ภาคผนวกที่ 5

เอกสารสอบเทียบความถูกต้องของเครื่องมือ

ภาคผนวกที่ 5.1 เอกสารสอบเทียบเครื่องมือตรวจวัดคุณภาพน้ำทิ้ง

ภาคผนวกที่ 5.1

เอกสารสอบเทียบเครื่องมือตรวจวัดคุณภาพน้ำทิ้ง

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025
CALIBRATION 0152

CERTIFICATE OF CALIBRATION

Certificate No. : 23-067793

Sample Code : 23-25874-001

Customer	:	บริษัท เอ็นไวร์โปร 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	:	pH Meter			
Manufacturer	:	HANNA instruments	Model	:	HI 2211
Serial No.	:	H0064643	ID No.	:	SV-TL.080/2560
Date of Receipt	:	22 June 2023	Date of Calibration	:	23 June 2023

Condition of Calibration

1. Environment

   1.1 Ambient temperature : 25.0 ± 2.5 °C 1.2 Relative humidity : 55.0 % ± 15.0 %

2. Calibration method

   In house method WI-CL-019: based on direct measurement by using standard voltage calibrator and using certified reference material (CRM).

3. Reference standard / Certified reference material

Instrument		ID No.	Certificate No.	Due Date
3.1 Voltage Calibrator		LB-AMC-01	22E3240	03 October 2023
3.2 Digital Thermometer		LB-TH-33	22-107027	02 October 2023
Certified Reference Material		Lot. No.	Ref No.	Expire Date
3.3 Buffer Solution pH	4.008	888850	PH216.L5	13 April 2025
3.4 Buffer Solution pH	6.985	888851	PH107.L5	13 April 2024
3.5 Buffer Solution pH	10.010	888852	PH220.L5	13 April 2024

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

   4.1 Instrument No. 3.1 through Technology Promotion Association (Thailand-Japan).

   4.2 Instrument No. 3.2 through Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

   4.3 Buffer Solution No. 3.3 and No. 3.5 traceable to CPA chem (through primary measurement method-Harned cell using calibrated thermometer, barometer, and nanovoltmeter Accredited laboratory ISO/IEC 17025 and ISO/IEC 17034).

   4.4 Buffer Solution No. 3.4 traceable to CPA chem (CPA RefN HARNED CELL LotN 61275737; CPA RefN HARNED CELL LotN 61273986 Accredited laboratory ISO/IEC 17025 and ISO/IEC 17034).

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 26 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. : 23-067793

Sample Code : 23-25874-001

Equipment	:	pH Meter	Resolution	:	0.01 pH ; 0.1 mV (± 399.9 mV), 1 mV (beyond ± 400 mV)
Manufacturer	:	HANNA instruments			
Serial No.	:	H0064643	Model	:	HI 2211
Range	:	-2.00 pH to 16.00 pH ; ±2000 mV	ID No.	:	SV-TL.080/2560

Results of Calibration

Part 1. DC Voltage measurement

pH Meter Serial No. : H0064643

Nominal Value	Applied DC Voltage	Average indicator reading		Uncertainty	Coverage factor
pH	mV	mV	pH	mV	*k*
0	414.113	414	0.00	± 0.59	2.00
4	177.477	177.5	4.00	± 0.083	2.00
7	0.000	0.1	7.00	± 0.083	2.00
10	-177.477	-177.3	10.00	± 0.083	2.00
14	-414.113	-414	14.00	± 0.59	2.00

Part 2. Performance of Electrode system

Electrode Manufacturer : HANNA instruments Model : HI1131

Electrode Serial No. : 0347487N

Two-Point Calibration at pH4 and pH7 Percent Slope : 99.4

Standard Buffer Solution	Average indicator reading		Error Value	Uncertainty	Coverage factor
pH (@ 25 °C)	pH	mV	pH	pH	*k*
4.008	4.02	167.1	0.012	± 0.011	2.00
6.985	7.00	-8.0	0.015	± 0.011	2.00

Two-Point Calibration at pH7 and pH10 Percent Slope : 97.3

Standard Buffer Solution	Average indicator reading		Error Value	Uncertainty	Coverage factor
pH (@ 25 °C)	pH	mV	pH	pH	*k*
6.985	7.00	-6.0	0.015	± 0.011	2.00
10.010	10.02	-180.2	0.010	± 0.011	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 -

THC Calibration Services
THAI HEART CALIBRATION CO., LTD.
111/21 Moo 5, Phraek Sa, Muang, Samut Prakan 10280
Tel. 0-2703-2163, 0-2757-8455, 0-2757-8496 Fax. 0-2757-8507

ACCREDITED ISO/IEC 17025 CALIBRATION LABORATORY AC-2695

CERTIFICATE OF CALIBRATION

Certificate No.: B0-0307014/23 **Page** 1 **of total** 2 **pages**

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

Equipment	Standard Weight		
Manufacturer	-	**Model**	-
Serial No.	-	**ID No.**	SV-TL.110/2562
Description	Size: 200 g, Quantity: 1 Pcs.		

Environmental Conditions	Ambient Temperature:	(20 ± 2) °C
	Relative Humidity:	(50 ± 10) %
	Atmospheric Pressure:	(1010 ± 10) mbar
Calibration Location	Gators Laboratory (BL)	
Received Date	3 July 2023	
Calibration Date	4 July 2023	
Date of Issue	5 July 2023	
Condition of Artifacts	Used conditions but can be calibrated	

Checked by _____ **Approved by** _____

Act as Technical Manager — 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.

Envirpro Co., Ltd.

Certificate No.: B0-0307014/23 **Page** 2 **of total** 2 **pages**

Reference Method:

- The calibration method used was CP-210 based on OIML R111-1:2004
- The conventional density of standard weight (E2) was estimated as 8,000 ± 30 kg/m3.
- 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 200 g	Class E2	B916537870	MM-0061-23	Mar. 28, 2025	NIMT

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:
- NIMT, National Institute of Metrology (Thailand).

Measurement Results:

Nominal Values	Conventional Mass		Uncertainty of Measurement	Maximum Permissible Error of Class F1 (MPE)
	Before Adjustment	After Adjustment		
200 g	200 g +0.12 mg	-	± 0.33 mg	± 1.0 mg

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 Amorn

Envimpo Co., Ltd.

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025
CALIBRATION 0152

CERTIFICATE OF CALIBRATION

Certificate No. : 23-067802

Sample Code : 23-25875-003

Customer	:	บริษัท เอ็นไวร์โปร 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	:	Burette		
Manufacturer	:	witeg	Class	: A
Serial No.	:	N/A	ID No.	: SV-TL.115/2564
Date of Receipt	:	20 June 2023	Date of Calibration	: 28 June 2023

Condition of Calibration

1. Environment
   - 1.1 Ambient Temperature : 20 °C ± 2.5 °C
   - 1.2 Atmospheric Pressure : 1013 hPa ± 8 hPa
   - 1.3 Relative Humidity : 50 % ± 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-11	23-043823	04 May 2024
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

Issue date : 29 June 2023

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

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).

Enviro Co., Ltd.

REPORT OF CALIBRATION

Certificate No. : 23-067802

Sample Code : 23-25875-003

Equipment	:	Burette	Capacity	:	50 ml
Manufacturer	:	witeg	Class	:	A
Serial No.	:	N/A	ID No.	:	SV-TL.115/2564

Results of Calibration

Calibration results without adjustment.

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

SI Unit cm^3 = ml

Nominal value	(ml)	25	50
Average reading	(ml)	25.04883	50.0680
Standard deviation	(ml)	0.00506	0.0011
Error value	(ml)	-0.04883	-0.0680
Uncertainty	± (ml)	0.010	0.010
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 -

Enviro Co., Ltd.

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025
CALIBRATION 0152

CERTIFICATE OF CALIBRATION

Certificate No. : 23-067813

Sample Code : 23-25875-014

Customer : บริษัท เอ็นไวร์โปร 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 : PYREX — Class : A

Serial No. : N/A — ID No. : SV-TL.035/2555

Date of Receipt : 20 June 2023 — Date of Calibration : 27 June 2023

Condition of Calibration

1. Environment
   - 1.1 Ambient Temperature : 20 °C ± 2.5 °C
   - 1.2 Atmospheric Pressure : 1013 hPa ± 8 hPa
   - 1.3 Relative Humidity : 50 % ± 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 : Miss Latthawan Phuchiwon
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).

Enviro Co., Ltd.

REPORT OF CALIBRATION

Certificate No. : 23-067813

Sample Code : 23-25875-014

Equipment	:	Cylinder	Capacity	:	100 ml
Manufacturer	:	PYREX	Class	:	A
Serial No.	:	N/A	ID No.	:	SV-TL.035/2555

Results of Calibration

Calibration results without adjustment.

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

SI Unit cm^3 = ml

Nominal value	(ml)	50	100
Average reading	(ml)	50.534	100.386
Standard deviation	(ml)	0.009	0.015
Error value	(ml)	-0.534	-0.386
Uncertainty	± (ml)	0.048	0.049
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 -

Enviro Co., Ltd.

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025
CALIBRATION 0152

CERTIFICATE OF CALIBRATION

Certificate No. : 23-067815

Sample Code : 23-25875-016

Customer : บริษัท เอ็นไวร์โปร 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 °C ± 2.5 °C
   - 1.2 Atmospheric Pressure : 1013 hPa ± 8 hPa
   - 1.3 Relative Humidity : 50 % ± 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).

Enviro Co., Ltd.

REPORT OF CALIBRATION

Certificate No. : 23-067815

Sample Code : 23-25875-016

Equipment	:	Cylinder	Capacity	:	1000 ml
Manufacturer	:	witeg	Class	:	A
Serial No.	:	N/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 cm^3 = 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	± (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 -

Enviro Co., Ltd.

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025
CALIBRATION 0152

CERTIFICATE OF CALIBRATION

Certificate No. : 23-067806

Sample Code : 23-25875-007

Customer	:	บริษัท เอ็นไวร์โปร 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	:	Volumetric flask		
Manufacturer	:	witeg	Class	: A
Serial No.	:	N/A	ID No.	: SV-TL.063/2559
Date of Receipt	:	20 June 2023	Date of Calibration	: 27 June 2023

Condition of Calibration

1. Environment
   - 1.1 Ambient Temperature : 20 °C ± 2.5 °C
   - 1.2 Atmospheric Pressure : 1013 hPa ± 8 hPa
   - 1.3 Relative Humidity : 50 % ± 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-21	22-074908	17 July 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 : Miss Latthawan Phuchiwon
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).

Enviro Co., Ltd.

REPORT OF CALIBRATION

Certificate No. : 23-067806

Sample Code : 23-25875-007

Equipment	:	Volumetric flask	Capacity	:	100 ml
Manufacturer	:	witeg	Class	:	A
Serial No.	:	N/A	ID No.	:	SV-TL.063/2559

Results of Calibration

Calibration results without adjustment.

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

SI Unit cm^3 = ml

Nominal value	(ml)	100
Average reading	(ml)	100.03391
Standard deviation	(ml)	0.00336
Error value	(ml)	-0.03391
Uncertainty	± (ml)	0.018
Coverage factor	(*k*)	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 -

Enviro Co., Ltd.

AMARC | ASIA MEDICAL AND AGRICULTURAL LABORATORY AND RESEARCH CENTER

NSC-TISI-TIS17025
CALIBRATION 0152

CERTIFICATE OF CALIBRATION

Certificate No. : 23-067816

Sample Code : 23-25875-017

Customer : บริษัท เอ็นไวร์โปร 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 : Volumetric pipette

Manufacturer : witeg | Class : A

Serial No. : N/A | ID No. : SV-TL.058/2559

Date of Receipt : 20 June 2023 | Date of Calibration : 28 June 2023

Condition of Calibration

1. Environment
   - 1.1 Ambient Temperature : 20 °C ± 2.5 °C
   - 1.2 Atmospheric Pressure : 1013 hPa ± 8 hPa
   - 1.3 Relative Humidity : 50 % ± 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-17	22-074907	17 July 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 : Miss Latthawan Phuchiwon, 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).

Enviro Co., Ltd.

REPORT OF CALIBRATION

Certificate No. : 23-067816

Sample Code : 23-25875-017

Equipment	:	Volumetric pipette	Capacity	:	100 ml
Manufacturer	:	witeg	Class	:	A
Serial No.	:	N/A	ID No.	:	SV-TL.058/2559

Results of Calibration

Calibration results without adjustment.

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

SI Unit cm^3 = ml

Nominal value	(ml)	100
Average reading	(ml)	99.96752
Standard deviation	(ml)	0.00880
Error value	(ml)	0.03248
Uncertainty	± (ml)	0.018
Coverage factor	(*k*)	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 -

Envimpro Co., Ltd.

CLC
Accredited
ISO/IEC 17025

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

ilac-MRA
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ISO/IEC 17025
CALIBRATION AND DIMENSIONAL MEASUREMENT
ACDM-2814

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

@clccalibration

Envirpro Co., Ltd.

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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

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ANSI National Accreditation Board
ACCREDITED
ISO/IEC 17025
CALIBRATION AND DIMENSIONAL MEASUREMENT
ACDM-2814

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 ± 2) °C **Relative Humidity : (55 ± 10) %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%.

@clccalibration

Enviro Co., Ltd.

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

Environ Co.,Ltd.

ITSS
CALIBRATION LABORATORY
Inter Temp Service and Supply Co., Ltd.
11 Moo 4 Klongsongton-noon, Ladkrabang, Bangkok 10520 Thailand
Tel: +66 (0) 2557 1073 Fax: +66 (0) 2557 1074 http://www.itsscallab.com

NSC-TISI-TIS 17025
CALIBRATION 0134

CALIBRATION CERTIFICATE

Issued Date : **25 July 2023**
Site Calibration

Certificate No .: 23S0216
Order Item No.: 2307-085

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

Instrument Name : Hot Air Oven
Model : UM 400
Serial No. : b402.1449
ID No. : SV-TL.004/2546
Manufacturer : Memmert
Receipt Date : 20 July 2023
Calibration Date : 20 July 2023

Location of Calibration : Analysis Laboratory 1, 3rd floor, ENVIRPRO CO., LTD.
168/28 Nakniwas Rd., Ladprao,
Bangkok 10230

Environmental Conditions : Temperature 25 °C ± 15 °C
: Relative Humidity 55 % ± 25 %

Calibration Method Used :

This instrument was calibrated by measured temperature with standard data acquisition unit with RTD Sensor in difference location of chamber. The position of sensor installation and calibration procedure refer to TLAS G-20.

Traceability of Measurement :

This Calibration Certificate is traceble to international and/or national standards which realize the units of measurement according to the International System of Units (SI) as follows:
- The calibration laboratory of Inter Temp Service & Supply Co., Ltd.

Calibrated by : Mr. Surachai Russamee

Approved by :

(Mr. Pornsak Anuchartibud)
Laboratory Manager

The uncertainties are for confidence probability of approximately 95%.

This certificate may not be reproduced other than in full, except with the prior written approval of the Laboratory Manager of Inter Temp Service and Supply Co., Ltd.

Envirpro Co., Ltd.

ITSS

Details of Calibration

1. Reference Standard Equipment Used :

Equipment	Mfg/Model	Serial No.	Cert. No.	Due Date
Data Acquisition	Agilent/34970A	MY44080357	23T1393	20 April 2024
Multiplexer Module	Agilent/34901A	MY60009545	23T1393	20 April 2024
RTD Sensor	Thermology/Pt100	Lab213/01 to Lab213/10	23T1393	20 April 2024

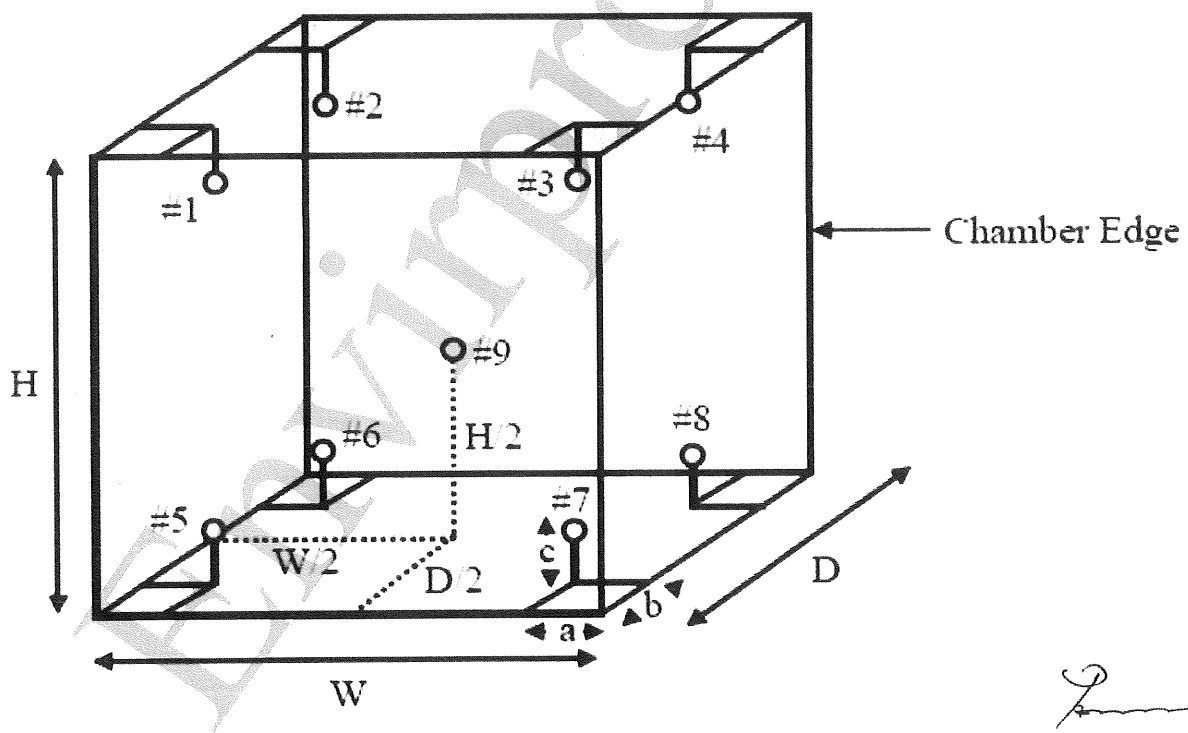
2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.
3. Condition of calibration item : normal condition, no indication for any damage or mulfunction
4. Internal Dimension of Chamber (W x H x D) = 40 cm. x 40 cm. x 30 cm.
5. Sensors at each corner and wall ; a , b , c are approximately 5 cm. to 10 cm.

Result of Calibration

Function : Temperature Generator **(Without Adjustment)**

Environmental of Calibration

	Initial	End
Temperature	27.4 °C	26.0 °C
Relative Humidity	56 %	51 %
AC Line Voltage	227.5 V	227.8 V



Enviro Co., Ltd.

Uncertainty of Measurement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with NAC requirements.

Result of Calibration

Function : Temperature Generator **(Without Adjustment)**

Reporting of Temperature Distribution

Calibration Point (°C)	Measured Temperature (°C) @ Probe No. (Probe No.#9 is REF)									Uncertainty of Meas. (± °C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
140.0	141.857	142.975	142.427	140.673	142.188	144.214	142.173	143.168	143.943	0.89

Reporting of Temperature Enclosure Performance

Setting Temperature (°C)	Indicating Temperature (°C)	Measured* Uniformity (°C)	Measured** Stability (± °C)	Overall*** Variation (°C)
140.0	140.0	3.310	0.160	3.630

Measured Uniformity*

The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location (# 9) which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions.
The reference sensor should preferably be located at the geometric center of the chamber.

Measured Stability**

One-half of the greatest maximum difference of measured temperatures at any one sensor, for at least half an hour after reaching steady state or after one achieved complete cycle of control whichever comes first.
The specific check of temperature stability at specific positions or locations of working space within the chamber according to the way of use should be specified.

Overall Variation***

The difference of the maximum and the minimum measured temperatures throughout observation time.

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Enviro Co., Ltd.

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Inter Temp Service and Supply Co., Ltd.
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NSC-TISI-TIS 17025
CALIBRATION 0134

CALIBRATION CERTIFICATE

Issued Date : **25 July 2023**
Site Calibration

Certificate No .: 23S0217
Order Item No.: 2307-085

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

Instrument Name : Hot Air Oven
Model : UFE 400
Serial No. : G410.0133
ID No. : SV-TL.021/2553
Manufacturer : Memmert
Receipt Date : 20 July 2023
Calibration Date : 20 July 2023

Location of Calibration : Analysis Laboratory 1, 3rd floor, ENVIRPRO CO., LTD.
168/28 Nakniwas Rd., Ladprao,
Bangkok 10230

Environmental Conditions : Temperature 25 °C ± 15 °C
: Relative Humidity 55 % ± 25 %

Calibration Method Used :

This instrument was calibrated by measured temperature with standard data acquisition unit with RTD Sensor in difference location of chamber. The position of sensor installation and calibration procedure refer to TLAS G-20.

Traceability of Measurement :

This Calibration Certificate is traceble to international and/or national standards which realize the units of measurement according to the International System of Units (SI) as follows:
- The calibration laboratory of Inter Temp Service & Supply Co., Ltd.

Calibrated by : Mr. Surachai Russamee

Approved by :

(Mr. Pornsak Anuchartibud)
Laboratory Manager

The uncertainties are for confidence probability of approximately 95%.

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Enviro Co., Ltd.

ITSS

Details of Calibration

1. Reference Standard Equipment Used :

Equipment	Mfg/Model	Serial No.	Cert. No.	Due Date
Data Acquisition	Agilent/34970A	MY44080357	23T1393	20 April 2024
Multiplexer Module	Agilent/34901A	MY41003378	23T1393	20 April 2024
RTD Sensor	Thermology/Pt100	Lab129/01 to Lab129/10	23T1393	20 April 2024

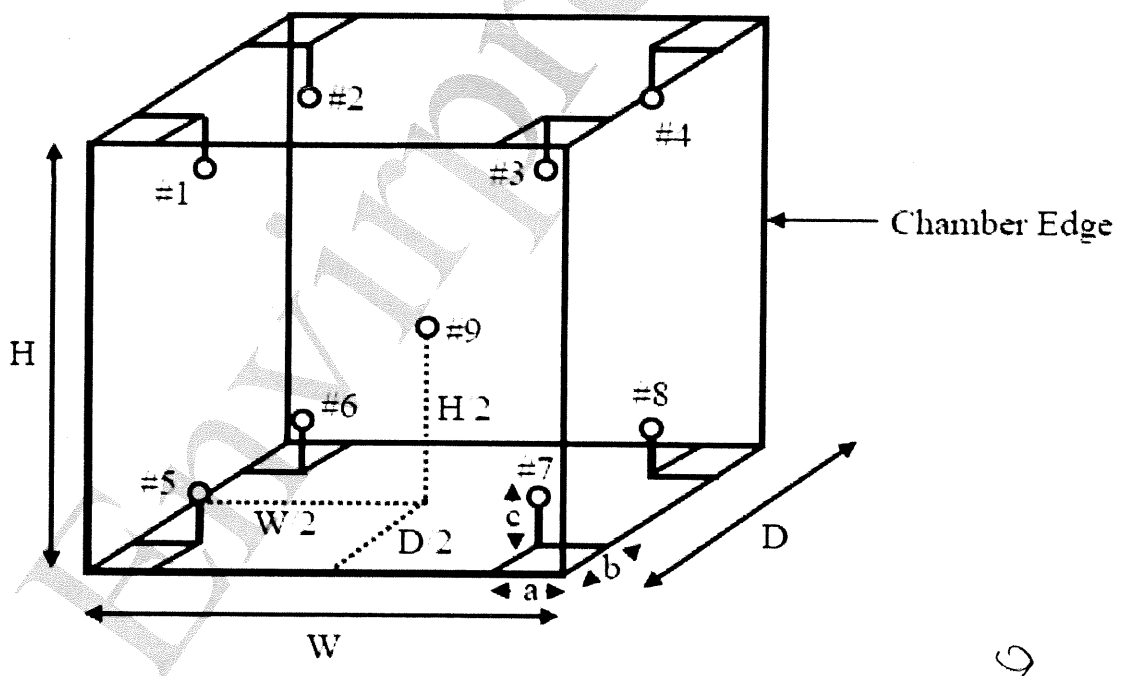
2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.
3. Condition of calibration item : normal condition, no indication for any damage or mulfunction
4. Internal Dimension of Chamber (W x H x D) = 40 cm. x 40 cm. x 30 cm.
5. Sensors at each corner and wall ; a , b , c are approximately 5 cm. to 10 cm.

Result of Calibration

Function : Temperature Generator **(Without Adjustment)**

Environmental of Calibration

	Initial	End
Temperature	27.2 °C	26.3 °C
Relative Humidity	55 %	54 %
AC Line Voltage	227.5 V	227.8 V



Enviro Co., Ltd.

Uncertainty of Measurement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with NAC requirements.

Result of Calibration

Function : Temperature Generator **(Without Adjustment)**

Reporting of Temperature Distribution

Calibration Point (°C)	Measured Temperature (°C) @ Probe No. (Probe No.#9 is REF)									Uncertainty of Meas. (± °C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
104.0	104.243	103.902	103.624	104.037	103.942	103.681	103.886	104.119	103.772	0.35
180.0	181.172	180.547	179.618	180.528	180.866	180.232	180.152	181.009	180.269	0.68

Reporting of Temperature Enclosure Performance

Setting Temperature (°C)	Indicating Temperature (°C)	Measured* Uniformity (°C)	Measured** Stability (± °C)	Overall*** Variation (°C)
103.5	103.5	0.490	0.060	0.690
180.0	180.0	0.940	0.190	1.720

Measured Uniformity*

The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location (# 9) which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions.
The reference sensor should preferably be located at the geometric center of the chamber.

Measured Stability**

One-half of the greatest maximum difference of measured temperatures at any one sensor, for at least half an hour after reaching steady state or after one achieved complete cycle of control whichever comes first. The specific check of temperature stability at specific positions or locations of working space within the chamber according to the way of use should be specified.

Overall Variation***

The difference of the maximum and the minimum measured temperatures throughout observation time.

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CALIBRATION AND DIMENSIONAL MEASUREMENT
ACDM-2814

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE	:	DISSOLVED OXYGEN METER
MANUFACTURER	:	YSI
MODEL / TYPE	:	5000-115/5010
SERIAL NO.	:	17C104148/17C100383[SV-TL.079/2560]
CLID. NO.	:	272101627
JOB CONTROL NO.	:	230711075584

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

DATE OF RECEIVED : 11 July 2023

DATE OF ISSUED : 13 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 : Sukgasem Seehanart
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
13 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. Q23075584

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CALIBRATION AND DIMENSIONAL MEASUREMENT
ACDM-2814

REPORT OF CALIBRATION

FOR

NOMENCLATURE	:	DISSOLVED OXYGEN METER
MANUFACTURER	:	YSI
MODEL / TYPE	:	5000-115/5010
SERIAL NO.	:	17C104148/17C100383[SV-TL.079/2560]
DATE OF CALIBRATION	:	12 July 2023

ENVIRONMENT CONDITIONS :

Temperature : (25 ± 2.5) °C Relative Humidity : (50 ± 15) %RH

PROCEDURE USED :

This instrument was calibrated under procedure No. **CLC-CPCH-06.** The calibration was performed by direct measurement with Certified Reference Material (CRM).

REFERENCE STANDARD USED :

Dissolved Oxygen, Sigma-Alorich Product ID QC3077-500ML .

TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Merck Co., Ltd.

Lot LRAD0713.01 , Due Date September 2023.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2{,}00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q23075584

@clccallbration

Environro Co., Ltd.

CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment ( ) adjustment

The table in the following gives the calibration results and associated measurement uncertainties of Dissolved Oxygen Meter.

CALIBRATION DATA

Nominal Value (mg/L)	DUC Reading (mg/L)	Correction (mg/L)	Uncertainty (mg/L)
5.91	5.94	-0.03	± 0.22

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 008 Page 4 of 54

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

Envirpro Co., Ltd.

End of Certificate

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CALIBRATION LABORATORY CO., LTD.

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CALIBRATION 0059
CLC

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE	:	LIQUID IN GLASS THERMOMETER
MANUFACTURER	:	AA PRECISION
MODEL / TYPE	:	[-5]-250 °C
SERIAL NO.	:	12775[SV-TL.025/2554]
CLID. NO.	:	232102157
JOB CONTROL NO.	:	230711075581

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 : Monthira Treechum
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. Q23075581

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Envirpro Co., Ltd.

CALIBRATION LABORATORY CO., LTD.
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CALIBRATION 0059
CLC

REPORT OF CALIBRATION

FOR

NOMENCLATURE	:	**LIQUID IN GLASS THERMOMETER**
MANUFACTURER	:	**AA PRECISION**
MODEL / TYPE	:	**[-5]-250 °C**
SERIAL NO.	:	**12775[SV-TL.025/2554]**
DATE OF CALIBRATION	:	**13 July 2023**

ENVIRONMENT CONDITIONS :

Temperature : (23 ± 2) °C **Relative Humidity :** (55 ± 10) % RH

PROCEDURE USED :

This instrument was calibrated under procedure No. **WI-305-64** based on **ASTM E 77 : 2014** as calibration guidelines.

The calibration was performed by comparison with Calibration Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Calibration Bath, Kambic Model OB-22/2 ULT,OB-22/2 S/N. 17115653,17115654.

2. Precision Thermometer, ASL Model F200-A-8 S/N. 014433/03 with IPRT S/N. PO106346-1-13,L0193A-1-1, L1123A-1-5,H0191A ITEM6/12.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co., Ltd. Certificate No. Q22130792,Q22127844. Due Date 05 January 2024,21 December 2023.

2. The measurements are traceable to International System of Units (SI) , through Thailand Institute of Scientific and Technological Research (TISTR) and National Institute of Metrology (Thailand).
Certificate No. PSL-T 0010/66,TT-0020-23,TT-0166-22,TT-0145-22,TT-0004-23.
Due Date 06 November 2023,22 February 2024,01 December 2023,09 November 2023,12 January 2024.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2{,}00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

@clccalibration

CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment ( ) adjustment

The DUC Reading were recorded and the means value were reported of four times measurement in the table below.

CALIBRATION DATA

CORRECTION OF TEMPERATURE

STD Reading (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty ± (°C)
84.88	85.0	- 0.12	0.13
150.04	150.0	+ 0.04	0.17

Range : -5 °C to 250 °C

Graduation : 0.5 °C

Immersion Type : Total Immersion.

Correction of Reference Temperature (0 °C) = 0.1 °C

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 39 of 138

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

Enviropro Co., Ltd.

End of Certificate

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CALIBRATION LABORATORY CO., LTD.

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NSC-TISI-TIS 17025
CALIBRATION 0059
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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE	:	DIGITAL THERMOHYGRO METER
MANUFACTURER	:	TESTO
MODEL / TYPE	:	608-H1
SERIAL NO.	:	66122327[SV-TL.012/2546]
CLID. NO.	:	232102147
JOB CONTROL NO.	:	230711075576

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

DATE OF RECEIVED : 11 July 2023 DATE OF ISSUED : 18 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 : Tanawan Seenam-Ngoen
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
18 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. Q23075576

@clccalibration

Environ Co., Ltd.

CALIBRATION LABORATORY CO., LTD.
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
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NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

REPORT OF CALIBRATION

FOR

NOMENCLATURE	:	DIGITAL THERMOHYGRO METER
MANUFACTURER	:	TESTO
MODEL / TYPE	:	608-H1
SERIAL NO.	:	66122327[SV-TL.012/2546]
DATE OF CALIBRATION	:	14 July 2023

ENVIRONMENT CONDITIONS :

Temperature : (23 ± 2) °C **Relative Humidity :** (55 ± 10) %RH

PROCEDURE USED :

This instrument was calibrated under procedure No. **WI-305-74**. The calibration was performed by using Chilled Mirror Hygrometer and Temperature & Humidity Chamber which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, Edgetech Model Dew Master S/N. 36151.

Temperature & Humidity Chamber, PGC Model 9141-5114 S/N.0802282.

TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Thunder Scientific Corporation. Certificate No. 21028, Due Date 09 December 2023.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2{,}00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Environ Co., Ltd.

CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment ( ) adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring digital thermohygro meter.

CALIBRATION DATA

1. CORRECTION OF TEMPERATURE

Test point (°C)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty ±(°C)
22.0	22.01	22.0	+0.01	0.40
25.0	25.01	24.8	+0.21	
28.0	28.02	27.8	+0.22	

2. CORRECTION OF HUMIDITY

STD Temperature (°C)	STD Reading (%RH)	DUC Reading (%RH)	Correction (%RH)	Uncertainty ± (%RH)
25	40.01	45.1	-5.09	1.20
25	49.99	55.8	-5.81	1.20
25	59.99	66.6	-6.61	1.40

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 48 of 138

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

End of Certificate

Environ Co., Ltd.

CALIBRATION LABORATORY CO., LTD.
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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com

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Accredited
ISO/IEC 17025

NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE	:	DIGITAL THERMOHYGRO METER
MANUFACTURER	:	TESTO
MODEL / TYPE	:	608-H1
SERIAL NO.	:	30117665[SV-TL.014/2548]
CLID. NO.	:	232102149
JOB CONTROL NO.	:	230711075577

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

DATE OF RECEIVED : 11 July 2023

DATE OF ISSUED : 18 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 : Tanawan Seenam-Ngoen
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
18 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. Q23075577

F3-011-04/01-12

@clccalibration

Envirpro Co., Ltd.

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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

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THAILAND
NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

REPORT OF CALIBRATION

FOR

NOMENCLATURE	:	DIGITAL THERMOHYGRO METER
MANUFACTURER	:	TESTO
MODEL / TYPE	:	608-H1
SERIAL NO.	:	30117665[SV-TL.014/2548]
DATE OF CALIBRATION	:	14 July 2023

ENVIRONMENT CONDITIONS :

Temperature : (23 ± 2) °C **Relative Humidity :** (55 ± 10) %RH

PROCEDURE USED :

This instrument was calibrated under procedure No. **WI-305-74**. The calibration was performed by using Chilled Mirror Hygrometer and Temperature & Humidity Chamber which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, Edgetech Model Dew Master S/N. 36151.

Temperature & Humidity Chamber, PGC Model 9141-5114 S/N.0802282.

TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Thunder Scientific Corporation.

Certificate No. 21028, Due Date 09 December 2023.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2{,}00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Environ Co., Ltd.

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CALIBRATION LABORATORY CO., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
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CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment ( ) adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring digital thermohygro meter.

CALIBRATION DATA

1. CORRECTION OF TEMPERATURE

Test point (°C)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty ±(°C)
20.0	20.01	20.0	+0.01	0.40
25.0	25.00	25.0	0.00	
30.0	29.98	30.0	-0.02	

2. CORRECTION OF HUMIDITY

STD Temperature (°C)	STD Reading (%RH)	DUC Reading (%RH)	Correction (%RH)	Uncertainty ± (%RH)
25	35.00	39.2	-4.20	1.20
25	50.00	53.6	-3.60	1.20
25	64.99	64.8	+0.19	1.40

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 48 of 138

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

End of Certificate

Environ Co., Ltd.

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PerkinElmer

AA02409210

MAINTENANCE REPORT AND CALIBRATION CERTIFICATE

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAnalyst 200/400

SERIAL NUMBER 201S5082209 **DATE TESTED** August 17, 2023

1. INSTRUMENT CHECKS

A. The mirror, prism and lenses condition. Clean if necessary.	OK
B. Inspect the grating.	OK
C. Inspect and clean or replace the dust filter.	OK
D. Clean the burner head, chamber and end cap.	OK
E. Clean the nebulizer.	OK
F. Check the condition of the end cap, chamber and nebulizer o-rings.	OK
G. Clean the drain system.	OK
H. Clean exterior the instrument.	OK

2. GAS SYSTEM CHECKS

A. Leak test all internal and extenal gas box joints	OK
B. Inspect the acetylene catridge filter. (Replacement catridge filter every 1 year)	OK
C. Inspect the air catridge filter. (Replacement catridge filter every 6 months)	OK

3. ELECTRICAL

A. Check incoming AC line voltage for proper levels and grounding.	OK
B. Check unit's software and firmware revisions and upgrade if necessary.	OK

4. FIAS CHECKS

A. Pump and 5 Port Valve	OK
B. Chemifold and Tubing	OK
C. Power Supply	OK
D. Flow meter and Gas system	OK

Enviro Co. Ltd.

PerkinElmer Ltd. 290 Soi 17, Rama 9 Road, Bangkapi, Huay Kwang, Bangkok 10310

PerkinElmer

AA02409210

MAINTENANCE REPORT AND CALIBRATION CERTIFICATE

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAnalyst 200/400

SERIAL NUMBER 201S5082209 DATE TESTED August 17, 2023

PARAMETER	SPECIFICATION	ACTUAL VAULE
5. PERFORMANCE TESTS		
*1. Detector-Linearity with Barium (553.55 nm).		
Neutral Density Filter 0.2 :	0.1806 Abs. ± 5%	0.1734 Abs.
Neutral Density Filter 1.0 :	1.0531 Abs. + 5%	1.0170 Abs.
2. Baseline Noise at 1 Abs with Barium (553.55 nm). (at an integration time of 0.5 seconds and 99 replicates)	SD ≤ 0.010 Abs.	0.0017 Abs.
3. AA Baseline with Copper (Cu 324.75 nm). (at an integration time of 0.5 seconds and 99 replicates)	SD ≤ 0.001 Abs.	0.0001 Abs.
4. D_2 Background Compensation (Copper 324.75 nm). with Neutral Density Filter 1.0	Absorbance ≤ 0.010 Abs	-0.0022 Abs.
5. AA-BG Baseline Noise with Copper (324.75 nm). (at an integration time of 2.0 seconds and 99 replicates)	SD ≤ 0.005 Abs.	0.0002 Abs.
6. Flame Safety Interlock all Functions.		OK

Enviro Co. Ltd.

AA02409210

MAINTENANCE REPORT AND CALIBRATION CERTIFICATE

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAnalyst 200/400

Customer :	บริษัท เอ็นไวร์โปร จำกัด	Date Tested:	August 17, 2023
		Recommendation Recertification Period	6 Months
Address :	168/28, 168/30, 168/71 ถนนนาคนิวาส แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพมหานคร	Recertification Due:	February 17, 2024
		Date Last Certified:	February 17, 2023
User Name:		Visit Number:	2 of 2
Phone:		PerkinElmer Phone:	02-719-6420 ext 206
Fax:		PerkinElmer Fax:	02-318-5597

CONFIGURATION TESTED

MODEL	SERIAL NUMBER	SOFTWARE
AAnalyst 400	201S5082209	AA WinLab32 Version 7.2
FIAS 100	100S3020504	

TEST STANDARD USED	PART NUMBER	EXPIRATION DATE
GFAAS Mix STD	N9300244	FEB 30, 2024
MG0-056	N101-3000	
MG2-054	N101-3002	

Enviro Co.,Ltd.

PerkinElmer

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MAINTENANCE REPORT AND CALIBRATION CERTIFICATE

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAnalyst 200/400

SERIAL NUMBER 201S5082209	DATE TESTED August 17, 2023	
PARAMETER	SPECIFICATION	ACTUAL VAULE
7. Wavelength Accuracy with Nickel (232.00 nm).		
Nickel Prism Position	± 190 steps	21 Steps
Nickel Grating Position	+ 380, - 260 steps	32 Steps
3 mg/L Ni Standard Mean Abs	≥ 0.200 Abs	0.218 Abs.
8. Flame Sensitivity with Copper (324.75 nm).		
Cu Prism Position	± 120	12 Steps
Cu Grating Position	± 380	24 Steps
(2 mg/L Cu Standard at an integration time of 10 seconds and 10 replicates)		
Mean Absorbance	≥ 0.250	0.332 Abs.
Capacitance value	≥ 1.0 pF	1.5 pF

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MAINTENANCE REPORT AND CALIBRATION CERTIFICATE

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAnalyst 200/400

SERIAL NUMBER 201S5082209 **DATE TESTED** August 17, 2023

Remarks :

* - Neutral Density Filter refer to data sheet.

- Cu and Ni std replaced by N9300244 GFAAS Mix Standard

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

☑ meets

☐ does not meet

the PerkinElmer Specifications listed on this certificate.

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

Service Department PerkinElmer Ltd.

Customer Service Engineer: K h w a n . S .

(Khwanchai Siangwong)

Customer Service Engineer

Environ Co. Ltd.

PerkinElmer Ltd. 290 Soi 17, Rama 9 Road, Bangkapi, Huay Kwang, Bangkok 10310

THAI HEART CALIBRATION CO., LTD.
112/1 Moo 5, Phraek Sa, Muang, Samut Prakan 10280
Tel. 0-2394-2162, 0-2757-8435, 0-2757-8496 Fax.: 0-2757-8507

ACCREDITED ISO/IEC 17025 CALIBRATION LABORATORY AC-2695

CERTIFICATE OF CALIBRATION

Certificate No.: C1-3009001/23 **Page** 1 **of total** 3 **pages**

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

Equipment	Spectrophotometer		
Manufacturer	HACH	**Model**	DR 6000
Serial No.	1893325	**ID No.**	SV-TL.110/2562
Description	-		

Environmental Conditions	Ambient Temperature:	28.4 °C
	Relative Humidity:	58 %
	Atmospheric Pressure:	-
Calibration Location	Analysis Laboratory 1	
Received Date	30 September 2023	
Calibration Date	30 September 2023	
Date of Issue	30 September 2023	
Condition of Artifacts	Used conditions but can be calibrated	

Checked by

Act as Technical Manager

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

Approved by

Representative of Managing Director

(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.

Envirpro Co., Ltd.

Certificate No.: C1-3009001/23 **Page** 2 **of total** 3 **pages**

Reference Method:

- The calibration method used was CP-004 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
Holmium Glass Filter	RM-HG	34645	100503	Mar. 25, 2024	Starna
Didymium Glass Filter	RM-DG	11978	100499	Mar. 25, 2024	
Neutral Density Filter	RM-1N2N3N	11562	100582	Mar. 30, 2024	
60 mg/l Potassium Dichromate	RM-06	31473	100505	Mar. 25, 2024	

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:
- Starna Scientific Ltd.

Measurement Results:

Spectral Bandwidth : 2 nm, Scan Speed : -, Data Interval : 0.1 nm

1. Wavelength accuracy

Standard Wavelength (nm)	UUC Reading (nm)	Correction (nm)	Uncertainty (± nm)
361.00	360.2	0.80	0.13
418.61	418.2	0.41	0.14
536.66	535.9	0.76	0.13
684.49	684.3	0.19	0.14
748.48	748.3	0.18	0.14

Environ Co., Ltd.

Calibrated by Onnapa

THC Calibration Services
THAI HEART CALIBRATION CO., LTD.
112/1 Moo 5, Phraek Sa, Muang, Samut Prakan 10280
Tel. 0-2394-2162, 0-2757-8435, 0-2757-8496 Fax.: 0-2757-8507
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Measurement Results (Cont.):

2. Photometric Accuracy

UV Region

Wavelength (nm)	Standard Value (A)	UUC Reading (A)	Correction (A)	Uncertainty (± A)
235	0.7444	0.743	0.0014	0.0056
257	0.8622	0.858	0.0042	0.0056
313	0.2899	0.293	-0.0031	0.0056
350	0.6384	0.636	0.0024	0.0056

Visible Region

Wavelength (nm)	Standard Value (A)	UUC Reading (A)	Correction (A)	Uncertainty (± A)
440	1.0353	1.035	0.0003	0.0032
	0.7311	0.730	0.0011	0.0032
	0.5432	0.545	-0.0018	0.0032
465	0.9650	0.965	0.0000	0.0032
	0.6749	0.674	0.0009	0.0032
	0.4937	0.496	-0.0023	0.0032
546.1	0.9959	0.994	0.0019	0.0032
	0.6850	0.683	0.0020	0.0032
	0.5082	0.510	-0.0018	0.0032
590	1.0356	1.033	0.0026	0.0032
	0.7147	0.712	0.0027	0.0032
	0.5369	0.538	-0.0011	0.0032
635	0.9878	0.986	0.0018	0.0032
	0.6826	0.680	0.0026	0.0032
	0.5216	0.522	-0.0004	0.0032

UUC : Unit Under Calibration.

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 Onnapa