUED : 14 July 2023

Report of calibration screening must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Sittipong Pimdee
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory

14 July 2023



This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q23075583

F3-011-04/01-12

page 1 of 3



@clccalibration

REPORT OF CALIBRATION

FOR

NOMENCLATURE : BAROMETER
MANUFACTURER : BARIGO
MODEL / TYPE : N/A
SERIAL NO. : N/A[SV-TL.019/2550]
DATE OF CALIBRATION : 12 July 2023

ENVIRONMENT CONDITIONS :

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

Relative Humidity : $(55 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPPP-07 according to DKD-R 6-1 as calibration guidelines.

The calibration was performed by direct measurement with Reference Pressure Monitor which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Reference Pressure Monitor, Fluke Model RPM3 S/N. 829.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).

Certificate No. MP-0181-22, Due Date 26 October 2023.

UNCERTAINTY :

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of $k = 2$. It has been evaluated according to the "Calibration of Pressure Gauges (DKD-R 6-1)" which provides a level of confidence approximately 95%.

Certificate No. Q23075583

F3-011-04/01-12

page 2 of 3



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The DUC was exercised by applying a known pressure from its zero to full scale 1 times. Then 2 series of known gauge pressure were applied. The STD reading were recorded and the means value were reported in the table below.

CALIBRATION DATA

CORRECTION OF PRESSURE

DUC Test point (hPa)	STD Reading (hPa)		Correction (hPa)	
	Up	Down	Up	Down
970	970.7	970.8	+0.7	+0.8
980	980.4	980.5	+0.4	+0.5
990	990.2	990.3	+0.2	+0.3
1000	999.9	999.9	-0.1	-0.1
1010	1009.5	1009.6	-0.5	-0.4
1020	1019.3	1019.4	-0.7	-0.6
1030	1029.1	1029.1	-0.9	-0.9

Uncertainty of measurement ± 0.2 hPa

Transmitting fluid : Air.

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 008 Page 36 of 54

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q23075583

F3-011-04/01-12

page 3 of 3



@clccalibration

CERTIFICATE OF CALIBRATION

Certificate No. : 23-067815

Sample Code : 23-25875-016

Customer : บริษัท เอ็นไวโรโปร จำกัด
เลขที่ 168/28 ถนนนาคนิวาส แขวงลาดพร้าว
เขตลาดพร้าว กรุงเทพมหานคร 10230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited
(Calibration Laboratory)

Equipment : Cylinder

Manufacturer : witeg

Class : A

Serial No. : N/A

ID No. : SV-TL.101/2562

Date of Receipt : 20 June 2023

Date of Calibration : 22 June 2023

Condition of Calibration

1. Environment
- 1.1 Ambient Temperature : $20^{\circ}\text{C} \pm 2.5^{\circ}\text{C}$
- 1.2 Atmospheric Pressure : $1013\text{ hPa} \pm 8\text{ hPa}$
- 1.3 Relative Humidity : $50\% \pm 10\%$

2. Calibration method : ASTM E542-01 (2012)

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
3.1 Electronic Balance	LB-BL-10	22-084559	01 August 2023
3.2 Thermo Hygrometer	LB-DA-05	23-041454	24 April 2024
3.3 Barometer	LB-PS-03	23P36	08 January 2024
3.4 Thermometer	LB-TM-23	22-107029	02 October 2023

4. This certificate is traceable to the international system of unit (SI Unit).

- 4.1 Instrument No. 3.1, 3.2, 3.4 through : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited
- 4.2 Instrument No. 3.3 through : Technology Promotion Association (Thailand-Japan)

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

6. Condition of calibration item : Normal

Calibrated by : Mr. Anupong Lakawin
Scientist

Approved by : (Mr. Somchai Neampunt)
Signed for Director

Issue date : 29 June 2023

The uncertainties are for a confidence probability of approximately 95%.

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (AMARC).

REPORT OF CALIBRATION

Certificate No. : 23-067815

Sample Code : 23-25875-016

Equipment : Cylinder

Manufacturer : witeg

Serial No. : N/A

Capacity : 1000 ml

Class : A

ID No. : SV-TL.101/2562

Results of Calibration

Calibration results without adjustment.

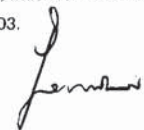
The result obtained is the arithmetic average value of volumes from 10 single weighings.

SI Unit $\text{cm}^3 = \text{ml}$

Nominal value	(ml)	500	1000
Average reading	(ml)	500.88	1001.38
Standard deviation	(ml)	0.02	0.02
Error value	(ml)	-0.88	-1.38
Uncertainty	\pm (ml)	0.15	0.15
Coverage factor	(k)	2.00	2.00

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

- End of Report -



ภาคผนวก ง-3

ใบรับรองสอบเทียบเครื่องมือตรวจวัดระดับเสียงทั่วไป

Certificate of Calibration

Certificate No.: C2312-0580

Customer: ENVIRPRO COMPANY LIMITED
168/28 Nakniwas Road,
Ladprao, Bangkok 10230

Date of calibration: 2023-12-25
Date of issue: 2023-12-25
Instrument Calibrated: Sound Calibrator
Manufacturer: TENMARS
Type: ST-120
Serial no: 211203744

Calibration and verification performed:

The performed tests refer to IEC 60942 (2017): Electroacoustics - Sound Calibrators. The calibrator has been tested as described in Annex B of the same standard.

Preconditioning:

The equipment was preconditioned for more than 16 hours at the specified calibration temperature and humidity

Instruments and Program:

A complete list of instruments, hardware, and software, that has been used for this calibration is separately available from the calibration laboratory.

Equipment standards used:

- Sound Measuring Equipment Calibration Unit 483B S/N31083
- Digital Multimeter Keysight S/N HP34401A
- Ultra-low Distortion Function Generator Stanford SRS DS360 S/N123625
- Acoustic Sound Calibrator Class 0 Nor1253 S/N32941
- Reference Microphone Condenser G.R.A.S. 40AU-1 S/N309231
- Sound Analyser Nor140 S/N1405248
- System Software Nor1504A

Traceability

The measured values are traceable to following the ISO/IEC 17025 laboratories:

Sound Pressure Level: NCL, Norway

Reference Microphone: NCL, Norway

Voltage: TPA, Thailand

Frequency: TPA, Thailand

Distortion Meter: EEI, Thailand

This certificate of calibration is issued by Acoustic Laboratory Thailand (ALT). It also states that the laboratory has a satisfactory quality assurance system and traceability to accredited or national calibration laboratories. This certificate may not be reproduced other than in full.

Environmental conditions:	Pressure:	Temperature:	Relative humidity:
Reference conditions:	101.325 kPa	23.0 °C	50 %RH
Measurement conditions:	101.93 ± 0.02 kPa	22.8 ± 1.2 °C	53.9 ± 2.9 %RH

1. Sound pressure level

Specified sound pressure level (dB)	Measured sound pressure level (dB)	Deviated value (dB)	Tolerance limit IEC60942:2017 Class 1 (dB)
Reference microphone 40AU S/N 309231			
94.00	94.96	0.96	±0.25
114.00	115.12	1.12	±0.25

2. Frequency

Specified Frequency (Hz)	Measured Frequency (Hz)	Deviated value (%)	Tolerance limit IEC60942:2017 Class 1 (%)
Reference microphone 40AU S/N 309231			
1000.00	999.96	0.00	±0.7
1000.00	999.96	0.00	±0.7

3. Total distortion + Noise

Specified sound pressure level (dB)	Measured Distortion (%)	Tolerance limit IEC60942:2017 Class 1 (%)
94.00	0.3	±2.5
114.00	2.7	±2.5

Uncertainty of measurement

Parameters	Uncertainty
Sound pressure level	0.10 dB
Frequency	0.020 %
Total distortion + Noise	0.10 %

Date of calibration: 2023-12-25

Date of issue : 2023-12-25

Certificate No.: C2312-0580

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

Calibrated By: Athakom
(Mr. Athakom sumphan)

Approved By: Pitupong
(Mr. Pitupong Sarapho)

Date of calibration: 2023-12-25

Date of issue : 2023-12-25

----- End of Certificate of Calibration -----

ภาคผนวก ง-4

ใบรับรองสอบเทียบเครื่องมือตรวจวัดคุณภาพอากาศ
ในสถานประกอบการ

Certificate of Calibration

Customer

Name : ENVIRPRO CO., LTD.
Address : 168/28 Nakniwas Rd., Ladprao, Bangkok 10230

Certificate No : 23-AFM-256

Request No : Req-2023-2405

Unit Under Calibration Details

Measurement Item : Air Flow Meter
Manufacturer : MesaLabs
Model : Defender 510
Serial Number : 205593
ID : -

Sensor Model : -

Sensor Serial Number : -

Location of Calibration : LAB 4 AIR VELOCITY METER

Calibration Environment and Details

Temperature : 23 °C ± 3 °C
Humidity : 55 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 10 November 2023
Calibration Date : 19 December 2023

Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceble	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	12 July 2024
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	12 July 2024
Temperature meter	GT 11	08000057	Qreborn	27 February 2024
Pressure meter	CPG2400	41000KDU/651882	TPA	7 November 2023


Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

Note :

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

Calibration By :


Mr. Noppadon Luangart
Service Calibration Engineer

Approved By :


Mr. Pacit Mathavorn

Calibration Engineer Supervisor

Issue Date : 19 December 2023

Certificate No : 23-AFM-256

Request No : Req-2023-2405

Result of Calibration :

Temperature (°C)	Pressure (kPa)	STD (l/min)	UUC (l/min)	Error (l/min)	Uncertainty (l/min)
25.00	101.20	0.501	0.50129	0.0003	0.0077
25.20	101.20	1.005	1.0059	0.001	0.015
25.30	101.10	2.006	2.0049	-0.001	0.028
25.40	101.00	3.006	3.0083	0.002	0.043
25.40	100.80	5.047	5.0449	-0.002	0.073

Note

STD : Standard UUC : Unit Under Calibration

- UUC Reference Condition : At atmospheric pressure and room temperature condition

- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{meas}} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature

Meas = Measurement Condition

ref = Standard Condition

* Indicates non accredited

End of Certificate

CERTIFICATE OF CALIBRATION

Certificate No.: B1-2602013/24

Page 1 **of total** 5 **pages**

Customer

ENVIRPRO CO., LTD.

168/28 Nakniwas Rd., Ladprao, Bangkok 10230

Equipment

Electronic Balance

Manufacturer

AND

Model

HR-202i

Serial No.

15204549

ID No.

SV-TL.121/2565

Description

Maximum Capacity: 50 g

Resolution: 0.00001 g

Maximum Capacity: 220 g

Resolution: 0.0001 g

Environmental Conditions

Ambient Temperature: 27.1 °C

Relative Humidity: 42.5 %

Atmospheric Pressure: -

Calibration Location

ห้องเครื่องชั่ง

Received Date

26 February 2024

Calibration Date

26 February 2024

Date of Issue

27 February 2024

Condition of Artifacts

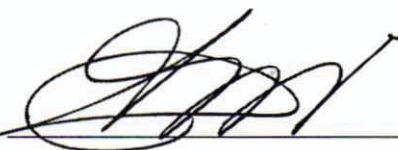
Used conditions but can be calibrated

Checked by



Act as Technical Manager

Approved by



Representative of Managing Director

- | | |
|---|--|
| <input type="checkbox"/> (Krisyosl K.) | <input type="checkbox"/> (Sakda Y.) |
| <input type="checkbox"/> (Patiphan K.) | <input type="checkbox"/> (Onnapa P.) |
| <input type="checkbox"/> (Pongsak H.) | <input type="checkbox"/> (Nitiphong K.) |
| <input checked="" type="checkbox"/> (Kanung C.) | <input type="checkbox"/> (Nonthachai K.) |
| <input type="checkbox"/> (Pramong P.) | <input type="checkbox"/> (Noppol P.) |

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

Certificate No.: B1-2602013/24

Page 2 of total 5 pages

Reference Method:

- The calibration method used was CP-208 based on UKAS LAB 14
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Model	Serial No.	Cert. No.	Due Date	Traceability
Standard Weight Set 1 mg - 200 g	-	158841	MM-0032-22	Mar. 15, 2024	NIMT

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- NIMT, National Institute of Metrology (Thailand).

Measurement Results:

- ☒ Without Adjustment
☐ After Adjustment

1. Repeatability

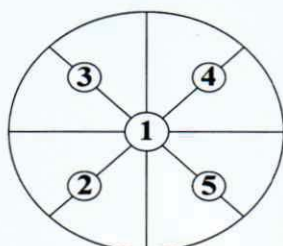
Nominal Weight	Standard Deviation of Reading (g)
200 g	0.00003

Certificate No.: B1-2602013/24

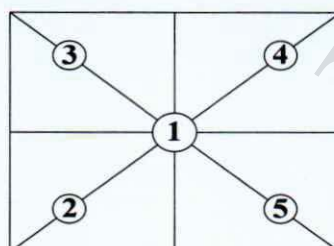
Page 3 of total 5 pages

Measurement Results (Cont.):

2. Off-Center Loading



Front



Front



Measuring Positions

Measuring Positions	Instrument Reading (g)	Max. Difference (g)
1	49.99996	0.00012
2	50.00002	
3	49.99994	
4	49.99990	
5	50.00002	
1	49.99997	

3. Error of indication from nominal value

Standard Weight (g)	Instrument Reading (g)		Correction (g)	Uncertainty of Measurement (g)
	Without Adjustment	After Adjustment		
0.00100	0.00099	-	0.00001	± 0.000043
0.00300	0.00300	-	0.00000	± 0.000044
0.00500	0.00501	-	-0.00001	± 0.000043
0.01000	0.01002	-	-0.00002	± 0.000044
0.05000	0.05002	-	-0.00002	± 0.000044
0.10000	0.10001	-	-0.00001	± 0.000044
0.50000	0.50001	-	-0.00001	± 0.000045
1.00000	1.00000	-	0.00000	± 0.000045
9.99998	9.99999	-	-0.00001	± 0.000052
19.99997	20.00001	-	-0.00004	± 0.000062
29.99995	30.00002	-	-0.00007	± 0.000074
40.00000	40.00007	-	-0.00007	± 0.000074

Calibrated by Natthapong

Certificate No.: B1-2602013/24

Page 4 of total 5 pages

Measurement Results (Cont.):

3.Error of indication from nominal value (Cont.)

Standard Weight (g)	Instrument Reading (g)		Correction (g)	Uncertainty of Measurement (g)
	Without Adjustment	After Adjustment		
49.99993	49.99997	-	-0.00004	± 0.000081
59.9999	60.0000	-	-0.0001	± 0.00014
69.9999	70.0000	-	-0.0001	± 0.00014
79.9999	80.0000	-	-0.0001	± 0.00014
84.9999	85.0000	-	-0.0001	± 0.00014
89.9999	89.9999	-	0.0000	± 0.00015
99.9999	99.9998	-	0.0001	± 0.00016
109.9999	109.9999	-	0.0000	± 0.00028
119.9999	119.9999	-	0.0000	± 0.00028
129.9998	130.0000	-	-0.0002	± 0.00028
139.9999	140.0000	-	-0.0001	± 0.00028
149.9998	150.0000	-	-0.0002	± 0.00028
159.9998	160.0000	-	-0.0002	± 0.00028
169.9998	170.0000	-	-0.0002	± 0.00028
179.9998	180.0000	-	-0.0002	± 0.00028
189.9998	190.0000	-	-0.0002	± 0.00028
199.9999	200.0000	-	-0.0001	± 0.00028

Certificate No.: B1-2602013/24

Page 5 of total 5 pages

Measurement Results (Cont.):

4. Effect of Tare

Nominal Tare Weight (g)	Standard Weight (g)		Instrument Reading (g)	Instrument Deviation (g)
50	Tare		0.0000	0.0000
	at 20 %	10.0000	10.0000	0.0000
	at 40 %	20.0000	20.0001	0.0001
	at 60 %	50.0000	49.9998	-0.0002
	at 80 %	100.0000	100.0000	0.0000
	at 100 %	150.0000	150.0000	0.0000

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

- End of Certificate -

GC Clarus 500/580 Preventive Maintenance (PM)

Company Name:	ENVIRPRO CO.,LTD		
Address (Instrument Location):	168/28 Nak Niwat road, Lad Phrao district, Bangkok 10230		
Serial Number:	650N3022702	Service Tag:	N50APSXFFX
Customer Name (if applicable):	Khun Wanlee	PM number:	1 of 2
Service Engineer Name:	Monchai Kitcharoenkeat	Service Order Number:	WO-02477837
Date PM Performed: (DD-MMM-YYYY)	17-Aug-2023	Next PM Due Date: (DD-MMM-YYYY)	17-Aug-2024

Part Number	Release	Publication Date	
TH09370050	2.2	Jan 2020	

Scope

The purpose of this PM is to ensure the continued functionality of the Clarus 500 and Clarus 580 GC by inspecting and replacing any worn or damaged parts. This service should only be performed by a trained representative of PerkinElmer. The customer should save their method before the PM begins.

General Instructions:

The customer must provide the engineer operational data to demonstrate recent instrument performance prior to starting the PM. Always check with the customer before making any changes that may affect the customer's analysis or calibration, including a current back-up of system software and/or data files. The completed document should be signed by an authorized PerkinElmer and customer representative and left with the customer. Update the PM sticker and instrument logbook as required.

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Component List

Component / Specific Model	Serial #	Software Version	Configuration Notes
Clarus 500	650N3022702		

Parts Lists

Additional Tools Required for PM				
Part Number (if applicable)	Description	Quantity	Serial #	Calibration Due Date (MM/YY)
Additional Reagents and Standards Required for PM				
Part Number (if applicable)	Description	Quantity	Batch/Lot #	Expiration Date (MM/YY)

Procedure Checklist

Use (✓) to check off those steps in the checklist that have been completed.

1. General:

- ☒ Review the instrument performance with the customer and document any recent problems.

- ☒ Check incoming AC line voltage for proper levels and grounding.

L-N	220	Volt
L-G	220	Volt
N-G	0.37	Volt

**Neutral to ground not more than 0.5 volts peak to peak*

- ☒ Inspect all gas line filters and traps; Replace if necessary with customer supplied spares.

Carrier gas ☐ Helium ☒ Nitrogen ☐ Hydrogen

Moisture level ☒ Good ☐ Need to replace ☐ Other _____

Detector gas ☒ Air Zero ☒ Hydrogen ☐ Nitrogen ☐ Helium

Moisture level ☒ Good ☐ Need to replace ☐ Other _____

- ☒ Inspect the customer log book and make any appropriate PM entries.

- ☒ Leak check all fittings from the gas source to instrument.

Gas leakage ☒ Pass ☐ Fail Comment _____

- ☒ Perform general inspection of system for cleanliness.

- ☒ Inspect for functional and clean electronic cooling and oven vent fans

Electronic cooling fan ☒ Yes ☐ No

Oven cooling fan ☒ Yes ☐ No

2. Electronic :

- ☒ Check oven temperature. Calibrate if necessary.

Oven temperature set point 150 °C ☒ Pass ☐ Fail

- ☐ Check sub-ambient option. (If installed).

Oven temperature set point 5 °C ☐ Pass ☐ Fail

- ☒ Perform routine maintenance on detector/injector. Replace parts as necessary with customer supplied spares.

- ☒ Check flows, including split flows if applicable. Calibrate if necessary.

Carrier flow	Pass
Split flow	Pass
- ☒ Check detector gas flows and adjust if necessary.

Detector flow	N/A
---------------	-----
- ☒ Autosampler installed ☒ Yes ☐ No

Check autosampler sensor for wear and replace if necessary.	
Vial sensor	Pass
Door sensor	Pass
Tower sensor	Pass
Plunger sensor	Pass
Elevator sensor	Pass
- ☒ Remove syringe, manually flush. Replace with customer supplied spare if necessary.
- ☒ Check firmware version. Upgrade to current levels if necessary.

Firmware version	----
------------------	------
- ☒ Measure all accessible power supply voltages.

5 Volt	Pass
+15 Volt	Pass
-15 Volt	Pass
24 Volt	Pass
- ☒ Record all detector voltage signal.

Detector Channel A	1.34	mV.
Detector Channel B	----	mV.

3. Diagnostics Tests:

- ☒ Run instrument diagnostics.

BRAM	Pass
EPROM	Pass
- ☒ Run Autosampler diagnostics.

BRAM	Pass
EPROM	Pass

4. Review:

- ☒ Review with the customer PM work performed.
- ☒ Review with the customer routine maintenance procedures.
- ☒ Discuss recommended customer-supplied materials to have on hand
- ☒ Attach PM sticker.
- ☒ Update Logbook.

Additional Comments

Additional Comments Regarding the PM

Review

<i>The preventive maintenance checks and if applicable performance tests for Clarus500/580 GC have been completed.</i>	
<i>This Clarus500/580 GC</i>	<i>Pass</i>
<i>the preventive maintenance.</i>	
Review of Preventive Maintenance:	
Authorized PerkinElmer Representative: Monchai Kitcharoenkeat	Date: 17-Aug-2023 (DD-MMM-YYYY)
Authorized Customer Representative: Wanlee	Date: 17-Aug-2023 (DD-MMM-YYYY)



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24070076-3

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222011

ID. Number : N/A

Environmental Conditions

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

Received Date : 03 Jul 2024

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

Calibration Date : 04 Jul 2024

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 05 Jul 2024

Method of Calibration

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

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

Calibrated by : Mr.Nanthawat Wanasit

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24070076-3

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



ID LINE : IEC17025



Result of Calibration

Certificate Number : SPR24070076-3

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

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

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.8	93.8	-0.2	-0.2	0.15
114	113.7	113.7	-0.3	-0.3	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.8	93.8	-0.2	-0.2	0.15
114	113.7	113.7	-0.3	-0.3	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24070076-5

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222012

ID. Number : N/A

Environmental Conditions

Ambient Temperature : 23 °C \pm 3 °C

Received Date : 03 Jul 2024

Relative Humidity : 50 % \pm 15 %

Calibration Date : 04 Jul 2024

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 05 Jul 2024

Method of Calibration


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

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

Calibrated by : Mr.Nanthawat Wanasit

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24070076-5

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

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



ID LINE : IEC17025



Result of Calibration

Certificate Number : SPR24070076-5

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

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

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR22020020-3

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Rd., Ladprao, Bangkok 10230

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222013

ID. Number : N/A

Environmental Conditions

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

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

Location of Calibration : In-Lab

Calibration Procedure : SP-CPE-04-01

Received Date : 02 Feb 2022

Calibration Date : 02 Feb 2022

Recommend Due Date : N/A

Date of Issue : 03 Feb 2022

Method of Calibration

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

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

Calibrated by : Mr.Chumpon Dokpikul

Calibration Officer

Approved by :

(Mr.Worapong Sinthusopa)

Authorized Signatory



Calibration Report

Certificate Number : SPR22020020-3

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	SC-942	B014059	EEL.BP. 34/1264	22 Dec 2022

Traceability

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

TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate No. : SPR22020020-3

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

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

Select C

Unit : dB

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

Select Z

Unit : dB

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

Note:

The result of calibration was found accurate as show on date and place of calibration only.

This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24070076-2

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222223

ID. Number : N/A

Environmental Conditions

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

Received Date : 03 Jul 2024

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

Calibration Date : 04 Jul 2024

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 05 Jul 2024

Method of Calibration

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

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

Calibrated by : Mr.Nanthawat Wanasit

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24070076-2

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

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



ID LINE : IEC17025



Result of Calibration

Certificate Number : SPR24070076-2

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

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

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24070076-6

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222224

ID. Number : N/A

Environmental Conditions

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

Received Date : 03 Jul 2024

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

Calibration Date : 04 Jul 2024

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 05 Jul 2024

Method of Calibration


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

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

Calibrated by : Mr.Nanthawat Wanasit

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24070076-6

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

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



ID LINE : IEC17025



Result of Calibration

Certificate Number : SPR24070076-6

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

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

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

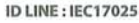
Note :

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

Measurement Uncertainty

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

- End of Certificate -



Page : 1 of 3

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

ID. Number : N/A

Date of Issue : 05 Jul 2024

SP-FM-04-15 rev.0



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24070076-8

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

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



ID LINE : IEC17025



Result of Calibration

Certificate Number : SPR24070076-8

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

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

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.8	113.8	-0.2	-0.2	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24070076-4

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Sound Level Meter

Manufacturer : ACO

Model : 6236

Serial Number : 222226

ID. Number : N/A

Environmental Conditions

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

Received Date : 03 Jul 2024

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

Calibration Date : 04 Jul 2024

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 05 Jul 2024

Method of Calibration

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

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

Calibrated by : Mr.Nanthawat Wanasit

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24070076-4

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

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



ID LINE : IEC17025



Result of Calibration

Certificate Number : SPR24070076-4

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.5	114.5	0.5	0.5	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.4	114.4	0.4	0.4	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.4	114.4	0.4	0.4	0.15

Note :

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24030065-1

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Noise Dosimeter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 200300103

ID. Number : N/A

Environmental Conditions

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

Received Date : 06 Mar 2024

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

Calibration Date : 09 Mar 2024

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 10 Mar 2024

Method of Calibration


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

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

Calibrated by : Mr.Chumpon Dokpikul

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24030065-1

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

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

Envirpro Co., Ltd.



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24030065-1

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.7	113.7	-0.3	-0.3	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.7	113.7	-0.3	-0.3	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.7	113.7	-0.3	-0.3	0.15

Note:

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24030065-5

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Noise Dosimeter

Manufacturer : Quest Technologies

Model : Q-200

Serial Number : QB6060001

ID. Number : N/A

Environmental Conditions

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

Received Date : 06 Mar 2024

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

Calibration Date : 09 Mar 2024

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 10 Mar 2024

Method of Calibration

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

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

Calibrated by : Mr.Chumpon Dokpikul

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24030065-5

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

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

Envirpro Co., Ltd.



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24030065-5

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.5	93.5	-0.5	-0.5	0.15
114	113.5	113.5	-0.5	-0.5	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.5	93.5	-0.5	-0.5	0.15
114	113.5	113.5	-0.5	-0.5	0.15

Note:

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24030065-7

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Noise Dosimeter

Manufacturer : Quest Technologies

Model : Q-200

Serial Number : QBC100019

ID. Number : N/A

Environmental Conditions

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

Received Date : 06 Mar 2024

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

Calibration Date : 09 Mar 2024

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 10 Mar 2024

Method of Calibration

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

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

Calibrated by : Mr.Chumpon Dokpikul

Calibration Officer

Approved by :

(Mr.Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24030065-7

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

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

Envirpro Co., Ltd.



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24030065-7

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	93.9	93.9	-0.1	-0.1	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Note:

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

Measurement Uncertainty

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

- End of Certificate -



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24030065-3

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Noise Dosimeter

Manufacturer : Quest Technologies

Model : Q-400

Serial Number : QDA080044

ID. Number : N/A

Environmental Conditions

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

Received Date : 06 Mar 2024

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

Calibration Date : 09 Mar 2024

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 10 Mar 2024

Method of Calibration

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

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

Calibrated by : Mr.Chumpon Dokpikul

Calibration Officer

Approved by :

(Mr.Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24030065-3

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

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



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24030065-3

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.2	94.2	0.2	0.2	0.15
114	114.0	114.0	0.0	0.0	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.2	94.2	0.2	0.2	0.15
114	114.0	114.0	0.0	0.0	0.15

Note:

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

Measurement Uncertainty

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

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR23120008-1

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100038

ID. Number : N/A

Environmental Conditions

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

Received Date : 01 Dec 2023

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

Calibration Date : 04 Dec 2023

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 05 Dec 2023

Method of Calibration

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

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

Calibrated by : Mr.Karoon Pengsalung

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



Calibration Report

Certificate Number : SPR23120008-1

Page : 2 of 3

Reference Standards

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

Traceability

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

Envirpro Co., Ltd.



Result of Calibration

Certificate No. : SPR23120008-1

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.7	113.7	-0.3	-0.3	0.15

Select C

Unit : dB

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

Select Z

Unit : dB

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

Note:

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

Measurement Uncertainty

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

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR23120008-2

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100039

ID. Number : N/A

Environmental Conditions

Ambient Temperature : 23 °C \pm 3 °C

Received Date : 01 Dec 2023

Relative Humidity : 50 % \pm 15 %

Calibration Date : 04 Dec 2023

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 05 Dec 2023

Method of Calibration

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

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

Calibrated by : Mr.Karoon Pengsalung

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



Calibration Report

Certificate Number : SPR23120008-2

Page : 2 of 3

Reference Standards

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

Traceability

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

Envirpro Co., Ltd.



Result of Calibration

Certificate No. : SPR23120008-2

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

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

Select C

Unit : dB

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

Select Z

Unit : dB

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

Note:

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

Measurement Uncertainty

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

– End of Certificate –



Certificate of Calibration

Certificate Number : SPR23120008-3

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100040

ID. Number : N/A

Environmental Conditions

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

Received Date : 01 Dec 2023

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

Calibration Date : 04 Dec 2023

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 05 Dec 2023

Method of Calibration

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

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

Calibrated by : Mr.Karoon Pengsalung

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



Calibration Report

Certificate Number : SPR23120008-3

Page : 2 of 3

Reference Standards

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

Traceability

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

Envirpro Co., Ltd.



Result of Calibration

Certificate No. : SPR23120008-3

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

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

Select C

Unit : dB

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

Select Z

Unit : dB

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

Note:

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

Measurement Uncertainty

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

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR23120008-4

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100041

ID. Number : N/A

Environmental Conditions

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

Received Date : 01 Dec 2023

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

Calibration Date : 04 Dec 2023

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 05 Dec 2023

Method of Calibration

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

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Calibrated by : Mr.Karoon Pengsalung

Calibration Officer

Approved by :

(Mr.Prayoon Topart)

Authorized Signatory



Page : 2 of 3

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

TISTR - Thailand Institute of Scientific and Technological Research



Certificate of Calibration

Certificate Number : SPR23120008-5

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100042

ID. Number : N/A

Environmental Conditions

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

Received Date : 01 Dec 2023

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

Calibration Date : 04 Dec 2023

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 05 Dec 2023

Method of Calibration


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

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

Calibrated by : Mr.Karoon Pengsalung

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



Calibration Report

Certificate Number : SPR23120008-5

Page : 2 of 3

Reference Standards

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

Traceability

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

Envirpro Co., Ltd.



Result of Calibration

Certificate No. : SPR23120008-5

Range : 94 to 114 dB

Select A

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

Select C

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

Select Z

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

Note:

Measurement Uncertainty

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR23120008-6

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100043

ID. Number : N/A

Environmental Conditions

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

Received Date : 01 Dec 2023

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

Calibration Date : 04 Dec 2023

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 05 Dec 2023

Method of Calibration

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

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

Calibrated by : Mr.Karoon Pengsalung

Calibration Officer

Approved by :

(Mr.Prayoon Topart)

Authorized Signatory



Calibration Report

Certificate Number : SPR23120008-6

Page : 2 of 3

Reference Standards

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

Traceability

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

Envirpro Co., Ltd.



Result of Calibration

Certificate No. : SPR23120008-6

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

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

Select C

Unit : dB

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

Select Z

Unit : dB

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

Note:

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

Measurement Uncertainty

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

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR23120008-7

Page : 1 of 3

Customer : ENVIRPRO CO.,LTD.

168/28 Nakniwas Road., Ladprao, Ladprao, Bangkok 10230

Equipment Name : Noise Dose Meter

Manufacturer : Tenmars

Model : ST-130

Serial Number : 220100044

ID. Number : N/A

Environmental Conditions

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

Received Date : 01 Dec 2023

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

Calibration Date : 04 Dec 2023

Location of Calibration : In-Lab

Recommend Due Date : N/A

Calibration Procedure : SP-CPE-04-01

Date of Issue : 05 Dec 2023

Method of Calibration


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

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

Calibrated by : Mr.Karoon Pengsalung

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



Page : 2 of 3

TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate No. : SPR23120008-7

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

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

Select C

Unit : dB

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

Select Z

Unit : dB

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

Note:

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

Measurement Uncertainty

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

- End of Certificate -



CERTIFICATE OF CALIBRATION

CERTIFICATE NO. C24H-0028

PAGE 1 OF 2

Reference No. 24051-1

Submitted By : บริษัท เอ็นไวร็อบ จำกัด
168/28 ถนนนาคนิวาส แขวงลาดพร้าว กรุงเทพมหานคร 10230

Equipment : Thermal Environment Monitor

ID No. :-

Manufacturer : QUEST TECHNOLOGY

Serial No. :TPK0060013

Model : QUEST Temp^o32

Condition As Received : Used Item

Condition of this calibration result :

Environment : Temperature : (23 ± 3) °C

Humidity : (50 ± 15) % RH

Reference / procedure Used :

This equipment was calibrated by comparison to precision humidity measuring instrument into humidity chamber for humidity measurement and a platinum resistance thermometer into temperature chamber for temperature measurement according to Capital Laboratory calibration procedure No. CP-H01, CP-H02

Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Dated
Data Acquisition with Switch Unit	34970A	-	E1U222283	30 May 24
Platinum Resistance Thermometer	12005	1006869	PSL-T1212/66	13 Oct 24
Digital hygroPalm	HP32	5190620	23T4623	1 Jun 24

This certification is traceable to the SI units through :

- Thailand Institute of Scientific and Technological Research (TISTR)
- Quality Calibration Co.,Ltd.
- NA Caltechnologies Co.,Ltd.

Uncertainty :

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

Received Date : 1 Mar 24

Calibration Date : 1 Mar 24

Issued Date : 7 Mar 24

Calibrated By : Kritsana Panboon

Approved By : 
Kritsana Panboon

This certificate may not be Reproduced except in full unless permission for the reproduction has been obtained writing from the laboratory.

CERTIFICATE NO. C24H-0028

PAGE 2 OF 2

The temperature scale used was based on ITS-90.

All data shown below were as-received values without adjustment.

Calibration result :

Function : Temperature Measurement.		WET	
Standard Temperature (°C)	U.U.C. Reading (°C)	Error (°C)	Uncertainty of Measurement (± °C)
0.024	-0.9	-0.924	0.57
7.056	6.1	-0.956	0.83
14.875	14.2	-0.675	0.83

Function : Temperature Measurement.		DRY	
14.875	15.1	0.225	0.83
35.068	35.0	-0.068	0.83
50.073	50.1	0.027	0.79

Function : Temperature Measurement.		GROVE	
14.875	14.7	-0.155	0.79
35.068	35.7	0.632	0.80
50.021	51.1	1.079	0.79

UUC=Unit Under Calibration

Function : Humidity Measurement.		(24.98 °C)	
Standard Humidity (% RH)	U.U.C. Reading (% RH)	Error (% RH)	Uncertainty of Measurement (% RH)
29.94	39	9.06	1.9
50.27	59	8.73	2.2
79.83	86	6.17	2.7

UUC=Unit Under Calibration

This report will certify of the calibrated equipment only.

-END-