



Premier Calibrate Instrument Co.,Ltd.

9/106 Soi Pahonyotin 61, Pahonyotin Rd., Anusawaree, Bangkok, Bangkok 10220

Phone : 02-9702378 ; Fax 02-9702379 ; E-mail : premier_calibrate@hotmail.com

CERTIFICATE OF CALIBRATION

Certificate Number : C23-0301

Submitted by : SP Environment Development Co., Ltd.
: 69/1 Moo 1, Boh Kwang Thong, Boh Thong District,
: Chon Buri 20270

Description : PIPETTE

Manufacturer : Kimble

Model : -

Serial No. : -

Identification No. : -

Environment Condition : (20 ± 2) °C (50 ± 15) % RH.

Location of Calibration : Premier Calibrate Instrument Co.,Ltd.

Received date : 21 March 2023

Calibration date : 23 March 2023

Issue date : 24 March 2023

Calibration method :

This instrument was calibration by comparison directed against Eelectronic balance follow to ASTM E542-01

Reference standard instruments :

Instruments	Model	Serial No	Certificate No.	Due date	Traceable
Eelectronic balance	PA214	B418317946	STD22 - M005	03 Jun 2023	PCI

This certificate is traceable to International System of Unit (SI Unit) traceability at :-

PCI : Premier Calibrate Instrument Co., Ltd.(Calibration 0233)

Uncertainty :

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

Comment :

1. This result of calibration was found accurate as shown on date and plate of calibration only.
2. This certificate is not any commercial transaction

Calibration By
Phanaruj Thanthisakulphat

Approved by

Yanawit Bunrod

Technical manager

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This certificate shall not be reproduced except in full, without the prior written approval of the Premier calibrate instrument Co.,Ltd.

CERTIFICATE OF CALIBRATION

Issued By :



Premier Calibrate Instrument Co.,Ltd.

Certificate Number

C23-0301

Result of Calibration : Without adjustment

Capacity : 10 ml

Instrument Condition : Used Item

Resolution : 0.1 ml

UUC*	Standard	UUC*	Uncertainty
Setting	Reading	Error	of Measurement
(ml)	(ml)	(ml)	(± ml)
3.0	3.0015	-0.0015	0.0020
6.0	6.0018	-0.0018	0.0027
10.0	10.0022	-0.0022	0.0027

CERTIFICATE OF CALIBRATION

Certificate No.: G0-3101003/23

Page 1 of total 2 pages

Customer SP ENVIRONMENTAL DEVELOPMENT CO., LTD.
69/1 Moo 1, Boh Kwang Thong,
Boh Thong District, Chon Buri 20270, Thailand

Equipment Volumetric Flask

Manufacturer witeg

Model -

Serial No. -

ID No. F100-1

Description Capacity : 100 mL

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$

Relative Humidity: $(50 \pm 10) \%$

Atmospheric Pressure: 1010 hPa

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 31 January 2023

Calibration Date 31 January 2023

Date of Issue 2 February 2023

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.: G0-3101003/23

Page 2 of total 2 pages
Reference Method:

- The calibration method used was CP-175 based on an in-house method.
- 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.	Certificate No.	Due Date	Traceability
Analytical Balance	XPR206CDR	C009071943	I0-2302003/22	Feb. 22, 2023	THC
Liquid in Glass Thermometer	Total	9560	I0-0403006/22	Mar. 4, 2023	
Data Logger	EC850	20081204	I0-0601002/23	Jan. 8, 2024	
Barometer	MHB-382SD	AJ.96940	I0-2812001/22	Dec. 27, 2023	

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

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

Nominal Volume (mL)	Measured Volume (mL)	Uncertainty (± mL)	Coverage Factor, <i>k</i>
100	99.9813	0.012	2.00

Note : 1 mL = 1 cm³

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

- End of Certificate -

CERTIFICATE OF CALIBRATION

Certificate No.: G0-3101004/23

Page 1 **of total** 2 **pages**

Customer SP ENVIRONMENTAL DEVELOPMENT CO., LTD.
69/1 Moo 1, Boh Kwang Thong,
Boh Thong District, Chon Buri 20270, Thailand

Equipment	Volumetric Flask		
Manufacturer	witeg	Model	-
Serial No.	-	ID No.	F250-2
Description	Capacity : 250 mL		

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: 1010 hPa

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 31 January 2023

Calibration Date 31 January 2023

Date of Issue 2 February 2023

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 checked="" type="checkbox"/> (Onnapa P.)
<input type="checkbox"/> (Pongsak H.)	<input type="checkbox"/> (Nitiphong K.)
<input type="checkbox"/> (Kanung C.)	<input type="checkbox"/> (Nonthachai K.)
<input type="checkbox"/> (Pramong P.)	<input type="checkbox"/> (Noppol P.)

(Dr. Ekachai Puttitwong)

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Certificate No.: - G0-3101004/23

Page 2 of total 2 pages

Reference Method:

- The calibration method used was CP-175 based on an in-house method.
- 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.	Certificate No.	Due Date	Traceability
Precision Balance	XPR5003S	C016309237	I0-2302004/22	Feb. 22, 2023	THC
Liquid in Glass Thermometer	Total	9560	I0-0403006/22	Mar. 4, 2023	
Data Logger	EC850	20081204	I0-0601002/23	Jan. 8, 2024	
Barometer	MHB-382SD	AJ.96940	I0-2812001/22	Dec. 27, 2023	

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

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

Nominal Volume (mL)	Measured Volume (mL)	Uncertainty (± mL)	Coverage Factor, <i>k</i>
250	249.956	0.032	2.00

Note : 1 mL = 1 cm³

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

- End of Certificate -

CERTIFICATE OF CALIBRATION

Certificate No.: G0-3101005/23

Page 1 of total 2 pages

Customer SP ENVIRONMENTAL DEVELOPMENT CO., LTD.
69/1 Moo 1, Boh Kwang Thong,
Boh Thong District, Chon Buri 20270, Thailand

Equipment	Volumetric Flask		
Manufacturer	witeg	Model	-
Serial No.	-	ID No.	F1000-3
Description	Capacity : 1000 mL		

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: 1010 hPa

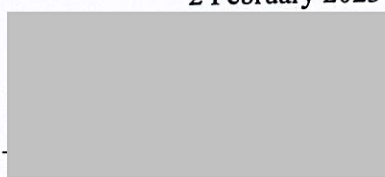
Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 31 January 2023

Calibration Date 31 January 2023

Date of Issue 2 February 2023

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)

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Certificate No.: G0-3101005/23

Page 2 of total 2 pages
Reference Method:

- The calibration method used was CP-175 based on an in-house method.
- 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.	Certificate No.	Due Date	Traceability
Precision Balance	XPR5003S	C016309237	I0-2302004/22	Feb. 22, 2023	THC
Liquid in Glass Thermometer	Total	9560	I0-0403006/22	Mar. 4, 2023	
Data Logger	EC850	20081204	I0-0601002/23	Jan. 8, 2024	
Barometer	MHB-382SD	AJ.96940	I0-2812001/22	Dec. 27, 2023	

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

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

Nominal Volume (mL)	Measured Volume (mL)	Uncertainty (± mL)	Coverage Factor, <i>k</i>
1000	999.975	0.12	2.00

Note : 1 mL = 1 cm³

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

- End of Certificate -

CERTIFICATE OF CALIBRATION

Certificate No.: G0-3101001/23

Page 1 of total 2 pages

Customer SP ENVIRONMENTAL DEVELOPMENT CO., LTD.
69/1 Moo 1, Boh Kwang Thong,
Boh Thong District, Chon Buri 20270, Thailand

Equipment	Cylinder	Model	-
Manufacturer	witeg	ID No.	C100-1
Serial No.	-		
Description	Capacity : 100 mL, Resolution : 1 mL		

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: 1010 hPa

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 31 January 2023

Calibration Date 31 January 2023

Date of Issue 2 February 2023

Checked by

Act as Technical Manager

Approved by

Representative of Managing Director

<input type="checkbox"/> (Krisyosl K.)	<input type="checkbox"/> (Sakda Y.)
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<input type="checkbox"/> (Pramong P.)	<input type="checkbox"/> (Noppol P.)

(Dr. Ekachai Puttitwong)

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Certificate No.: G0-3101001/23

Page 2 of total 2 pages

Reference Method:

- The calibration method used was CP-008 based on an in-house method.
- 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.	Certificate No.	Due Date	Traceability
Precision Balance	XPR5003S	C016309237	I0-2302004/22	Feb. 22, 2023	THC
Liquid in Glass Thermometer	Total	9560	I0-0403006/22	Mar. 4, 2023	
Data Logger	EC850	20081204	I0-0601002/23	Jan. 8, 2024	
Barometer	MHB-382SD	AJ.96940	I0-2812001/22	Dec. 27, 2023	

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

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

Nominal Volume (mL)	Measured Volume (mL)	Uncertainty (± mL)	Coverage Factor, <i>k</i>
100	99.807	0.020	2.11

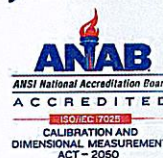
Note : 1 mL = 1 cm³

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

- End of Certificate -

Calibrated by Kittipong

REV.02 02/24/21



Certificate of Calibration

Certificate Number : SPR22120400-2

Page : 1 of 3

Customer : SP Environmental Development Co., Ltd

69/1 Moo 1 , Boh Kwang Thong, Boh Thong District, Chon Buri
20270, Thailand

Equipment Name : Electronic Balance

Manufacturer : Bel Engineering

Model : MA214A

Serial Number : CHA2000931

ID. Number : N/A

Environmental Conditions

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

Received Date : 27 Dec 2022

Relative Humidity : $60\% \pm 20\%$

Calibration Date : 09 Jan 2023

Location of Calibration : On-Site

Recommend Due Date : N/A

Calibration Procedure : SP-CPM-04-01

Date of Issue : 10 Jan 2023

Method of Calibration

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

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

Calibrated by : Mr.Sarawut Khitmai

Approved by : 

Calibration Officer

(Mr.Worapong Sinthusopa)

Authorized Signatory



Certificate Number : SPR22120400-2

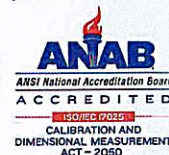
Page : 2 of 3

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Standard Weight Set	Class E2	B746971965	C02221902	16 Sep 2023

Traceability

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

SPC - SPC Calibration Center Co;Ltd.



Result of Calibration

Certificate No. : SPR22120400-2

Page : 3 of 3

Range capacity : 0 to 220 g

Resolution: 0.0001 g

Repeatability (n = 10 number of measurement)

Standard Weight (g)	Standard Deviation
200	0.0000

Departure of indication from nominal Value

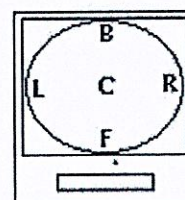
Unit : g

Nominal Value	UUC Reading	Error	Uncertainty (±)
No Load	0.0000	0.0000	0.000058
20.0	20.0000	0.0000	0.000064
40.0	40.0000	0.0000	0.000080
60.0	60.0000	0.0000	0.00011
80.0	80.0000	0.0000	0.00016
100.0	100.0000	0.0000	0.00016
120.0	120.0000	0.0000	0.00020
140.0	140.0000	0.0000	0.00020
160.0	160.0000	0.0000	0.00030
180.0	180.0000	0.0000	0.00030
200.0	200.0000	0.0000	0.00030

Off - Center Loading

Center	50.0000 g
Front	50.0000 g
Back	50.0000 g
Left	50.0000 g
Right	50.0000 g
Maximum difference	0.0000 g

A mass of 50 g was placed to various positions on the pan. The weighing machine reading error obtained is given in table.



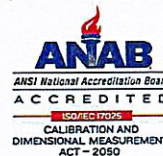
Note:

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 $k = 2$, providing a level of confidence approximately 95%

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR23020322-1

Page : 1 of 3

Customer : SP Environmental Development Co., Ltd

69/1 Moo 1 , Boh Kwang Thong, Boh Thong District, Chon Buri 20270,
Thailand

Equipment Name : Drying Oven

Manufacturer : Beijing Sci-Tech Development

Model : SOV 70B

Serial Number : KWF2018011001

ID. Number : N/A

Environmental Conditions

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

Received Date : 17 Feb 2023

Relative Humidity : 60 % \pm 20 %

Calibration Date : 20 Feb 2023

Location of Calibration : On-Site

Recommend Due Date : 20 Feb 2024

Calibration Procedure : SP-CPT-04-01

Date of Issue : 21 Feb 2023

Method of Calibration

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

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

Calibrated by : Mr.Navaporn Uengseng

Approved by :

Calibration Officer

(Mr.Nirut Loha)

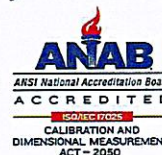
Authorized Signatory



Page : 2 of 3

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Data Acquisition/Switch Unit	34970A	MY44074688	SPR22120061-10	12 Jan 2024

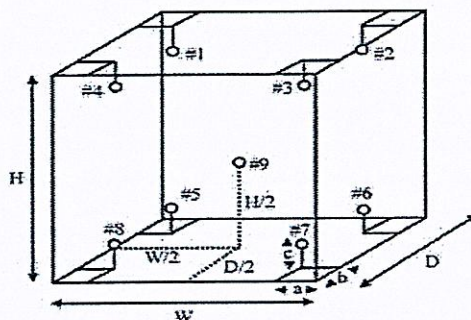
SP Metrology - SP Metrology system (Thailand) Co.Ltd.



Result of Calibration

Certificate No. : SPR23020322-1

Page : 3 of 3



Temperature Accuracy in the Measurement Zone.

Unit : °C

UUC Setting	Measured Temperature (°C) @ Probe No. (Probe No. 9 is REF.)									Uncertainty (±)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
104.0	103.90	103.78	103.93	104.01	103.83	103.93	103.76	103.90	103.84	0.26
150.0	149.23	149.21	148.86	149.44	148.69	148.73	148.93	148.82	149.14	0.26
180.0	179.42	180.29	180.21	179.76	179.22	180.21	180.11	179.24	179.49	0.26

Temperature Uniformity, Stability, Overall Variation

Unit : °C

UUC Setting	UUC Reading	Temperature Stability	Temperature Uniformity	Overall Variation
104.0	104.0	0.09	0.33	0.43
150.0	150.0	0.11	0.66	0.98
180.0	180.0	0.10	1.00	1.26

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 $k = 2$, providing a level of confidence approximately 95 %

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR23020322-2

Page : 1 of 3

Customer : SP Environmental Development Co., Ltd

69/1 Moo 1 , Boh Kwang Thong, Boh Thong District, Chon Buri 20270,
Thailand

Equipment Name : Refrigerator

Manufacturer : Koldtech

Model : MR600L-1D-R

Serial Number : 01771

ID. Number : N/A

Environmental Conditions

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

Received Date : 17 Feb 2023

Relative Humidity : $60\% \pm 20\%$

Calibration Date : 20 Feb 2023

Location of Calibration : On-Site

Recommend Due Date : 20 Feb 2024

Calibration Procedure : SP-CPT-04-01

Date of Issue : 21 Feb 2023

Method of Calibration

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

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

Calibrated by : Mr. Navaporn Uengseng

Approved by :

Calibration Officer

(Mr. Nirut Loha)

Authorized Signatory



Calibration Report

Certificate Number : SPR23020322-2

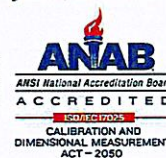
Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Data Acquisition/Switch Unit	34970A	MY44074688	SPR22120061-10	12 Jan 2024

Traceability

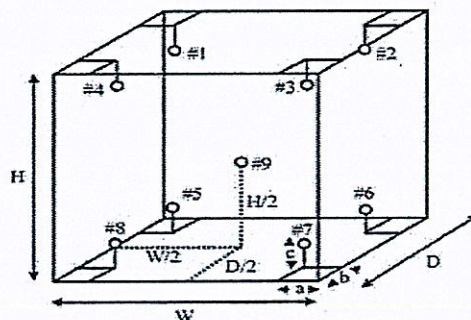
This certification is traceable to the International System of Unit maintained at :
SP Metrology - SP Metrology system (Thailand) Co.Ltd.



Result of Calibration

Certificate No. : SPR23020322-2

Page : 3 of 3



Temperature Accuracy in the Measurement Zone.

Unit : °C

UUC Setting	Measured Temperature (°C) @ Probe No. (Probe No. 9 is REF.)									Uncertainty (±)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
4.0	4.41	4.48	4.44	4.49	4.46	4.49	4.46	4.46	4.47	0.19

Temperature Uniformity, Stability, Overall Variation

Unit : °C

UUC Setting	UUC Reading	Temperature Stability	Temperature Uniformity	Overall Variation
4.0	4.0	0.09	0.20	0.26

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 $k = 2$, providing a level of confidence approximately 95 %

– End of Certificate –

CERTIFICATE OF CALIBRATION

Certificate No.: G0-3101001/23

Page 1 of total 2 pages

Customer SP ENVIRONMENTAL DEVELOPMENT CO., LTD.
69/1 Moo 1, Boh Kwang Thong,
Boh Thong District, Chon Buri 20270, Thailand

Equipment	Cylinder	Model	-
Manufacturer	witeg	ID No.	C100-1
Serial No.	-		
Description	Capacity : 100 mL, Resolution : 1 mL		

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: 1010 hPa

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 31 January 2023

Calibration Date 31 January 2023

Date of Issue 2 February 2023

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 checked="" type="checkbox"/> (Onnapa P.)
<input type="checkbox"/> (Pongsak H.)	<input type="checkbox"/> (Nitiphong K.)
<input type="checkbox"/> (Kanung C.)	<input type="checkbox"/> (Nonthachai K.)
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(Dr. Ekachai Puttitwong)

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Certificate No.: G0-3101001/23

Page 2 of total 2 pages

Reference Method:

- The calibration method used was CP-008 based on an in-house method.
- 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.	Certificate No.	Due Date	Traceability
Precision Balance	XPR5003S	C016309237	I0-2302004/22	Feb. 22, 2023	THC
Liquid in Glass Thermometer	Total	9560	I0-0403006/22	Mar. 4, 2023	
Data Logger	EC850	20081204	I0-0601002/23	Jan. 8, 2024	
Barometer	MHB-382SD	AJ.96940	I0-2812001/22	Dec. 27, 2023	

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

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

Nominal Volume (mL)	Measured Volume (mL)	Uncertainty (± mL)	Coverage Factor, <i>k</i>
100	99.807	0.020	2.11

Note : 1 mL = 1 cm³

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

- End of Certificate -

CERTIFICATE OF CALIBRATION

Certificate No.: G0-3101003/23

Page 1 of total 2 pages

Customer SP ENVIRONMENTAL DEVELOPMENT CO., LTD.
69/1 Moo 1, Boh Kwang Thong,
Boh Thong District, Chon Buri 20270, Thailand

Equipment	Volumetric Flask	Model	-
Manufacturer	witeg	ID No.	F100-1
Serial No.	-		
Description	Capacity : 100 mL		

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: 1010 hPa

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 31 January 2023

Calibration Date 31 January 2023

Date of Issue 2 February 2023

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.: G0-3101003/23

Page 2 of total 2 pages
Reference Method:

- The calibration method used was CP-175 based on an in-house method.
- 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.	Certificate No.	Due Date	Traceability
Analytical Balance	XPR206CDR	C009071943	I0-2302003/22	Feb. 22, 2023	THC
Liquid in Glass Thermometer	Total	9560	I0-0403006/22	Mar. 4, 2023	
Data Logger	EC850	20081204	I0-0601002/23	Jan. 8, 2024	
Barometer	MHB-382SD	AJ.96940	I0-2812001/22	Dec. 27, 2023	

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

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

Nominal Volume (mL)	Measured Volume (mL)	Uncertainty (± mL)	Coverage Factor, <i>k</i>
100	99.9813	0.012	2.00

Note : 1 mL = 1 cm³

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

- End of Certificate -

Calibrated by Kittipong

CERTIFICATE OF CALIBRATION

Certificate No.: G0-3101004/23

Page 1 **of total** 2 **pages**

Customer SP ENVIRONMENTAL DEVELOPMENT CO., LTD.
69/1 Moo 1, Boh Kwang Thong,
Boh Thong District, Chon Buri 20270, Thailand

Equipment	Volumetric Flask		
Manufacturer	witeg	Model	-
Serial No.	-	ID No.	F250-2
Description	Capacity : 250 mL		

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: 1010 hPa

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 31 January 2023

Calibration Date 31 January 2023

Date of Issue 2 February 2023

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 checked="" type="checkbox"/> (Onnapa P.)
<input type="checkbox"/> (Pongsak H.)	<input type="checkbox"/> (Nitiphong K.)
<input 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.: - G0-3101004/23

Page 2 of total 2 pages

Reference Method:

- The calibration method used was CP-175 based on an in-house method.
- 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.	Certificate No.	Due Date	Traceability
Precision Balance	XPR5003S	C016309237	I0-2302004/22	Feb. 22, 2023	THC
Liquid in Glass Thermometer	Total	9560	I0-0403006/22	Mar. 4, 2023	
Data Logger	EC850	20081204	I0-0601002/23	Jan. 8, 2024	
Barometer	MHB-382SD	AJ.96940	I0-2812001/22	Dec. 27, 2023	

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

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

Nominal Volume (mL)	Measured Volume (mL)	Uncertainty (± mL)	Coverage Factor, <i>k</i>
250	249.956	0.032	2.00

Note : 1 mL = 1 cm³

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

- End of Certificate -

CERTIFICATE OF CALIBRATION

Certificate No.: G0-3101005/23

Page 1 of total 2 pages

Customer SP ENVIRONMENTAL DEVELOPMENT CO., LTD.
69/1 Moo 1, Boh Kwang Thong,
Boh Thong District, Chon Buri 20270, Thailand

Equipment	Volumetric Flask	Model	-
Manufacturer	witeg	ID No.	F1000-3
Serial No.	-		
Description	Capacity : 1000 mL		

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: 1010 hPa

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 31 January 2023

Calibration Date 31 January 2023

Date of Issue 2 February 2023

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.: G0-3101005/23

Page 2 of total 2 pages
Reference Method:

- The calibration method used was CP-175 based on an in-house method.
- 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.	Certificate No.	Due Date	Traceability
Precision Balance	XPR5003S	C016309237	I0-2302004/22	Feb. 22, 2023	THC
Liquid in Glass Thermometer	Total	9560	I0-0403006/22	Mar. 4, 2023	
Data Logger	EC850	20081204	I0-0601002/23	Jan. 8, 2024	
Barometer	MHB-382SD	AJ.96940	I0-2812001/22	Dec. 27, 2023	

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

- THC, Thai Heart Calibration Co., Ltd.

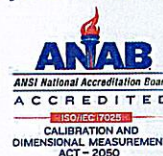
Measurement Results:

Nominal Volume (mL)	Measured Volume (mL)	Uncertainty (± mL)	Coverage Factor, <i>k</i>
1000	999.975	0.12	2.00

Note : 1 mL = 1 cm³

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

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR22120400-2

Page : 1 of 3

Customer : SP Environmental Development Co., Ltd

69/1 Moo 1 , Boh Kwang Thong, Boh Thong District, Chon Buri
20270, Thailand

Equipment Name : Electronic Balance

Manufacturer : Bel Engineering

Model : MA214A

Serial Number : CHA2000931

ID. Number : N/A

Environmental Conditions

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

Received Date : 27 Dec 2022

Relative Humidity : $60\% \pm 20\%$

Calibration Date : 09 Jan 2023

Location of Calibration : On-Site

Recommend Due Date : N/A

Calibration Procedure : SP-CPM-04-01

Date of Issue : 10 Jan 2023

Method of Calibration

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

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

Calibrated by : Mr.Sarawut Khitmai

Approved by :

Calibration Officer

(Mr.Worapong Sinthusopa)

Authorized Signatory



Calibration Report

Certificate Number : SPR22120400-2

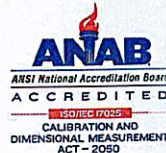
Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Standard Weight Set	Class E2	B746971965	C02221902	16 Sep 2023

Traceability

This certification is traceable to the International System of Unit maintained at :
SPC - SPC Calibration Center Co;Ltd.



Result of Calibration

Certificate No. : SPR22120400-2

Page : 3 of 3

Range capacity : 0 to 220 g

Resolution: 0.0001 g

Repeatability (n = 10 number of measurement)

Standard Weight (g)	Standard Deviation
200	0.0000

Departure of indication from nominal Value

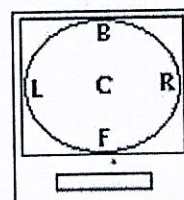
Unit : g

Nominal Value	UUC Reading	Error	Uncertainty (±)
No Load	0.0000	0.0000	0.000058
20.0	20.0000	0.0000	0.000064
40.0	40.0000	0.0000	0.000080
60.0	60.0000	0.0000	0.00011
80.0	80.0000	0.0000	0.00016
100.0	100.0000	0.0000	0.00016
120.0	120.0000	0.0000	0.00020
140.0	140.0000	0.0000	0.00020
160.0	160.0000	0.0000	0.00030
180.0	180.0000	0.0000	0.00030
200.0	200.0000	0.0000	0.00030

Off - Center Loading

Center	50.0000 g
Front	50.0000 g
Back	50.0000 g
Left	50.0000 g
Right	50.0000 g
Maximum difference	0.0000 g

A mass of 50 g was placed to various positions on the pan. The weighing machine reading error obtained is given in table.



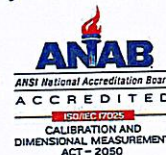
Note:

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 $k = 2$, providing a level of confidence approximately 95%

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR23020322-2

Page : 1 of 3

Customer : SP Environmental Development Co., Ltd

69/1 Moo 1 , Boh Kwang Thong, Boh Thong District, Chon Buri 20270,
Thailand

Equipment Name : Refrigerator

Manufacturer : Koldtech

Model : MR600L-1D-R

Serial Number : 01771

ID. Number : N/A

Environmental Conditions

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

Relative Humidity : $60\% \pm 20\%$

Location of Calibration : On-Site

Calibration Procedure : SP-CPT-04-01

Received Date : 17 Feb 2023

Calibration Date : 20 Feb 2023

Recommend Due Date : 20 Feb 2024

Date of Issue : 21 Feb 2023

Method of Calibration

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

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

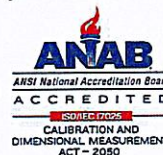
Calibrated by : Mr. Navaporn Uengseng

Calibration Officer

Approved by :

(Mr. Nirut Loha)

Authorized Signatory



Calibration Report

Certificate Number : SPR23020322-2

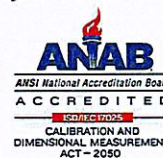
Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Data Acquisition/Switch Unit	34970A	MY44074688	SPR22120061-10	12 Jan 2024

Traceability

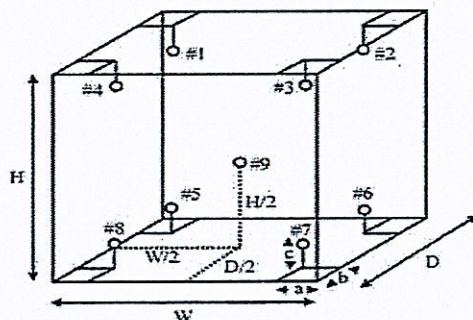
This certification is traceable to the International System of Unit maintained at :
SP Metrology - SP Metrology system (Thailand) Co.Ltd.



Result of Calibration

Certificate No. : SPR23020322-2

Page : 3 of 3



Temperature Accuracy in the Measurement Zone.

Unit : °C

UUC Setting	Measured Temperature (°C) @ Probe No. (Probe No. 9 is REF.)									Uncertainty (±)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
4.0	4.41	4.48	4.44	4.49	4.46	4.49	4.46	4.46	4.47	0.19

Temperature Uniformity, Stability, Overall Variation

Unit : °C

UUC Setting	UUC Reading	Temperature Stability	Temperature Uniformity	Overall Variation
4.0	4.0	0.09	0.20	0.26

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 $k = 2$, providing a level of confidence approximately 95 %

- End of Certificate -

PerkinElmer TruQ

Atomic Spectroscopy Standard



Certificate of Analysis

PerkinElmer Number: N0691579
Description: Multi-Element Standard
Matrix: 2% HNO₃
Lot Number: 57-208CRX1

Certification Date: JAN -- 2022

Expiration Date: JUL 30 2023

* Instrumental Analysis using ICP Spectrometer:

Analyte	Labeled	Measured	SRM	Analyte	Labeled	Measured	SRM
As	50.0 µg/mL	50.4 µg/mL	3103a*	Ni	10.0 µg/mL	10.1 µg/mL	3136*
K	50.0 µg/mL	50.5 µg/mL	3141a*	Sr	10.0 µg/mL	10.1 µg/mL	3153a*
La	10.0 µg/mL	10.1 µg/mL	3127a*	Zn	10.0 µg/mL	10.1 µg/mL	3168a*
Li	10.0 µg/mL	10.1 µg/mL	3129a*	Ba	1.00 µg/mL	1.00 µg/mL	3104a*
Mn	10.0 µg/mL	10.1 µg/mL	3132*	Mg	1.00 µg/mL	0.996 µg/mL	3131a*

* - indicates NIST SRM

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

Reference Multi: Lot# 4-39MJ, 3-168MJ

Refer to side 2 for details of certification.

Balances are calibrated with weight sets traceable to NIST.

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



PerkinElmer®

Certifying Officer: [Redacted]

PerkinElmer, Inc.

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

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

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

CERTIFICATE OF CALIBRATION

Certificate No.: G0-3101002/23

Page 1 of total 2 pages

Customer SP ENVIRONMENTAL DEVELOPMENT CO., LTD.
69/1 Moo 1, Boh Kwang Thong,
Boh Thong District, Chon Buri 20270, Thailand

Equipment Cylinder
Manufacturer: witeg **Model** -
Serial No. - **ID No.** C500-2
Description Capacity : 500 mL, Resolution : 5 mL

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: 1010 hPa

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 31 January 2023

Calibration Date 31 January 2023

Date of Issue 2 February 2023

Checked by

Act as Technical Manager

Approved by

Representative of Managing Director

(Dr. Ekachai Puttitwong)

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

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.: G0-3101002/23

Page 2 of total 2 pages
Reference Method:

- The calibration method used was CP-008 based on an in-house method.
- 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.	Certificate No.	Due Date	Traceability
Precision Balance	XPR5003S	C016309237	I0-2302004/22	Feb. 22, 2023	THC
Liquid in Glass Thermometer	Total	9560	I0-0403006/22	Mar. 4, 2023	
Data Logger	EC850	20081204	I0-0601002/23	Jan. 8, 2024	
Barometer	MHB-382SD	AJ.96940	I0-2812001/22	Dec. 27, 2023	

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

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

Nominal Volume (mL)	Measured Volume (mL)	Uncertainty (± mL)	Coverage Factor, <i>k</i>
500	499.229	0.067	2.00

Note : 1 mL = 1 cm³

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

- End of Certificate -

Calibrated by Kittipong

REV.02 02/24/21



PerkinElmer TruQ

Atomic Spectroscopy Standard

Certificate of Analysis

PerkinElmer Number: N9300221

Description: Instrument Calibration Standard 4

Matrix: 5% HNO₃

Lot Number: 58-169CRY1

Certification Date: MAY -- 2022

Expiration Date: NOV 30 2023

* Instrumental Analysis using ICP Spectrometer:

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

* - indicates NIST SRM

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

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

Refer to side 2 for details of certification.

Balances are calibrated with weight sets traceable to NIST.

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



Certifying Officer: _____

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

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Certificate of Calibration

Certificate Number : SPR22120400-2

Page : 1 of 3

Customer : SP Environmental Development Co., Ltd

69/1 Moo 1 , Boh Kwang Thong, Boh Thong District, Chon Buri
20270, Thailand

Equipment Name : Electronic Balance

Manufacturer : Bel Engineering

Model : MA214A

Serial Number : CHA2000931

ID. Number : N/A

Environmental Conditions

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

Received Date : 27 Dec 2022

Relative Humidity : $60\% \pm 20\%$

Calibration Date : 09 Jan 2023

Location of Calibration : On-Site

Recommend Due Date : N/A

Calibration Procedure : SP-CPM-04-01


Date of Issue : 10 Jan 2023

Method of Calibration

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

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

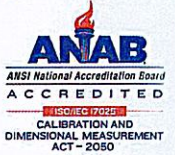
Calibrated by : Mr.Sarawut Khitmai

Approved by : 

Calibration Officer

(Mr.Worapong Sinthusopa)

Authorized Signatory



Calibration Report

Certificate Number : SPR22120400-2

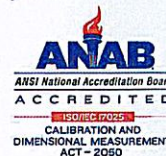
Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Standard Weight Set	Class E2	B746971965	C02221902	16 Sep 2023

Traceability

This certification is traceable to the International System of Unit maintained at :
SPC - SPC Calibration Center Co.,Ltd.



Result of Calibration

Certificate No. : SPR22120400-2

Page : 3 of 3

Range capacity : 0 to 220 g

Resolution: 0.0001 g

Repeatability (n = 10 number of measurement)

Standard Weight (g)	Standard Deviation
200	0.0000

Departure of indication from nominal Value

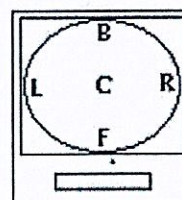
Unit : g

Nominal Value	UUC Reading	Error	Uncertainty (±)
No Load	0.0000	0.0000	0.000058
20.0	20.0000	0.0000	0.000064
40.0	40.0000	0.0000	0.000080
60.0	60.0000	0.0000	0.00011
80.0	80.0000	0.0000	0.00016
100.0	100.0000	0.0000	0.00016
120.0	120.0000	0.0000	0.00020
140.0	140.0000	0.0000	0.00020
160.0	160.0000	0.0000	0.00030
180.0	180.0000	0.0000	0.00030
200.0	200.0000	0.0000	0.00030

Off - Center Loading

Center	50.0000 g
Front	50.0000 g
Back	50.0000 g
Left	50.0000 g
Right	50.0000 g
Maximum difference	0.0000 g

A mass of 50 g was placed to various positions on the pan. The weighing machine reading error obtained is given in table.



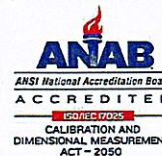
Note:

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 $k = 2$, providing a level of confidence approximately 95%

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR23020322-2

Page : 1 of 3

Customer : SP Environmental Development Co., Ltd

69/1 Moo 1 , Boh Kwang Thong, Boh Thong District, Chon Buri 20270,
Thailand

Equipment Name : Refrigerator

Manufacturer : Koldtech

Model : MR600L-1D-R

Serial Number : 01771

ID. Number : N/A

Environmental Conditions

Ambient Temperature : $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ Received Date : 17 Feb 2023

Relative Humidity : $60\% \pm 20\%$ Calibration Date : 20 Feb 2023

Location of Calibration : On-Site Recommend Due Date : 20 Feb 2024

Calibration Procedure : SP-CPT-04-01 Date of Issue : 21 Feb 2023

Method of Calibration

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

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

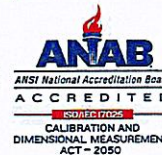
Calibrated by : Mr. Navaporn Uengseng

Approved by :

Calibration Officer

(Mr. Nirut Loha)

Authorized Signatory



Calibration Report

Certificate Number : SPR23020322-2

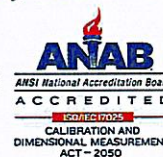
Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Data Acquisition/Switch Unit	34970A	MY44074688	SPR22120061-10	12 Jan 2024

Traceability

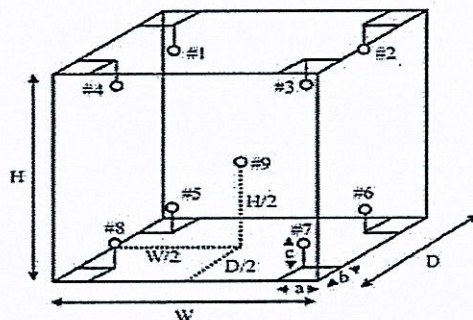
This certification is traceable to the International System of Unit maintained at :
SP Metrology - SP Metrology system (Thailand) Co.Ltd.



Result of Calibration

Certificate No. : SPR23020322-2

Page : 3 of 3



Temperature Accuracy in the Measurement Zone.

Unit : °C

UUC Setting	Measured Temperature (°C) @ Probe No. (Probe No. 9 is REF.)									Uncertainty (±)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
4.0	4.41	4.48	4.44	4.49	4.46	4.49	4.46	4.46	4.47	0.19

Temperature Uniformity, Stability, Overall Variation

Unit : °C

UUC Setting	UUC Reading	Temperature Stability	Temperature Uniformity	Overall Variation
4.0	4.0	0.09	0.20	0.26

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 $k = 2$, providing a level of confidence approximately 95 %

- End of Certificate -

CERTIFICATE OF CALIBRATION

Certificate No.: G0-3101009/23

Page 1 of total 2 pages

Customer SP ENVIRONMENTAL DEVELOPMENT CO., LTD.
69/1 Moo 1, Boh Kwang Thong,
Boh Thong District, Chon Buri 20270, Thailand

Equipment	Volumetric Pipette		
Manufacturer	witeg	Model	-
Serial No.	-	ID No.	P3-4
Description	Capacity : 3 mL		

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: 1013 hPa

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 31 January 2023

Calibration Date 31 January 2023

Date of Issue 2 February 2023

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.: G0-3101009/23

Page 2 of total 2 pages
Reference Method:

- The calibration method used was CP-174 based on an in-house method.
- 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.	Certificate No.	Due Date	Traceability
Analytical Balance	XPR206CDR	C009071943	I0-2302003/22	Feb. 22, 2023	THC
Liquid in Glass Thermometer	Total	9560	I0-0403006/22	Mar. 4, 2023	
Data Logger	EC850	20081204	I0-0601002/23	Jan. 8, 2024	
Barometer	MHB-382SD	AJ.96940	I0-2812001/22	Dec. 27, 2023	

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

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

Nominal Volume (mL)	Measured Volume (mL)	Uncertainty (± mL)	Coverage Factor, <i>k</i>
3	2.9957	0.00085	2.00

 Note : 1 mL = 1 cm³

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

- End of Certificate -

CERTIFICATE OF CALIBRATION

Certificate No.: G0-3101010/23

Page 1 **of total** 2 **pages**

Customer SP ENVIRONMENTAL DEVELOPMENT CO., LTD.
69/1 Moo 1, Boh Kwang Thong,
Boh Thong District, Chon Buri 20270, Thailand

Equipment	Volumetric Pipette		
Manufacturer	witeg	Model	-
Serial No.	-	ID No.	P4-5
Description	Capacity : 4 mL		

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: 1013 hPa

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 31 January 2023

Calibration Date 31 January 2023

Date of Issue 2 February 2023

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)

Certificate No.: G0-3101010/23

Page 2 of total 2 pages
Reference Method:

- The calibration method used was CP-174 based on an in-house method.
- 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.	Certificate No.	Due Date	Traceability
Analytical Balance	XPR206CDR	C009071943	I0-2302003/22	Feb. 22, 2023	THC
Liquid in Glass Thermometer	Total	9560	I0-0403006/22	Mar. 4, 2023	
Data Logger	EC850	20081204	I0-0601002/23	Jan. 8, 2024	
Barometer	MHB-382SD	AJ.96940	I0-2812001/22	Dec. 27, 2023	

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

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

Nominal Volume (mL)	Measured Volume (mL)	Uncertainty (± mL)	Coverage Factor, <i>k</i>
4	3.9912	0.00085	2.06

 Note : 1 mL = 1 cm³

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

- End of Certificate -

CERTIFICATE OF CALIBRATION

Certificate No.: G0-3101013/23

Page 1 of total 2 pages

Customer SP ENVIRONMENTAL DEVELOPMENT CO., LTD.
69/1 Moo 1, Boh Kwang Thong,
Boh Thong District, Chon Buri 20270, Thailand

Equipment Volumetric Pipette

Manufacturer witeg

Model -

Serial No. -

ID No. P100-8

Description Capacity : 100 mL

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: 1012 hPa

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 31 January 2023

Calibration Date 31 January 2023

Date of Issue 2 February 2023

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)

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Certificate No.: G0-3101013/23

Page 2 of total 2 pages

Reference Method:

- The calibration method used was CP-174 based on an in-house method.
- 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.	Certificate No.	Due Date	Traceability
Analytical Balance	XPR206CDR	C009071943	I0-2302003/22	Feb. 22, 2023	THC
Liquid in Glass Thermometer	Total	9560	I0-0403006/22	Mar. 4, 2023	
Data Logger	EC850	20081204	I0-0601002/23	Jan. 8, 2024	
Barometer	MHB-382SD	AJ.96940	I0-2812001/22	Dec. 27, 2023	

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

- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

Nominal Volume (mL)	Measured Volume (mL)	Uncertainty (± mL)	Coverage Factor, <i>k</i>
100	99.9314	0.012	2.00

Note : 1 mL = 1 cm³

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

- End of Certificate -

CERTIFICATE OF COMPLETION

This is to certify that

Duang Hiransuk

has completed the course

ICP Solid State RF Generator

17 May 2019

Date

Vinny Maharaj - Sr. Manager Service
Training

Certified by

CERTIFICATE OF COMPLETION

This is to certify that

Duang Hiransuk

has completed the course

ICP Basic Theory/Operation/Software

15 May 2019

Date

Vinny Maharaj - Sr. Manager Service
Training

Certified by

CERTIFICATE OF COMPLETION

This is to certify that

Duang Hiransuk

has completed the course

ICP Avio 200

22 May 2019

Date

Vinny Maharaj - Sr. Manager Service
Training

Certified by

PerkinElmer TruQ

Atomic Spectroscopy Standard



Certificate of Analysis

PerkinElmer Number: N0691579
Description: Multi-Element Standard
Matrix: 2% HNO₃
Lot Number: 7-263MFX1

Certification Date: OCT -- 2022
Expiration Date: APR 30 2024

* Instrumental Analysis using ICP Spectrometer:

Analyte	Labeled	Measured	SRM	Analyte	Labeled	Measured	SRM
As	50.0 µg/mL	49.8 µg/mL	3103a*	Ni	10.0 µg/mL	9.95 µg/mL	3136*
K	50.0 µg/mL	49.5 µg/mL	3141a*	Sr	10.0 µg/mL	9.96 µg/mL	3153a*
La	10.0 µg/mL	9.89 µg/mL	3127a*	Zn	10.0 µg/mL	9.96 µg/mL	3168a*
Li	10.0 µg/mL	9.91 µg/mL	3129a*	Ba	1.00 µg/mL	0.994 µg/mL	3104a*
Mn	10.0 µg/mL	9.91 µg/mL	3132*	Mg	1.00 µg/mL	0.995 µg/mL	3131a*

* - indicates NIST SRM

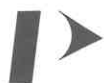
† - indicates CRM (when NIST SRM is not available)

Reference Multi: Lot# 57-138CR, 58-199CR

Refer to side 2 for details of certification.

Balances are calibrated with weight sets traceable to NIST.

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



PerkinElmer®

Certifying Officer: _____

PerkinElmer, Inc.

U.S.A. Tel: 1-203-925-4600
U.S.A. Toll Free: 1-800-762-4000

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

PerkinElmer TruQ

Atomic Spectroscopy Standard



Certificate of Analysis

PerkinElmer Number: N9300221
Description: Instrument Calibration Standard 4
Matrix: 5% HNO₃
Lot Number: 59-091CRY1

Certification Date: DEC - - 2022
Expiration Date: JUN 30 2024

* Instrumental Analysis using ICP Spectrometer:

Analyte	Labeled	Measured	SRM	Analyte	Labeled	Measured	SRM
As	100 µg/mL	100 µg/mL	3103a*	Pb	50.0 µg/mL	49.8 µg/mL	3128*
Tl	100 µg/mL	100 µg/mL	3158*	Se	50.0 µg/mL	50.1 µg/mL	3149*
Cd	50.0 µg/mL	50.0 µg/mL	3108*				

* - indicates NIST SRM

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

Reference Multi: Lot# 54-134CR, 57-156CR, 58-169CR

Refer to side 2 for details of certification.

Balances are calibrated with weight sets traceable to NIST.

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

Certifying Officer: _____



PerkinElmer, Inc.

U.S.A. Tel: 1-203-925-4600
U.S.A. Toll Free: 1-800-762-4000

MAINTENANCE AND IPV TEST CERTIFICATE MODEL

Avio 220

Customer :	<u>SP Pattana Environment</u>	Date Tested:	<u>September 15, 2023</u>
		Recommendation Recertification	
Address :	<u>69 moo1 Bo kwang thong</u>	Period	<u>6</u> Months
	<u>Bothong Chonburi</u>	Recertification Due:	<u>March 15, 2024</u>
	<u>20270</u>	Date Last Certified:	<u>March 16, 2023</u>
User Name:	<u>Tharawut</u>	Visit Number:	<u>1 of 2</u>
Phone:	<u>085-205-8787</u>	PerkinElmer Phone:	<u>02-719-6420 ext 206</u>
E - Mail :		PerkinElmer Fax:	<u>02-318-5597</u>

CONFIGURATION TESTED		
MODEL	SERIAL NUMBER	SOFTWARE
<u>Avio 220Max</u>	<u>M79S2103081</u>	
TESTED EQUIPMENT	CALIBRATION NUMBER	EXPIRATION
<u>IPV Method</u>		
TEST STANDARD USED	PART NUMBER	EXPIRATION DATE
<u>Multielement Standard</u>	<u>N069-1579</u>	<u>Apr 30,2024</u>
<u>Instrument Cal. STD4</u>	<u>N930-0221</u>	<u>Jun 30,2024</u>
CUSTOMER SUPPLIED	COMMENTS	CUSTOMER INITIALS
<u>2 % HNO3</u>		
<u>10 % HNO3</u>		

MAINTENANCE AND IPV TEST CERTIFICATE MODEL**Avio 220****SERIAL NUMBER:** M79S2103081**DATE TESTED:**September 15, 2023**1. MECHANICAL CHECKS**

A. Inspect and clean all fans and filters.

☐ OK

B. Inspect and replace as necessary, all torch components including the RF coil.

☐ OK

C. Inspect all tubing for sign of clacking or leaking.

☐ OK

D. Adjust water and gas pressure regulator settings.

☐ OK

E. Inspect and leak check pneumatics drawers.

☐ OK

F. Clean the exterior of the instrument.

☐ OK**2. OPTICAL CHECKS**

A. Inspect and clean all optical components.

☐ OK

B. As required, check and replace all purgefilters.

☐ OK

C. Recheck optical alignment.

☐ OK**3. COOLING SYSTEM CHECKS**

A. Perform preventive maintenance on chiller.

☐ OK

B. Flush out the chiller every year.

☐ OK**4. PERFORMANCE CHECKS**

A. Torch View Alignment.

☐ OK

B. Wavelength Calibration.

☐ OK

MAINTENANCE AND IPV TEST CERTIFICATE MODEL

Avio 220

SERIAL NUMBER: <u>M79S2103081</u>		DATE TESTED: <u>September 15, 2023</u>	
PARAMETER	SPECIFICATION		FINAL VALUE
Spectral Resolution : UV			
As	193.696 nm	≤ 0.009 nm	<u>0.00818</u> nm
Ni	231.604 nm	≤ 0.011 nm	<u>0.00890</u> nm
Ni	341.476 nm	≤ 0.015 nm	<u>0.01347</u> nm
Spectral Resolution : VIS			
Ba	455.403 nm	≤ 0.020 nm	<u>0.01822</u> nm
Precision			
Zn	206.200 nm	% RSD ≤ 1.0 %	<u>0.40</u> %
Mg	280.271 nm	% RSD ≤ 1.0 %	<u>0.14</u> %
Mg	285.213 nm	% RSD ≤ 1.0 %	<u>0.13</u> %
Ba	455.403 nm	% RSD ≤ 1.0 %	<u>0.24</u> %
Detection Limits : Axial			
Tl	190.801 nm	3(sd)	<u>6.61</u> ppb
As	193.696 nm	3(sd)	<u>2.32</u> ppb
Se	196.026 nm	3(sd)	<u>1.73</u>
Pb	220.353 nm	3(sd)	<u>0.98</u> ppb
Detection Limits : Radial			
As	193.696 nm	3(sd)	<u>10.24</u> ppb
Zn	213.857 nm	3(sd)	<u>0.10</u> ppb
Mn	257.610 nm	3(sd)	<u>0.06</u> ppb
La	379.478 nm	3(sd)	<u>0.38</u> ppb
Ba	455.403 nm	3(sd)	<u>0.04</u> ppb
Ba	493.408 nm	3(sd)	<u>0.09</u> ppb
BEC : Axial (IB X 1000)/(IS-IB)			
Mn	257.610 nm	≤ 30 ppb	<u>1.28</u> ppb
BEC : Radial (IB X 1000)/(IS-IB)			
Mn	257.610 nm	≤ 30 ppb	<u>3.16</u> ppb

**MAINTENANCE AND IPV TEST CERTIFICATE MODEL****Avio 220****SERIAL NUMBER:** M79S2103081**DATE TESTED:** September 15, 2023**Remarks :**

Commissioning follow as commissioning performance sheets.

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



meets



does not meet

the PerkinElmer Specifications listed on this certificate.

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

Service Department PerkinElmer Ltd.

Customer Service Engineer:

(

Duang Hiransuk

)

Service Engineer

Service Report

Work Order Number	Activity Code	Billing Type	Requested Start Date	Model	Serial Number
WO-02473014	Planned Maintenance	Contract	30/08/2566 21:41 น.	ICPN0790016	M79S2103081
Service Representative Name	Contract Number	Expiry Date	Equipment ID	System ID	
Hiransuk, Duang	SC-0035626589	19/06/2024	N/A	N/A	
UDI Number					
N/A					
Equipment Location			Bill To Name		
บริษัท เอสพีพัฒนาสิ่งแวดล้อม จำกัด อำเภอหนอง จังหวัดชลบุรี 10 20270 TH			บริษัท เอสพีพัฒนาสิ่งแวดล้อม จำกัด แขวงคลองสองต้นนุ่น เขตลาดกระบัง กรุงเทพฯ 10 5120 TH		
Customer Contact	Phone Number	Fax Number	Email	Purchase Order	
ธราวุฒิ แสงชูวงศ์	085-2058787	N/A	aomygod6017@gmail.com	PO 66 08-00 069	

Work Description		
PM Avio220 Cleaned Replace PM Kit Test Performance followed the procedure		
Start Date	End Date	Work Description
15/09/2023	15/09/2023	

Tools Used					
Quantity	Calibrated Tool	Description	Serial Number	Last Calibration Date	Next Calibration Date
*** No Calibrated Tools Used ***					

Material Used				
Part Number	Part Description	Note	Lot/Serial Number	Quantity
09920041	HOSE CLAMP 1/4 INCH ST STL			1
09995098	Spectrometer Air Filter			2
N0790436	Cyclonic/Conc Adj Injector O-Ring Kit			1
N0790439	Optical Kit Avio 200 w/Windows/O-Rings			1

Labour Details			
Part Number	Part Description	Start Date	Quantity
SV000013	Preventative maintenance	15/09/2023	4.5
SV000002	Service Travel		3.5

Work Complete		Customer Signature	Technician Signature
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		
PM/OQ/IPV Left with Customer			
Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		
		17/9/2566 ธราวุฒิ แสงชูวงศ์	17/9/2566 Hiransuk, Duang