

## ภาคผนวก ฉ

เอกสารสอบเทียบเครื่องมือวัด





ID LINE : IEC17025



## Certificate of Calibration

Certificate Number : SPR24050187-1

Page : 1 of 3

Customer : TNP ENVIRONMENT CO.,LTD.

332/173 Moo.3, Bang Rak Phatthana, Bang Bua Thong, Nonthaburi  
11110

Equipment Name : Autoclave

Manufacturer : BIOBASE

Model : BKQ-Z50I

Serial Number : BKQ-Z50I23055014

ID. Number : TNP.LAB.56

### 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-04-04

Received Date : 11 May 2024

Calibration Date : 16 May 2024

Recommend Due Date : 16 May 2025

Date of Issue : 17 May 2024

### Method of Calibration

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

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

[Redacted Signature Area]

Authorized Signatory



ID LINE : IEC17025



## Calibration Report

Certificate Number : SPR24050187-1

Page : 2 of 3

### Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Data Acquisition/Switch Unit	34970A	MY44074688	SPR24010142-25	11 Jan 2025

### Traceability

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





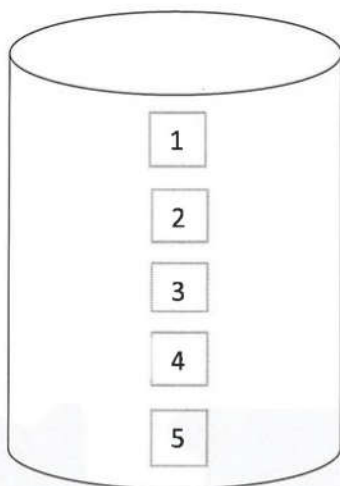
ID LINE : IEC17025



## Result of Calibration

Certificate Number : SPR24050187-1

Page : 3 of 3



### 1. Temperature Accuracy in the Measurement Zone.

Unit : °C

UUC Setting	Measured Temperature (°C) @ Probe No.					Uncertainty ( ± )
	# 1	# 2	# 3	# 4	# 5	
115.0	115.1	115.0	115.1	115.0	115.1	0.26
121.0	121.1	121.0	121.0	121.1	121.1	0.26

### 2. Temperature Uniformity, Stability

Unit : °C

UUC Setting	UUC Reading	Temperature Stability	Temperature Uniformity
115.0	115.0	0.02	0.04
121.0	121.0	0.02	0.04

#### Note :

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

#### Measurement Uncertainty

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

- End of Certificate -





ID LINE : IEC17025



## Certificate of Calibration

Certificate Number : SPR24050187-2

Page : 1 of 3

Customer : TNP ENVIRONMENT CO.,LTD.

332/173 Moo.3, Bang Rak Phatthana, Bang Bua Thong, Nonthaburi  
11110

Equipment Name : pH Meter

Manufacturer : Eutech

Model : pH 700

Serial Number : 3178920

ID. Number : TNP.LAB.57

### 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-CPC-04-01

Received Date : 11 May 2024

Calibration Date : 16 May 2024

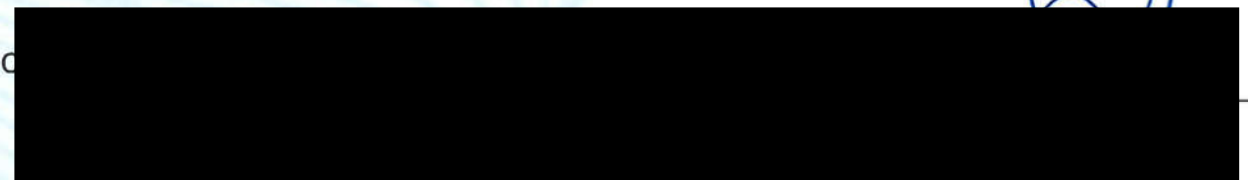
Recommend Due Date : 16 May 2025

Date of Issue : 17 May 2024

### Method of Calibration

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

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Authorized Signatory



ID LINE : IEC17025



## Calibration Report

Certificate Number : SPR24050187-2

Page : 2 of 3

### Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Standard pH Solution	PH016.L5	Lot No.970880	61278486	25 Apr 2025
Standard pH Solution	PH107.L5	Lot No.970881	61281486	25 Apr 2025
Standard pH Solution	PH020.L5	Lot No.970882	61297722	25 Apr 2025

### Traceability

This certification is traceable to the International System of Unit maintained at :  
C.P.A. Chem - ANAB#AT-1836 (ISO/IEC 17025:2017) and ANAB#AR-1835 (ISO/IEC  
17034:2016)





ID LINE : IEC17025



## Result of Calibration

Certificate Number : SPR24050187-2

Page : 3 of 3

Range : 0 to 14 pH

Resolution : 0.01 pH

pH Measurement @ 25 °C

Unit : pH

Standard Solution	UUC Reading	Error	Uncertainty ( ± )
4.008	4.03	0.022	0.012
6.984	7.00	0.016	0.012
10.011	9.96	-0.051	0.013

### Note :

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

### Measurement Uncertainty

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

- End of Certificate -





ID LINE : IEC17025



## Certificate of Calibration

Certificate Number : SPR24050187-3

Page : 1 of 3

Customer : TNP ENVIRONMENT CO.,LTD.

332/173 Moo.3, Bang Rak Phatthana, Bang Bua Thong, Nonthaburi  
11110

Equipment Name : Water Bath

Manufacturer : Memmert

Model : WTB24

Serial Number : LD23.0297

ID. Number : TNP.LAB.58

### Environmental Conditions

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

Received Date : 11 May 2024

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

Calibration Date : 16 May 2024

Location of Calibration : On-Site

Recommend Due Date : 16 May 2025

Calibration Procedure : SP-CPT-04-04

Date of Issue : 17 May 2024

### Method of Calibration

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

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

Authorized Signatory



ID LINE : IEC17025



## Calibration Report

Certificate Number : SPR24050187-3

Page : 2 of 3

### Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Data Acquisition/Switch Unit	34970A	MY44074688	SPR24010142-25	11 Jan 2025

### Traceability

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





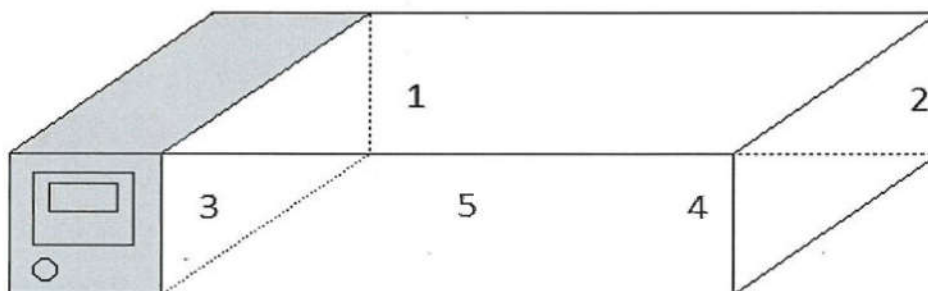
ID LINE : IEC17025



## Result of Calibration

Certificate Number : SPR24050187-3

Page : 3 of 3



### 1. Temperature Accuracy in the Measurement Zone.

Unit : °C

UUC Setting	Measured Temperature (°C) @ Probe No.					Uncertainty ( ± )
	# 1	# 2	# 3	# 4	# 5	
44.5	44.54	44.44	44.50	44.50	44.47	0.19

### 2. Temperature Uniformity, Stability

Unit : °C

UUC Setting	UUC Reading	Temperature Stability	Temperature Uniformity
44.5	44.5	0.07	0.20

#### Note :

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

#### Measurement Uncertainty

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

- End of Certificate -





ID LINE : IEC17025



## Certificate of Calibration

Certificate Number : SPR24050187-4

Page : 1 of 3

Customer : TNP ENVIRONMENT CO.,LTD.

332/173 Moo.3, Bang Rak Phatthana, Bang Bua Thong, Nonthaburi  
11110

Equipment Name : Incubator

Manufacturer : BIOBASE

Model : BJPX-M100B

Serial Number : BJPXM1002301016

ID. Number : TNP.LAB.59

### 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 : 11 May 2024

Calibration Date : 16 May 2024

Recommend Due Date : 16 May 2025

Date of Issue : 17 May 2024

### Method of Calibration

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

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Authorized Signatory



ID LINE : IEC17025



## Calibration Report

Certificate Number : SPR24050187-4

Page : 2 of 3

### Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Data Acquisition/Switch Unit	34970A	MY44074688	SPR24010142-25	11 Jan 2025

### Traceability

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





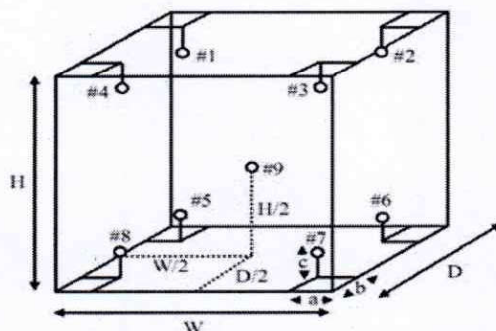
ID LINE : IEC17025



## Result of Calibration

Certificate Number : SPR24050187-4

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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	
35.0	35.20	35.17	35.26	35.22	35.28	35.18	35.24	35.22	35.28	0.19
37.0	37.16	37.24	37.24	37.20	37.23	37.27	37.19	37.23	37.28	0.19
41.5	41.68	41.72	41.77	41.72	41.67	41.74	41.74	41.75	41.79	0.19
42.0	42.22	42.25	42.18	42.28	42.30	42.32	42.27	42.31	42.33	0.19

Temperature Uniformity, Stability, Overall Variation

Unit : °C

UUC Setting	UUC Reading	Temperature Stability	Temperature Uniformity	Overall Variation
35.0	35.0	0.09	0.30	0.30
37.0	37.0	0.11	0.32	0.33
41.5	41.5	0.09	0.26	0.28
42.0	42.0	0.10	0.31	0.36

### 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 No. T/O 670044**

**Date of issue : 15-Mar-2024**

**Equipment Description** : Incubator  
**Equipment Model** : SMART i250-DS  
**Equipment Serial No.** : 0410-0121-0003  
**I.D. No. or Control No.** : -  
**Manufacturer** : Entech Industrial Solution Co.,Ltd.  
**Customer Name** : TNP ENVIRONMENT.CO.,LTD  
**Customer Address** : 332/173 Bang Rak Phatthana Subdistrict, Bang Bua Thong District,  
Nonthaburi 11110  
**Total pages of certificate** : 2 pages  
**Instrument Receiving Date** : 14-Mar-2024  
**Receiving No.** : O-240062  
**Environmental Conditions** : All of the measurement were carried out in the working area  
Temperature : ( 25 ± 15 ) °C  
Humidity : ( 55 ± 30 ) % RH  
Voltage : ( 220 ± 22 ) VAC  
**Calibration Place** : (TNP Lab) 332/173 Bang Rak Phatthana Subdistrict,Bang Bua Thong District,  
Nonthaburi 11110 Thailand  
**Calibration Procedure No.** : This instrument was calibrated by comparison of reference radiation source standard  
according to calibration work instruction no WI-CL-18-C

*The calibration certificate expended uncertainty of measurement 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 M 3003*

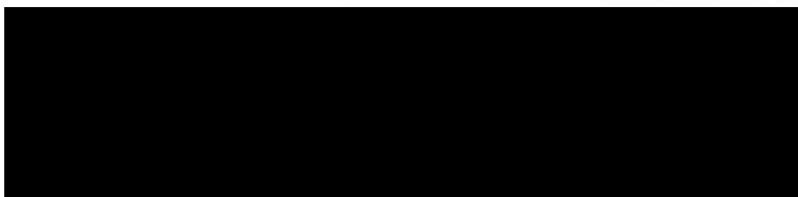
*The expression uncertainty and confidence in measurement.*

*This certificate is applied only to item under test environmental condition.*

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

*This calibration certificate documents are traceability to national standards, which realize the unit of measurement according to the International system of units (SI).*

**Date of Calibration** : 14-Mar-2024



Certificate No. : T/O 670044

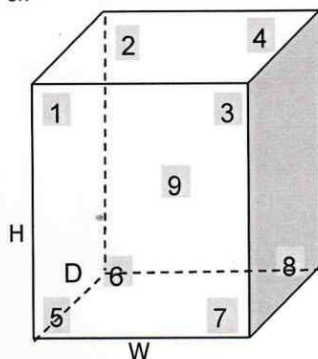
**The Reference Standard Instrument :-**

Instrument	Model	Serial No.	Cert No.	Due date
1) Data logger with RTD Probe	Agilent 34972A	MY49017365	PSL-T 0484-3/67	19-Feb-2025

**Measured room conditions**

<b>Temperature :</b>	Minimum: 23.6 °C	Maximum: 24.2 °C
<b>Humidity :</b>	Minimum: 48.5 %RH	Maximum: 56.9 %RH
<b>Voltage :</b>	Minimum: 220.1 VAC	Maximum: 223.4 VAC
<b>Fresh Air Setting:</b>	off	

**Sensor Position :**



**Working Space of chamber :**

(Inside Dimensions) W x D x H : 500 mm x 480 mm x 1100 mm

**Sensor Installation Details :**

- Sensor Number 1 to 8 installed approximately 50 mm From each wall.
- Sensor Number 9 installed approximately geometric of the chamber.

**Results :** The measurement results of the calibration were reported in the table below.

( \* ) Without adjustment

( ) After adjustment

UUC*	UUC*	Temperature Reading of Standard Sensor								
Setting	Reading	Sensor Position								
( °C )	( °C )	1	2	3	4	5	6	7	8	9
20.0	20.0	20.50	19.56	20.31	20.34	20.41	20.28	20.18	20.21	20.30

UUC*	UUC*	Temperature	Temperature	Overall	Uncertainty	Coverage
Setting	Reading	Uniformity	Stability	Variation	of Measurement	Factor
( °C )	( °C )	( °C )	( ± °C )	( °C )	( ± °C )	K
20.0	20.0	0.88	0.37	1.33	0.51	2

**UUC\* = Unit Under Calibration**

**Remark :-**

- Temperature reading of Standard Sensors shown in the table were taken from the average of Standard reading at each position.
- Temperature Uniformity was calculated from the difference between the maximum and minimum of actual temperature reading from all reference sensors at the same time.
- Temperature Stability was calculated from the maximum stability of nine positions, and formula of Stability is [ ( Maximum Temperature Value - Minimum Temperature Value ) / 2 ]
- Overall Variation was calculated from the difference between the maximum and minimum measured temperature throughout observation time.

**End of Report**





# THAI CALIBRATION SERVICES CO., LTD.

19/8 Moo 9 Soi Raiking 30 Puttamonthon 5 Rd., Sampran, Nakornpatom 73210

Tel. 0-3439-7682-5 Fax: 0-3439-7687

www.thaical.com E-mail : sale@thaicalibration.com, lab@thaicalibration.com



## CALIBRATION CERTIFICATE

Certificate No.S2406450S

page 1 of 2

**Customer :** TNP ENVIRONMENT CO., LTD.  
332/173 Moo 3 Tambon Bang Rak Phatthana,  
Amphoe Bang Bua Thong, Nonthaburi 11110

**Equipment :** Non-automatic weighing instrument (Electronic instrument)

**Manufacturer :** Sartorius **Order No. :** 67S2626-1

**Model :** SECURA224-1S **Ambient temperature :**  $(27.3 \pm 5.0) ^\circ\text{C}$

**Accuracy class :** - **Relative humidity :**  $(33.0 \pm 10.0) \%$

**Capacity :** 220 g **Received date :** 17-Jun-2024

**Resolution :** 0.0001 g **Date of calibration :** 17-Jun-2024

**Serial No. :** 0041305301 **Date of issue :** 19-Jun-2024

**ID No. :** TNP.LAB.31 **Condition of the balance :** Good working conditions

**Place of calibration :** ห้อง LAB

### Calibration method

This instrument was calibrated according to the EURAMET Calibration Guide No. 18.

### Condition of reference standard weight

<u>Instrument</u>	<u>Nominal value</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due-date</u>	<u>Density (kg/m<sup>3</sup>)</u>
1 Standard weight set	1 mg to 2 kg	15885+15849	M2310001S	7-Oct-2024	7950

### Traceability of the reference standard weight

This certificate is traceable to SI unit through Mass Calibration Laboratory Thai Calibration Services Co., Ltd., NSC-ONSC accredited no. Calibration 0189.

Calibrated By :

This calibration certificate may not be reproduced other than in full,  
except with the prior written approval of the head of TCS calibration laboratory.





# THAI CALIBRATION SERVICES CO., LTD.

19/8 Moo 9 Soi Raking 30 Puttamonton 5 Rd., Sampran, Nakornpatom 73210

Tel. 0-3439-7682-5 Fax: 0-3439-7687

www.thaical.com E-mail : sale@thaicalibration.com, lab@thaicalibration.com



NSC-TISI-TIS 17025  
CALIBRATION 0189

## CALIBRATION CERTIFICATE

Certificate No.S2406450S

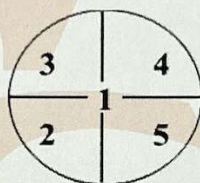
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### The repeatability of indication

Nominal Value ( g )	Standard Deviation of reading ( g )	Maximum difference between susscessive reading ( g )	n
200	0.00000	0.0000	5

### The effect of eccentric application of a load on the indication (test load : 100 g)

Position	Balance Reading ( g )
Point 1	100.0000
Point 2	99.9999
Point 3	100.0000
Point 4	100.0000
Point 5	100.0000
Eccentric Value	0.0001



### The error of indication

Nominal Value ( g )	Value of Reference Standard Weight ( g )	Balance Reading ( g )	Correction ( g )	Uncertainty (±) ( g )	k
Unload	0.0000	0.0000	0.0000	0.000082	2.00
0.1	0.1000	0.1000	0.0000	0.000083	2.00
0.5	0.5000	0.5000	0.0000	0.000084	2.00
1	1.0000	1.0000	0.0000	0.000085	2.00
5	5.0000	5.0001	-0.0001	0.000089	2.00
10	10.0000	10.0000	0.0000	0.000093	2.00
20	20.0000	20.0000	0.0000	0.00010	2.00
50	50.0000	50.0000	0.0000	0.00012	2.00
100	99.9999	100.0000	-0.0001	0.00015	2.00
200	199.9999	199.9999	0.0000	0.00026	2.00

Remark : Adjustment, External weight nominal value 200 g, Standard weight of Lab

### Uncertainty of measurement

The reported expanded uncertainty of measurement 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% (confidence level).

**This report will certify of the calibrated equipment only.**

--End--

**Certificate no:** H/T 670338

**Date of issue :** 21-Mar-24

<b>Instrument description</b>	:	Thermo-Hygrometer
<b>Instrument model</b>	:	Extech 445815
<b>Instrument serial no.</b>	:	PONPE5899554
<b>ID no. or control no.</b>	:	TNP.LAB.21
<b>Manufacturer</b>	:	Extech Instruments
<b>Probe description</b>	:	-
<b>Probe model</b>	:	-
<b>Probe serial</b>	:	-
<b>Customer name</b>	:	TNP ENVIRONMENT CO.,LTD.
<b>Customer address</b>	:	332/173 Moo 3 Tambon Bang Rak Phatthana, Amphoe Bang Bua Thong, Nonthaburi 11110
 <b>Total pages of certificate</b>	:	 2 Pages
<b>Receiving no.</b>	:	L-241004-1
<b>Receiving date.</b>	:	08-Mar-24
<b>Parameter of calibration</b>	:	Temperature Calibration
<b>Condition of UUC.</b>	:	Used
<b>Ambient condition</b>	:	All of the Measurement were carried out the stabilized laboratory Temperature : 23 ± 5 °C Humidity : 55 ± 15 %RH
<b>Calibration place</b>	:	17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210
 <b>Calibration procedure no.</b>	:	 This instrument was calibrated by comparison of indication with the Standard Thermo- hygrometer according to calibration Work Instruction no .WI-CL-11-C

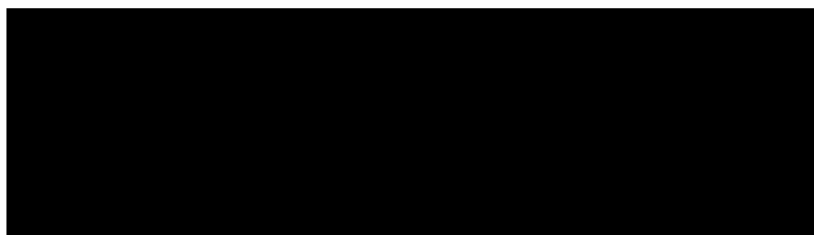
*The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurent Multiplied by coverage factor  $k=2$ , which for a normal distribution corresponds to a coverage probability of approximately 95%.*

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

*This Calibration Certificate may not be reporduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature and seal not valid.*

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

**Date of calibration** : 20-Mar-24





**Certificate no:** H/T 670338

**Standard references**

Standard	Reference No.	Vendor	Due Date
ARALAB 300ECP,Fitoclima	S2023070040-001	MIT	07-Jul-24
Thermo HygroPalm HP 23-A	SG-H-00579/66	Success Gateway	16-Aug-24

**Measured room conditions**

**Temperature :** 22.1 °C

**Humidity :** 55.9 %RH

**Pressure :** 1019.3 mbar

**Calibration results (Without Adjustment)**

**Reference temperature :** - °C

Parameter of standard	Standard values	Mean of UUC.	Error	Uncertainty (±)
Temperature (°C)	19.97	20.1	0.13	0.50
Temperature (°C)	25.02	25.2	0.18	0.50
Temperature (°C)	29.99	30.2	0.21	0.50

**Remark :** -

**End of Report**



# THAI CALIBRATION SERVICES CO., LTD.

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www.thaical.com E-mail : sale@thaicalibration.com, lab@thaicalibration.com



NSC-TISI-TIS 17025  
CALIBRATION 0189

## CALIBRATION CERTIFICATE

Certificate No.S2406451S

page 1 of 2

**Customer :** TNP ENVIRONMENT CO., LTD.  
332/173 Moo 3 Tambon Bang Rak Phatthana,  
Amphoe Bang Bua Thong, Nonthaburi 11110

**Equipment :** Non-automatic weighing instrument (Electronic instrument)

**Manufacturer :** Shimadzu

**Model :** AP225WD

**Accuracy class :** -

**Capacity :** 102 g / 220 g

**Resolution :** 0.00001 g / 0.0001 g

**Serial No. :** D316301848

**ID No. :** TNP.LAB.30

**Place of calibration :** ห้อง LAB

**Order No. :** 67S2626-2

**Ambient temperature :**  $(27.2 \pm 5.0) ^\circ\text{C}$

**Relative humidity :**  $(34.0 \pm 10.0) \%$

**Received date :** 17-Jun-2024

**Date of calibration :** 17-Jun-2024

**Date of issue :** 19-Jun-2024

**Condition of the balance :** Good working conditions

### Calibration method

This instrument was calibrated according to the EURAMET Calibration Guide No. 18.

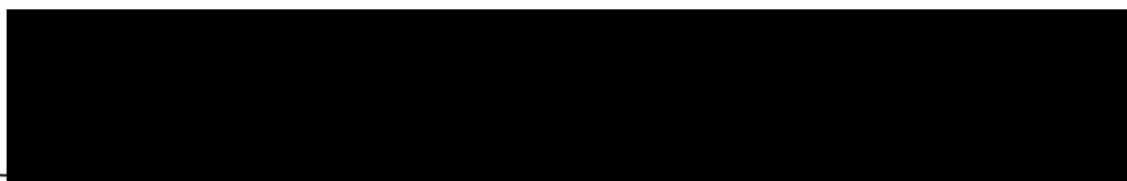
### Condition of reference standard weight

<u>Instrument</u>	<u>Nominal value</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due-date</u>	<u>Density (kg/m<sup>3</sup>)</u>
1 Standard weight set	1 mg to 2 kg	15885+15849	M2310001S	7-Oct-2024	7950

### Traceability of the reference standard weight

This certificate is traceable to SI unit through Mass Calibration Laboratory Thai Calibration Services Co., Ltd., NSC-ONSC accredited no. Calibration 0189.

Calibrated By :



This calibration certificate may not be reproduced other than in full,  
except with the prior written approval of the head of TCS calibration laboratory.





# THAI CALIBRATION SERVICES CO., LTD.

19/8 Moo 9 Soi Raiking 30 Puttamonthon 5 Rd., Sampran, Nakornpatom 73210

Tel. 0-3439-7682-5 Fax: 0-3439-7687

www.thaical.com E-mail : sale@thaicalibration.com, lab@thaicalibration.com



## CALIBRATION CERTIFICATE

Certificate No.S2406451S

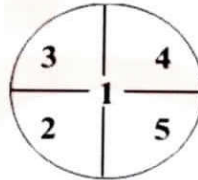
page 2 of 2

### The repeatability of indication

Nominal Value ( g )	Standard Deviation of reading ( g )	Maximum difference between successive reading ( g )	n
100	0.000009	0.00002	5
200	0.00005	0.0001	5

### The effect of eccentric application of a load on the indication (test load : 100 g)

Position	Balance Reading ( g )
Point 1	100.00000
Point 2	100.00002
Point 3	100.00000
Point 4	99.99994
Point 5	99.99995
Eccentric Value	0.00006



### The error of indication

Nominal Value ( g )	Value of Reference Standard Weight ( g )	Balance Reading ( g )	Correction ( g )	Uncertainty (±) ( g )	k
Unload	0.00000	0.00000	0.00000	0.000027	2.65
0.1	0.10000	0.10003	-0.00003	0.000026	2.28
0.5	0.50000	0.50003	-0.00003	0.000029	2.15
1	1.00000	1.00004	-0.00004	0.000031	2.10
5	4.99998	5.00001	-0.00003	0.000041	2.03
10	9.99999	10.00002	-0.00003	0.000047	2.00
20	20.00000	19.99998	+0.00002	0.000060	2.00
50	50.00001	50.00003	-0.00002	0.000074	2.00
100	99.99995	100.00000	-0.00005	0.00012	2.00
200	199.9999	200.0000	-0.0001	0.00026	2.00

Remark : Adjustment, External weight nominal value 100 g, Standard weight of Lab

### Uncertainty of measurement

The reported expanded uncertainty of measurement 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% (confidence level).

**This report will certify of the calibrated equipment only.**

--End--



# THAI CALIBRATION SERVICES CO., LTD.

19/8 Moo 9 Soi Raiking 30 Puttamonthon 5 Rd., Sampran, Nakornpatom 73210  
Tel. 0-3439-7682-5 Fax: 0-3439-7687

www.thaical.com E-mail : sale@thaicalibration.com, lab@thaicalibration.com



## CALIBRATION CERTIFICATE

Certificate No.S2406450S

page 1 of 2

**Customer :** TNP ENVIRONMENT CO., LTD.  
332/173 Moo 3 Tambon Bang Rak Phatthana,  
Amphoe Bang Bua Thong, Nonthaburi 11110

**Equipment :** Non-automatic weighing instrument (Electronic instrument)

**Manufacturer :** Sartorius **Order No. :** 67S2626-1

**Model :** SECURA224-1S **Ambient temperature :**  $(27.3 \pm 5.0) ^\circ\text{C}$

**Accuracy class :** - **Relative humidity :**  $(33.0 \pm 10.0) \%$

**Capacity :** 220 g **Received date :** 17-Jun-2024

**Resolution :** 0.0001 g **Date of calibration :** 17-Jun-2024

**Serial No. :** 0041305301 **Date of issue :** 19-Jun-2024

**ID No. :** TNP.LAB.31 **Condition of the balance :** Good working conditions

**Place of calibration :** ห้อง LAB

### Calibration method

This instrument was calibrated according to the EURAMET Calibration Guide No. 18.

### Condition of reference standard weight

<u>Instrument</u>	<u>Nominal value</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due-date</u>	<u>Density (kg/m<sup>3</sup>)</u>
1 Standard weight set	1 mg to 2 kg	15885+15849	M2310001S	7-Oct-2024	7950

### Traceability of the reference standard weight

This certificate is traceable to SI unit through Mass Calibration Laboratory Thai Calibration Services Co., Ltd., NSC-ONSC accredited no. Calibration 0189.

Calibrated By

This calibration certificate may not be reproduced other than in full,  
except with the prior written approval of the head of TCS calibration laboratory.





# THAI CALIBRATION SERVICES CO., LTD.

19/8 Moo 9 Soi Raiking 30 Puttamonthon 5 Rd., Sampran, Nakornpatom 73210

Tel. 0-3439-7682-5 Fax: 0-3439-7687

www.thaical.com E-mail : sale@thaicalibration.com, lab@thaicalibration.com



## CALIBRATION CERTIFICATE

Certificate No.S2406450S

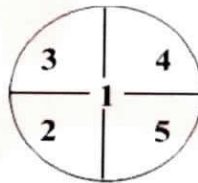
page 2 of 2

### The repeatability of indication

Nominal Value ( g )	Standard Deviation of reading ( g )	Maximum difference between successive reading ( g )	n
200	0.00000	0.0000	5

### The effect of eccentric application of a load on the indication (test load : 100 g)

Position	Balance Reading ( g )
Point 1	100.0000
Point 2	99.9999
Point 3	100.0000
Point 4	100.0000
Point 5	100.0000
Eccentric Value	0.0001



### The error of indication

Nominal Value ( g )	Value of Reference Standard Weight ( g )	Balance Reading ( g )	Correction ( g )	Uncertainty (±) ( g )	k
Unload	0.0000	0.0000	0.0000	0.000082	2.00
0.1	0.1000	0.1000	0.0000	0.000083	2.00
0.5	0.5000	0.5000	0.0000	0.000084	2.00
1	1.0000	1.0000	0.0000	0.000085	2.00
5	5.0000	5.0001	-0.0001	0.000089	2.00
10	10.0000	10.0000	0.0000	0.000093	2.00
20	20.0000	20.0000	0.0000	0.00010	2.00
50	50.0000	50.0000	0.0000	0.00012	2.00
100	99.9999	100.0000	-0.0001	0.00015	2.00
200	199.9999	199.9999	0.0000	0.00026	2.00

Remark : Adjustment, External weight nominal value 200 g, Standard weight of Lab

### Uncertainty of measurement

The reported expanded uncertainty of measurement 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% (confidence level).

**This report will certify of the calibrated equipment only.**

--End--



Harikul Science Co.,Ltd.  
694 Soi Ratchadanivet 24, Pracharatbamphen,  
Samsaennok, Huaikhwang, Bangkok 10310  
Tel: 0-2274-2456 Fax: 0-2274-2443  
Email: info@harikul.com www.harikul.com  
Certificate of Calibration

CERT.No.: HS-V032E

Calibration Date : 30 May 24  
Submitted by : TNP ENVIRONMENT COMPANY LIMITED.  
332/173 Moo. 3, Tambon Bang Rak Phatthana,  
Amphoe Bang Bua Thong, Nonthaburi 11110

Avg Room Temp : 20 °C  
Avg Water Temp : 20 °C  
Air Pressure : 757.00 mmH  
Salinity : 0 ppt

Model : YSI 4010-2W  
S/N : 22051520  
Probe : YSI 4100 BOD  
S/N : 22C102711  
ID NO. :  
Air Temp ref : S/N. F8065C26  
Barometric ref : S/N. F8065C26  
Water Temp ref : S/N. 11431  
Technician : Kittipong M.

#### Calibration Details

Calibration Point	100% air sat. (@20 °C, DO = 9.09 mg/l)	(status)	(status)
Measurement 1 (mg/l)	9.06	(PASS)	-
Measurement 2 (mg/l)	9.05	(PASS)	-
Measurement 3 (mg/l)	9.04	(PASS)	-
Measurement 4 (mg/l)	9.04	(PASS)	-
Measurement 5 (mg/l)	9.03	(PASS)	-
Measurement 6 (mg/l)	9.03	(PASS)	-
Measurement 7 (mg/l)	9.03	(PASS)	-
Measurement 8 (mg/l)	9.02	(PASS)	-
Measurement 9 (mg/l)	9.02	(PASS)	-
Measurement 10 (mg/l)	9.02	(PASS)	-
Mean Measurement	9.03	mg/l	-
Inaccuracy	0.06	mg/l	-

Overall Status (PASS)

#### Manufacturer Specification

Accuracy = +/- 0.2 mg/l

- 1) This certificate is issued based on the result that are found as shown on date and place of test only.
- 2) The calibration procedure followed in accordance with Harikul Science Co., Ltd.
- 3) This result shall not be used for advertising purpose.



CERT.No.: HS-V022D

**Harikul Science Co.,Ltd.**

694 Soi Ratchadanivet 24, Pracharatbamphen,  
Samsaennok, Huaikhwang, Bangkok 10310

Tel: 0-2274-2456 Fax: 0-2274-2443

Email: info@harikul.com www.harikul.com

Certificate of Calibration

Calibration Date : 10 Apr 24

Submitted by : TNP ENVIRONMENT COMPANY LIMITED  
332/173 Moo.3, Tambon Bang Rak Phatthana,  
Amphoe Bang Bua Thong, Nonthaburi 11110

Model : HI 5421  
S/N : 07210004101  
Probe : HI 76408W  
S/N : KC1N32W9P  
ID NO. :  
Air Temp ref : S/N. F8065C26  
Barometric ref : S/N. F8065C26  
Water Temp ref : S/N. 11430

Technician : Kittipong M.

#### Calibration Details

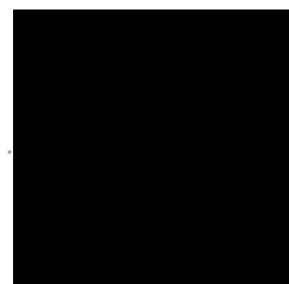
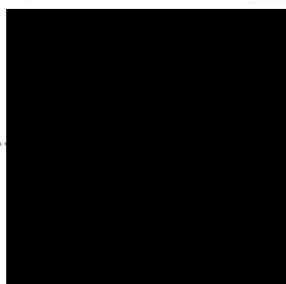
Calibration Point	100% air sat. (@20 °C, DO = 9.08 mg/l)	(status)	(status)
Measurement 1 (mg/l)	9.08	(PASS)	-
Measurement 2 (mg/l)	9.07	(PASS)	-
Measurement 3 (mg/l)	9.07	(PASS)	-
Measurement 4 (mg/l)	9.07	(PASS)	-
Measurement 5 (mg/l)	9.07	(PASS)	-
Measurement 6 (mg/l)	9.07	(PASS)	-
Measurement 7 (mg/l)	9.07	(PASS)	-
Measurement 8 (mg/l)	9.07	(PASS)	-
Measurement 9 (mg/l)	9.07	(PASS)	-
Measurement 10 (mg/l)	9.07	(PASS)	-
Mean Measurement	9.07	mg/l	-
Inaccuracy	0.01	mg/l	-

Overall Status (PASS)

#### Manufacturer Specification

Accuracy = +/- 0.15 mg/l

- 1) This certificate is issued based on the result that are found as shown on date and place of test only.
- 2) The calibration procedure followed in accordance with Harikul Science Co., Ltd.
- 3) This result shall not be used for advertising purpose.



**Certificate No.:** T/O 660198

**Date of issue :** 11-Oct-2023

**Equipment Description** : Refrigerator  
**Equipment Model** : P1010  
**Equipment Serial No.** : P1010-1020-0005  
**I.D. No. or Control No.** : TNP.LAB.01  
**Manufacturer** : Entech Industrial Solution Co.,Ltd.  
**Customer Name** : TNP ENVIRONMENT CO.,LTD.  
**Customer Address** : 332/173 Moo. 3 Tambon Bang Rak Phatthana, Amphoe Bang Bua Thong,  
Nonthaburi 11110  
**Total pages of certificate** : 2 pages  
**Instrument Receiving Date** : 9-Oct-2023  
**Receiving No.** : O-230230  
**Environmental Conditions** : All of the measurement were carried out in the working area  
Temperature : ( 25 ± 15 ) °C  
Humidity : ( 55 ± 30 ) % RH  
Voltage : ( 220 ± 22 ) VAC  
**Calibration Place** : 332/173 Moo. 3 Tambon Bang Rak Phatthana, Amphoe Bang Bua Thong,  
Nonthaburi 11110  
**Calibration Procedure No.** : This instrument was calibrated by comparison of reference radiation source standard  
according to calibration work instration no WI-CL-18-C

*The calibration certificate expended uncertainty of measurement 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%*

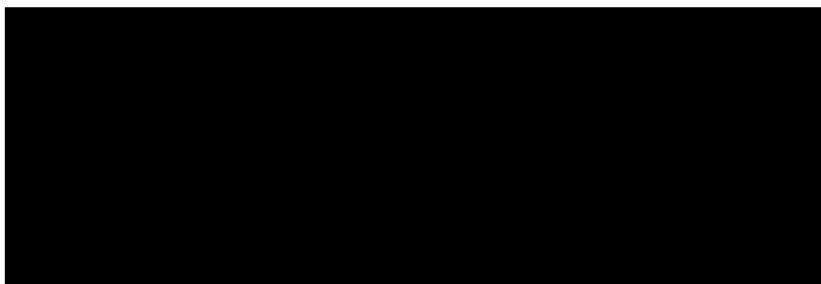
*The standard uncertainty of measurement has been determined in accordance with M 3003  
The expression uncertainty and confidence in measurement.*

*This certificate is applied only to item under test environmental condition.*

*This calibration certificate may not be reproduced other than in full except with the permission of the issuing laboratory.  
Calibration certificates without signature and seal are not valid.*

*This calibration certificate documents are traceability to national standards, which realize the unit of measurement according to the International system of units (SI).*

**Date of Calibration** : 9-Oct-2023





**Certificate No. : T/O 660198**

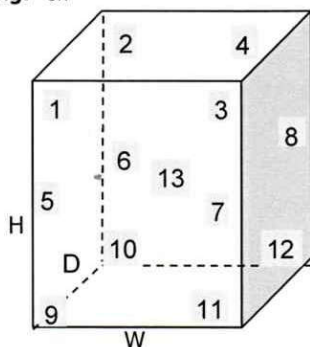
**The Reference Standard Instrument :-**

Instrument	Model	Serial No.	Cert No.	
1) Data logger with RTD Probe	Agilent 34972A	MY41187730	PSL-T 0651-1/66	21-Apr-2024
		MY60008352	PSL-T 0651-3/66	21-Apr-2024

**Measured room conditions**

<b>Temperature :</b>	Minimum: 30.8 °C	Maximum: 31.9 °C
<b>Humidity :</b>	Minimum: 50.7 %RH	Maximum: 57.2 %RH
<b>Voltage :</b>	Minimum: 219.8 VAC	Maximum: 223.4 VAC
<b>Fresh Air Setting:</b>	off	

**Sensor Position :**



**Working Space of chamber :**

(Inside Dimensions) W x D x H : 1560 mm x 500 mm x 1380 mm

**Sensor Installation Details :**

- Sensor Number 1 to 12 installed approximately 50 mm From each wall.
- Sensor Number 13 installed approximately geometric of the chamber.

**Results :** The measurement results of the calibration were reported in the table below.

( \* ) Without adjustment

( ) After adjustment

UUC* Setting	UUC* Reading	Temperature Reading of Standard Sensor								
( °C )	( °C )	Sensor Position								
		1	2	3	4	5	6	7	8	9
		4.02	4.35	4.01	4.20	4.37	4.22	4.17	4.39	4.05
		Sensor Position								
		10	11	12	13					
		4.29	4.30	4.28	4.19					

UUC* Setting	UUC* Reading	Temperature Uniformity	Temperature Stability	Overall Variation	Uncertainty of Measurement	Coverage Factor
( °C )	( °C )	( °C )	( ± °C )	( °C )	( ± °C )	K
4.0	4.1	1.19	1.08	2.47	1.5	2

**UUC\* = Unit Under Calibration**

**Remark :-**

- Temperature reading of Standard Sensors shown in the table were taken from the average of Standard reading at each position.
- Temperature Uniformity was calculated from the difference between the maximum and minimum of actual temperature reading from all reference sensors at the same time.
- Temperature Stability was calculated from the maximum stability of nine positions, and formula of Stability is [ ( Maximum Temperature Value - Minimum Temperature Value ) / 2 ]
- Overall Variation was calculated from the difference between the maximum and minimum measured temperature throughout observation time.

**End of Report**

## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : pH METER  
MANUFACTURER : HORIBA  
MODEL / TYPE : LAQUA-PH1100/9615S  
SERIAL NO. : B80A0042/9X0B0575  
CLID. NO. : 272001452  
JOB CONTROL NO. : 230911100397

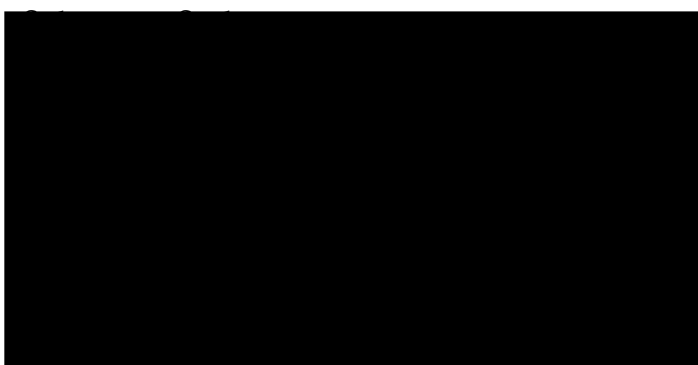
CUSTOMER : TNP ENVIRONMENT CO., LTD.  
332/173 MOO 3 TAMBON BANG RAK PHATTANA,  
AMPHOE BANG BUA THONG, NONTHABURI 11110

DATE OF RECEIVED : 11 September 2023

DATE OF ISSUED : 14 September 2023

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

Calibrated By :



Approved By :

14 September 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. Q23100397

F3-011-04/01-12

page 1 of 3



@clccalibration



## REPORT OF CALIBRATION

### FOR

**NOMENCLATURE** : pH METER  
**MANUFACTURER** : HORIBA  
**MODEL / TYPE** : LAQUA-PH1100/9615S  
**SERIAL NO.** : B80A0042/9X0B0575  
**DATE OF CALIBRATION** : 12 September 2023

---

#### ENVIRONMENT CONDITIONS :

**Temperature** :  $(25 \pm 2.5) ^\circ\text{C}$

**Relative Humidity** :  $(50 \pm 15) \% \text{ RH}$

#### PROCEDURE USED :

This instrument was calibrated under procedure No. **CLC-CPCH-01**. The calibration was performed by direct measurement with Certified Reference Material (CRM).

#### REFERENCE STANDARD USED :

1. pH Standard Solution, NIMT TRM CODE TRM-S-2003, TRM CODE TRM-S-2007.
2. pH Standard Solution, Control Company Catalog Number 06664263,11784256, Lot Number CC752722.

#### TRACEABILITY :

1. The measurements are traceable to International System of Units (SI) , through National Institute of Metrology (Thailand).  
Lot Number. 040822 , 230822. Due Date 26 April 2024.
2. The measurements are traceable to International System of Units (SI) , through Control Company.  
Certificate No. 4288-13355261 , Due Date 06 May 2024.

#### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table 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. Q23100397**

**F3-011-04/01-12**

page 2 of 3



**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 pH meter.

## CALIBRATION DATA

### **pH METER RESULT @ 25 °C**

Standard pH Buffer Solution (pH)	pH Meter Reading (pH)	pH Meter Reading (mV)	Correction (pH)	Uncertainty of pH Measurement ( $\pm$ pH)	k Factor
4.003	4.01	150.2	-0.007	0.010	2,00
7.000	7.00	-26.1	0.000	0.015	2,06
10.003	10.01	-187.1	-0.007	0.016	2,05

Technical Note. Setting function CAL 3 point ( 4,7,10 ).

The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 008 Page 2,3 of 54

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

**### End of Certificate ###**

**Certificate No. Q23100397**

**F3-011-04/01-12**

page 3 of 3



@clccalibration



## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : DIGITAL THERMO-HYGROMETER  
MANUFACTURER : EXTECH INSTRUMENTS  
MODEL / TYPE : 445814  
SERIAL NO. : PONPE5816745  
CLID. NO. : 232303263  
JOB CONTROL NO. : 230911100396

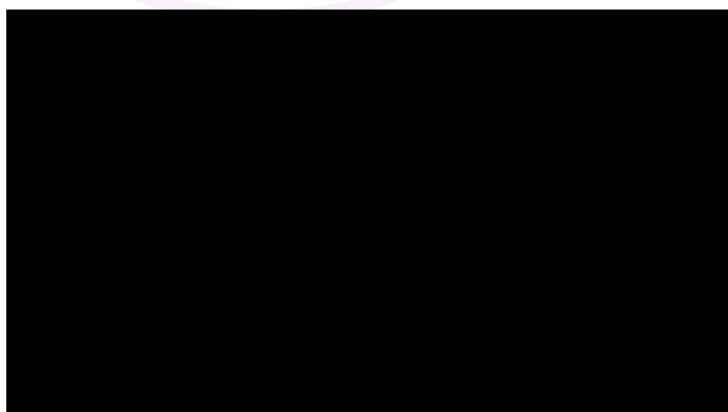
CUSTOMER : TNP ENVIRONMENT CO., LTD.  
332/173 MOO 3 TAMBON BANG RAK PHATTANA,  
AMPHOE BANG BUA THONG, NONTABURI 11110

DATE OF RECEIVED : 11 September 2023

DATE OF ISSUED : 15 September 2023

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

Calibrated By :



Approved By :

15 September 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. Q23100396

F3-011-04/01-12

page 1 of 3



@clccalibration

## REPORT OF CALIBRATION

### FOR

**NOMENCLATURE** : **DIGITAL THERMO-HYGROMETER**  
**MANUFACTURER** : **EXTECH INSTRUMENTS**  
**MODEL / TYPE** : **445814**  
**SERIAL NO.** : **PONPE5816745**  
**DATE OF CALIBRATION** : **13 September 2023**

---

#### ENVIRONMENT CONDITIONS :

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

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

#### PROCEDURE USED :

This instrument was calibrated under procedure No. **CLC-CPTH-11**. 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)"

**Certificate No. Q23100396**

**F3-011-04/01-12**

page 2 of 3



@clccalibration



## 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 thermo-hygrometer.

### CALIBRATION DATA

#### 1. CORRECTION OF TEMPERATURE

Test point ( ° C )	Actual Temperature ( ° C )	DUC Reading ( ° C )	Correction ( ° C )	Uncertainty $\pm$ ( ° C )
20.0	20.01	19.9	+0.11	0.27
25.0	25.01	25.2	-0.19	

#### 2. CORRECTION OF HUMIDITY

STD Temperature ( ° C )	STD Reading ( %RH )	DUC Reading ( %RH )	Correction ( %RH )	Uncertainty $\pm$ ( %RH )
25	50.0	47	+3.0	0.8

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 008 Page 49 of 54

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

**### End of Certificate ###**

Certificate No. Q23100396

F3-011-04/01-12

page 3 of 3



@clccalibration

## Certificate of Calibration

**Certificate No. :** 67-400049-1

**Page : 1 of 2**

**Submitted by :** TNP Environment Co., Ltd.

332/173 Moo 3 Bang Rak Phatthana, Bang Bua Thong, Nonthaburi 11110

**Equipment :** Liquid in Glass Thermometer

Manufacturer : SK

Model : N/A

Range : 0 °C to 200 °C

Resolution : 1 °C

Serial No. : N/A

Immersion : Total

ID No. : TNP.LAB.12

**Environment :** Ambient Temperature : (23 ± 2) °C

Relative Humidity : (50 ± 15) %

Line Voltage : (220 ± 22) VAC

**Date of Received :** 26 January 2024

**Date of Calibration :** 01 February to 02 February 2024

**Date of Issue :** 02 February 2024

**Calibrated by :** Chortip Samchusri

**Calibration Method :** This instrument was calibrated by In-house method comparison technique CAL-M4001 based on ASTM E77-07 by compared with PRT in the liquid bath at the constant controlled temperature.

The temperature scale used was based on ITS-90

**Reference Standard Instruments :** This certification is traceable to the International System of Units

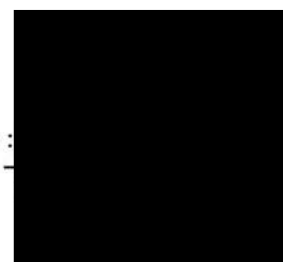
1. Platinum Resistance Thermometer (PRT)

ID No.	Cert. No.	Due Date	Traceability
400001	TT-0016-22	07 Feb 2024	National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No.	Cert. No.	Due Date	Traceability
400003	23E1866	01 Jun 2025	National Institute of Metrology Thailand (NIMT)
400004	23E1866	01 Jun 2025	National Institute of Metrology Thailand (NIMT)

Approved by :



## Certificate of Calibration

**Certificate No. : 67-400049-1**

**Page : 2 of 2**

**Result of Calibration :** Without Adjustment

**UUC Condition As-Received :** Good

**Function :** Temperature measurement

Ice point check : UUC\* reading 0 ° C Standard reading 0.8789 ° C

Standard Reading ( ° C )	UUC Reading ( ° C )	Correction ( ° C )	Uncertainty ( ± ° C )
21.2064	20	1.2	0.31
31.3084	30	1.3	0.31

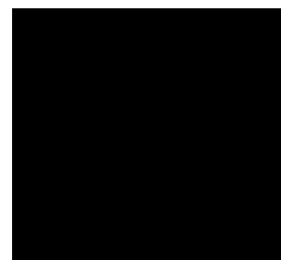
### Remark

UUC : Unit Under Calibration

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

This 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%

- oOo -





## Verification COD Reactor

Equipment Name      Dri-Block Heater-Digital  
 Serial No.              000827-A  
 Reference Standard    Thermocouple Type K  
 Calibration Date       10/03/2023

Temperature Ver        150±2 °C  
 Model                    DB 200/3  
 Certificate No.         21/4272  
 Next Cal. Date         10/03/2024

Left													
Hole 1				Hole 2				Hole 3					
NO.	Result			NO.	Result			NO.	Result				
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		
1	151.1	-0.36	150.7	1	150.6	-0.36	150.2	1	151.4	-0.36	151.0		
2	150.8	-0.36	150.4	2	151.7	-0.36	151.3	2	151.3	-0.36	150.9		
3	151.2	-0.36	150.8	3	151.1	-0.36	150.7	3	151.7	-0.36	151.3		
			Mean	150.67				Mean	150.77			Mean	151.11
			SD	0.208				SD	0.551			SD	0.208
			%RSD	0.138				%RSD	0.365			%RSD	0.138

Hole 4				Hole 5				Hole 6					
NO.	Result			NO.	Result			NO.	Result				
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		
1	151.7	-0.36	151.3	1	150.5	-0.36	150.1	1	151.5	-0.36	151.1		
2	151.6	-0.36	151.2	2	151.3	-0.36	150.9	2	151.4	-0.36	151.0		
3	151.5	-0.36	151.1	3	150.6	-0.36	150.2	3	150.5	-0.36	150.1		
			Mean	151.24				Mean	150.44			Mean	150.77
			SD	0.100				SD	0.436			SD	0.551
			%RSD	0.066				%RSD	0.290			%RSD	0.365

Hole 7				Hole 8				Hole 9					
NO.	Result			NO.	Result			NO.	Result				
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		
1	151.3	-0.36	150.9	1	151.7	-0.36	151.3	1	150.5	-0.36	150.1		
2	151.0	-0.36	150.6	2	150.5	-0.36	150.1	2	151.2	-0.36	150.8		
3	151.3	-0.36	150.9	3	151.4	-0.36	151.0	3	150.8	-0.36	150.4		
			Mean	150.84				Mean	150.84			Mean	150.47
			SD	0.173				SD	0.624			SD	0.351
			%RSD	0.115				%RSD	0.414			%RSD	0.233

Hole 10				Hole 11				Hole 12					
NO.	Result			NO.	Result			NO.	Result				
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		
1	151.6	-0.36	151.2	1	151.5	-0.36	151.1	1	150.7	-0.36	150.3		
2	151.6	-0.36	151.2	2	151.2	-0.36	150.8	2	151.6	-0.36	151.2		
3	150.8	-0.36	150.4	3	151.5	-0.36	151.1	3	151.2	-0.36	150.8		
			Mean	150.97				Mean	151.04			Mean	150.81
			SD	0.462				SD	0.173			SD	0.451
			%RSD	0.306				%RSD	0.115			%RSD	0.299

Verified By

**Confidential** - Not to be photocopied except by permission of the Laboratory Quality Manager or nominee.

## Verification COD Reactor

Equipment Name	Dri-Block Heater Digital	Temperature Ver	150±2 °C
Serial No.	000827-A	Model	DB 200/3
Reference Standard	Thermocouple Type K	Certificate No.	21/4272
Calibration Date	10/03/2023	Next Cal. Date	10/03/2024

**Middle**

Hole 1				Hole 2				Hole 3			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	151.2	-0.36	150.8	1	150.7	-0.36	150.3	1	151.1	-0.36	150.7
2	151.5	-0.36	151.1	2	151.7	-0.36	151.3	2	151.6	-0.36	151.2
3	151.6	-0.36	151.2	3	150.8	-0.36	150.4	3	150.9	-0.36	150.5
		Mean	151.07			Mean	150.71			Mean	150.84
		SD	0.208			SD	0.551			SD	0.361
		%RSD	0.138			%RSD	0.365			%RSD	0.239

Hole 4				Hole 5				Hole 6			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	151.5	-0.36	151.1	1	151.6	-0.36	151.2	1	150.5	-0.36	150.1
2	150.7	-0.36	150.3	2	151.2	-0.36	150.8	2	150.6	-0.36	150.2
3	151.6	-0.36	151.2	3	151.2	-0.36	150.8	3	151.2	-0.36	150.8
		Mean	150.91			Mean	150.97			Mean	150.41
		SD	0.493			SD	0.231			SD	0.379
		%RSD	0.327			%RSD	0.153			%RSD	0.252

Hole 7				Hole 8				Hole 9			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	151.5	-0.36	151.1	1	151.5	-0.36	151.1	1	151.2	-0.36	150.8
2	150.5	-0.36	150.1	2	151.7	-0.36	151.3	2	150.9	-0.36	150.5
3	150.8	-0.36	150.4	3	151.1	-0.36	150.7	3	151.4	-0.36	151.0
		Mean	150.57			Mean	151.07			Mean	150.81
		SD	0.513			SD	0.306			SD	0.252
		%RSD	0.341			%RSD	0.202			%RSD	0.167

Hole 10				Hole 11				Hole 12			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	151	-0.36	150.6	1	151.5	-0.36	151.1	1	151.2	-0.36	150.8
2	150.6	-0.36	150.2	2	150.6	-0.36	150.2	2	150.5	-0.36	150.1
3	151.5	-0.36	151.1	3	151.0	-0.36	150.6	3	151.1	-0.36	150.7
		Mean	150.67			Mean	150.67			Mean	150.57
		SD	0.451			SD	0.451			SD	0.379
		%RSD	0.299			%RSD	0.299			%RSD	0.251

Verified By

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## Verification COD Reactor

Equipment Name Dri-Block Heater Digital  
 Serial No. 000827/A  
 Reference Standard Thermocouple Type K  
 Calibration Date 10/03/2023

Temperature Ver 150±2 °C  
 Model DB 200/3  
 Certificate No. 21/4272  
 Next Cal. Date 10/03/2024

Right

Hole 1				Hole 2				Hole 3			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	149.9	-0.36	149.5	1	150.3	-0.36	149.9	1	151.0	-0.36	150.6
2	151.1	-0.36	150.7	2	151.0	-0.36	150.6	2	151.0	-0.36	150.6
3	150.9	-0.36	150.5	3	149.9	-0.36	149.5	3	150.4	-0.36	150.0
		Mean	150.27			Mean	150.04			Mean	150.44
		SD	0.643			SD	0.557			SD	0.346
		%RSD	0.428			%RSD	0.371			%RSD	0.230

Hole 4				Hole 5				Hole 6			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	150.8	-0.36	150.4	1	150.0	-0.36	149.6	1	150.5	-0.36	150.1
2	151.0	-0.36	150.6	2	150.0	-0.36	149.6	2	150.8	-0.36	150.4
3	150.9	-0.36	150.5	3	150.7	-0.36	150.3	3	149.8	-0.36	149.4
		Mean	150.54			Mean	149.87			Mean	150.01
		SD	0.100			SD	0.404			SD	0.513
		%RSD	0.066			%RSD	0.270			%RSD	0.342

Hole 7				Hole 8				Hole 9			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	150.8	-0.36	150.4	1	151.1	-0.36	150.7	1	150.2	-0.36	149.8
2	150.9	-0.36	150.5	2	150.7	-0.36	150.3	2	150.2	-0.36	149.8
3	151.0	-0.36	150.6	3	151.1	-0.36	150.7	3	149.9	-0.36	149.5
		Mean	150.54			Mean	150.61			Mean	149.74
		SD	0.100			SD	0.231			SD	0.173
		%RSD	0.066			%RSD	0.153			%RSD	0.116

Hole 10				Hole 11				Hole 12			
NO.	Result			NO.	Result			NO.	Result		
	temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.		temp. °C	Corr.	temp+Corr.
1	150.6	-0.36	150.2	1	150.5	-0.36	150.1	1	150.9	-0.36	150.5
2	150.5	-0.36	150.1	2	150.9	-0.36	150.5	2	150.0	-0.36	149.6
3	149.9	-0.36	149.5	3	151.1	-0.36	150.7	3	150.5	-0.36	150.1
		Mean	149.97			Mean	150.47			Mean	150.11
		SD	0.379			SD	0.306			SD	0.451
		%RSD	0.252			%RSD	0.203			%RSD	0.300

Verified By

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## สรุปผลการ Verify

ปรับอุณหภูมิ 154.0 °C แต่ค่าควบคุมมีอุณหภูมิ 150 ± 2 °C ทุกครั้ง

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Verified By



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**ARCHEMICA**

## **Certificate of Calibration**

**Aquion RFIC : Anion System (ID#1054)**

**This certificate is to verify that instrument below are calibrated  
by**

**Archemica Lab Co.,Ltd.**

**Aquion**

**S/N 220380025**

**AS-DV**

**S/N 2203880170**

**For**

**SGS (Thailand) Limited (Rayong Branch).**



**Operator Signature**



**Date: 15 / Nov / 2023**

**Applications Chemist**



## MAINTENANCE AND TEST CERTIFICATE MODEL

### Avio220 Max

<b>Customer :</b> <u>SGS(Thailand)Limited</u>	<b>Date Tested:</b> <u>January 10, 2024</u>
<u>Rayong Branch</u>	<b>Recommendation Recertification</b>
<b>Address :</b> <u>1/209 , 1/211 Moo 1,</u>	<b>Period</b> <u>6</u> <b>Months</b>
<u>T. Banchang, A. Banchang</u>	<b>Recertification Due:</b> <u>July 10, 2024</u>
<u>Rayong 21130</u>	<b>Date Last Certified:</b> <u>N/A</u>
<b>User Name</b> <u>Khun Saijai Ruangsawat</u>	<b>Visit Number:</b> <u>1OF2 W</u>
<b>Phone:</b> <u>+66(0)38685260-64</u>	<b>PerkinElmer Phone:</b> <u>02-719-6420 ext 206</u>
<b>Email:</b> <u><a href="mailto:saijai.ruangsawat@sgs.com">saijai.ruangsawat@sgs.com</a></u>	<b>PerkinElmer Fax:</b> <u>02-318-5597</u>

### CONFIGURATION TESTED

MODEL	SERIAL NUMBER	SOFTWARE
<u>AVIO200 MAX</u>	<u>M79S2304111</u>	<u>Syngristix V5</u>
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>
TESTED EQUIPMENT	CALIBRATION NUMBER	EXPIRATION
<u>IPV Methods</u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>
TEST STANDARD USED	PART NUMBER	EXPIRATION DATE
<u>Multielement Standard</u>	<u>N069-1579</u>	<u>30-Dec-24</u>
<u>Instrument Cal. STD4</u>	<u>N930-0221</u>	<u>30-Nov-24</u>
<u> </u>	<u> </u>	<u> </u>
CUSTOMER SUPPLIED	COMMENTS	CUSTOMER INITIALS
<u>2 % HNO3</u>	<u> </u>	<u> </u>
<u>10 % HNO3</u>	<u> </u>	<u> </u>





**MAINTENANCE AND TEST CERTIFICATE MODEL**  
**Avio220 Max**

<b>SERIAL NUMBER</b> <u>M79S2304111</u>	<b>DATE TESTED</b> <u>January 10, 2024</u>
<b>1. MECHANICAL CHECKS</b>	
A. Inspect and clean all fans and filters.	<input type="checkbox"/> OK
B. Inspect and replace as necessary, all torch components including the RF coil.	<input type="checkbox"/> OK
C. Inspect all tubing for sign of clacking or leaking.	<input type="checkbox"/> OK
D. Adjust water and gas pressure regulator settings.	<input type="checkbox"/> OK
E. Inspect and leak check pneumatics drawers.	<input type="checkbox"/> OK
F. Clean the exterior of the instrument.	<input type="checkbox"/> OK
<b>2. OPTICAL CHECKS</b>	
A. Inspect and clean all optical components.	<input type="checkbox"/> OK
B. As required, check and replace all purgefilters.	<input type="checkbox"/> OK
C. Recheck optical alignment.	<input type="checkbox"/> OK
<b>3. COOLING SYSTEM CHECKS</b>	
A. Perform preventive maintenance on chiller.	<input type="checkbox"/> OK
B. Flush out the chiller every year.	<input type="checkbox"/> OK
<b>4. PERFORMANCE CHECKS</b>	
A. Torch View Alignment.	<input type="checkbox"/> OK
B. Wavelength Calibration.	<input type="checkbox"/> OK



## MAINTENANCE AND TEST CERTIFICATE MODEL

### Avio220 Max

SERIAL NUMBER <u>M79S2304111</u>		DATE TESTED <u>January 10, 2024</u>	
PARAMETER	SPECIFICATION		FINAL VALUE
Spectral Resolution : UV			
As 193.696 nm	≤ 0.009 nm	<u>0.00864</u> nm	
Ni 231.604 nm	≤ 0.011 nm	<u>0.01009</u> nm	
Ni 341.476 nm	≤ 0.015 nm	<u>0.01169</u> nm	
Spectral Resolution : VIS			
Ba 455.403 nm	≤ 0.020 nm	<u>0.01776</u> nm	
Precision			
Zn 206.200 nm	% RSD ≤ 1.0 %	<u>0.28</u> %	
Mg 280.271 nm	% RSD ≤ 1.0 %	<u>0.73</u> %	
Mg 285.213 nm	% RSD ≤ 1.0 %	<u>0.61</u> %	
Ba 455.403 nm	% RSD ≤ 1.0 %	<u>0.54</u> %	
Detection Limits : Axial			
Tl 190.801 nm	3(sd)	<u>1.52</u> ppb	
As 193.696 nm	3(sd)	<u>1.4</u> ppb	
Se 196.026 nm	3(sd)	<u>1.53</u> ppb	
Pb 220.353 nm	3(sd)	<u>1.72</u> ppb	
Detection Limits : Radial			
As 193.696 nm	3(sd)	<u>1.69</u> ppb	
Zn 213.857 nm	3(sd)	<u>0.42</u> ppb	
Mn 257.610 nm	3(sd)	<u>0.1</u> ppb	
La 379.478 nm	3(sd)	<u>0.61</u> ppb	
Ba 455.403 nm	3(sd)	<u>0.13</u> ppb	
Ba 493.408 nm	3(sd)	<u>0.1</u> ppb	
BEC : Axial (IB X 1000)/(IS-IB)			
Mn 257.610 nm	≤ 30 ppb	<u>7.83</u> ppb	
BEC : Radial (IB X 1000)/(IS-IB)			
Mn 257.610 nm	≤ 30 ppb	<u>17.57</u> ppb	



**MAINTENANCE AND TEST CERTIFICATE MODEL**  
**Avio220 Max**

**SERIAL NUMBER** M79S2304111

**DATE TESTED** January 10, 2024

**Remarks :**

Commissioning follow as commissioning performance sheets.

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

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meets

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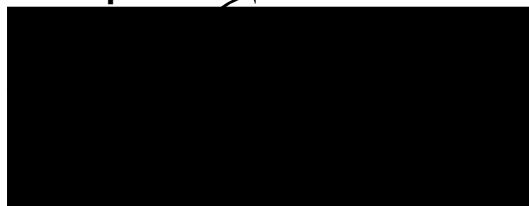
does not meet

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:







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



Cert.No.: 23CHO565  
Page.: 1 of 3

## Certificate of Calibration

Equipment :	Spectrophotometer
Manufacturer :	Merck
Model :	Prove 100
Serial No. :	1904113676
ID No. :	S2019025
Condition As-Received:	Used Item
Received Date :	21 September 2023
Calibration Date :	21 September 2023
Reference :	2309-0483OC-2
Submitted by :	SGS (Thailand) Limited 1/209, 1/211 Moo 1, Ban Chang, Ban Chang, Rayong 21130
Calibration Place :	Spectrophotometry Lab
Ambient Temperature :	( 23.8 - 20.9 ) °C (On-Site)
Relative Humidity :	( 50.1 - 50.2 ) % (On-Site)
Calibration Procedure :	In - house method : CP-QCH4 based on ASTM E 275-01

Issue Date : 26 September 2023

The Uncertainties are for a confidence probability of approximately 95%

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

A 0058836



Cert. No. : 23CHO565

Page : 2 of 3

**Condition of calibration result**

1. Reference Standard Material :

<u>Material</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due date</u>
1. Absorbance Standard set	39130	106269	10 Oct 2024
2. Wavelength Standard set	36730	98330	19 Jan 2024
3. Wavelength Standard set	36730	98331	19 Jan 2024

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

3. This certificate is traceable to the International System of Unit maintained through :  
- Starna Scientific Ltd.

4. Spectral BandWidth : 4 nm  
Scan Speed : - nm/min

**Calibration Results : without adjustment**

**Wavelength Accuracy**

<b>Certified Values of Reference Material ( nm )</b>	<b>UUC Reading ( nm )</b>	<b>Uncertainty of Measurement ( <math>\pm</math> nm )</b>	<b>Coverage Factor <i>k</i></b>
418.48	418.5	0.15	2.00
513.70	513.1	0.14	2.00
536.90	536.3	0.14	2.00
637.94	637.6	0.14	2.00
879.70	878.8	0.15	2.00



Cert. No. : 23CHO565

Page : 3 of 3

**Calibration Results : without adjustment**

**Photometric Accuracy**

Wavelength (nm)	Certified Values of Reference Material ( Abs )	UUC Reading ( Abs )	Uncertainty of Measurement ( $\pm$ Abs )	Coverage Factor <i>k</i>
440.0	Zero	0.000	0.0028	2.00
	0.5645	0.563	0.0028	2.00
	0.6988	0.698	0.0028	2.00
	1.0017	1.001	0.0028	2.00
546.1	Zero	0.000	0.0028	2.00
	0.5281	0.527	0.0028	2.00
	0.6962	0.696	0.0028	2.00
	0.9984	0.998	0.0028	2.00
635.0	Zero	0.000	0.0028	2.00
	0.5699	0.569	0.0028	2.00
	0.7606	0.760	0.0028	2.00
	1.0927	1.092	0.0028	2.00

**Remark**

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer

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

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# MAINTENANCE AND IPV TEST CERTIFICATE MODEL

## Avio 200

<b>Customer :</b>	<u>Environment &amp; Laboratory</u>	<b>Date Tested:</b>	<u>September 9, 2022</u>
		<b>Recommendation Recertification</b>	
<b>Address :</b>	<u>40 Soi Liangmueangnon 13</u>	<b>Period</b>	<u>12</u> <b>Months</b>
	<u>Talad Kwan, Mueang</u>	<b>Recertification Due:</b>	<u>September 9, 2023</u>
	<u>Nonthaburi 11000</u>	<b>Date Last Certified:</b>	<u>January 14, 2021</u>
<b>User Name:</b>	<u>K. Alisa</u>	<b>Visit Number:</b>	<u>1 of 1</u>
<b>Phone:</b>	<u>086-568-4249</u>	<b>PerkinElmer Phone:</b>	<u>02-719-6420 ext 206</u>
<b>E - Mail :</b>		<b>PerkinElmer Fax:</b>	<u>02-318-5597</u>

CONFIGURATION TESTED		
<b>MODEL</b>	<b>SERIAL NUMBER</b>	<b>SOFTWARE</b>
<u>Avio 200</u>	<u>079S16062402</u>	
<b>TESTED EQUIPMENT</b>	<b>CALIBRATION NUMBER</b>	<b>EXPIRATION</b>
<u>IPV Method</u>		
<b>TEST STANDARD USED</b>	<b>PART NUMBER</b>	<b>EXPIRATION DATE</b>
<u>Multielement Standard</u>	<u>N069-1579</u>	<u>Jun 30,2023</u>
<u>Instrument Cal. STD4</u>	<u>N930-0221</u>	<u>Nov 30, 2023</u>
<b>CUSTOMER SUPPLIED</b>	<b>COMMENTS</b>	<b>CUSTOMER INITIALS</b>
<u>2 % HNO3</u>		
<u>10 % HNO3</u>		

**MAINTENANCE AND IPV TEST CERTIFICATE MODEL****Avio 200****SERIAL NUMBER:** 079S16062402**DATE TESTED:**September 9, 2022**1. MECHANICAL CHECKS**

A. Inspect and clean all fans and filters.

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

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

D. Adjust water and gas pressure regulator settings.

E. Inspect and leak check pneumatics drawers.

F. Clean the exterior of the instrument.

**2. OPTICAL CHECKS**

A. Inspect and clean all optical components.

B. As required, check and replace all purge filters.

C. Recheck optical alignment.

**3. COOLING SYSTEM CHECKS**

A. Perform preventive maintenance on chiller.

B. Flush out the chiller every year.

**4. PERFORMANCE CHECKS**

A. Torch View Alignment.

B. Wavelength Calibration.

# MAINTENANCE AND IPV TEST CERTIFICATE MODEL

## Avio 200

SERIAL NUMBER: 079S16062402 DATE TESTED: September 9, 2022

PARAMETER SPECIFICATION FINAL VALUE

### Spectral Resolution : UV

As	193.696 nm	≤ 0.009 nm	<u>0.00765</u> nm
Ni	231.604 nm	≤ 0.011 nm	<u>0.00885</u> nm
Ni	341.476 nm	≤ 0.015 nm	<u>0.01268</u> nm

### Spectral Resolution : VIS

Ba	455.403 nm	≤ 0.020 nm	<u>0.01519</u> nm
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### Precision

Zn	206.200 nm	% RSD ≤ 1.0 %	<u>0.58</u> %
Mg	280.271 nm	% RSD ≤ 1.0 %	<u>0.17</u> %
Mg	285.213 nm	% RSD ≤ 1.0 %	<u>0.18</u> %
Ba	455.403 nm	% RSD ≤ 1.0 %	<u>0.22</u> %

### Detection Limits : Axial

TI	190.801 nm	3(sd)	<u>0.25</u> ppb
As	193.696 nm	3(sd)	<u>1.92</u> ppb
Se	196.026 nm	3(sd)	<u>0.99</u>
Pb	220.353 nm	3(sd)	<u>1.24</u> ppb

### Detection Limits : Radial

As	193.696 nm	3(sd)	<u>1.12</u> ppb
Zn	213.857 nm	3(sd)	<u>0.06</u> ppb
Mn	257.610 nm	3(sd)	<u>0.00</u> ppb
La	379.478 nm	3(sd)	<u>0.09</u> ppb
Ba	455.403 nm	3(sd)	<u>0.01</u> ppb
Ba	493.408 nm	3(sd)	<u>0.01</u> ppb

### BEC : Axial (IB X 1000)/(IS-IB)

Mn	257.610 nm	≤ 30 ppb	<u>4.50</u> ppb
----	------------	----------	-----------------

### BEC : Radial (IB X 1000)/(IS-IB)

Mn	257.610 nm	≤ 30 ppb	<u>5.91</u> ppb
----	------------	----------	-----------------





**MAINTENANCE AND IPV TEST CERTIFICATE MODEL**  
**Avio 200**

SERIAL NUMBER: 079S16062402DATE TESTED: September 9, 2022

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: \_\_\_\_\_

(

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Cert. No.: 23TM1100

Page : 1 of 3

## Certificate of Calibration

**Equipment :** Incubator

**Manufacturer :** Memmert

**Model :** BM 500

**Serial No. :** D593.0342

**ID No. :** CHI-002

**Submitted by :** Environment & Laboratory Co.,Ltd.  
40 Soi Liangmueangnonthaburi 13,  
Talad Kwan, Mueang,  
Nonthaburi 11000

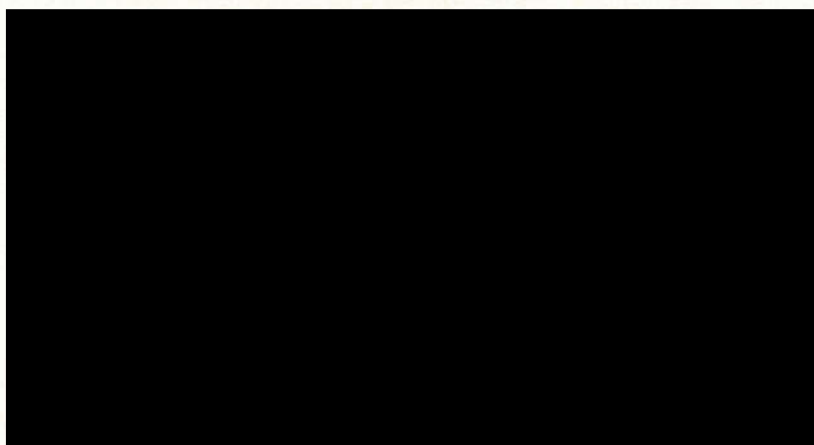
**Location :** Room No. 204

**Received Order :** 12 July 2023

**Calibration Date :** 12 July 2023

**Ambient Temperature :** ( 26 ± 10 ) °C

**Relative Humidity :** ( 50 ± 30 ) %



The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0056478



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2307-0094OC-4

Cert. No.: 23TM1100

Page : 2 of 3

**Procedure Used :-**

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector ( RTD ).

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1 ) Data Acquisition	MY41021843	22LM172	TPA	27 Dec 2023

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

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

**Remark :** TPA : Technology Promotion Association ( Thailand - Japan )

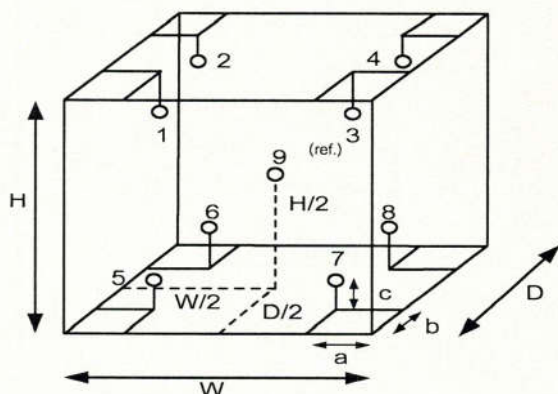
**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Not Available

**Environment during calibration**

	Beginning	Finished
Temp. ( °C )	22	22
REL.Humid. ( % )	64	66
AC Supply ( Volt )	222	221



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

**Probe Installation Details :**

a = 5.0 cm  
b = 5.0 cm  
c = 5.0 cm

**Dimension of Chamber :**

D = 0.40 m  
W = 0.56 m  
H = 0.48 m  
Capacity = 0.11 m<sup>3</sup>





Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2307-0094OC-4  
**Result of Calibration :-** ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Not Available

Cert. No.: 23TM1100

Page : 3 of 3

Calibration Point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Temperature stability ( ± °C )	Temperature uniformity ( °C )	Overall Variation ( °C )	Coverage Factor <i>k</i>
35.0	35.0	35.0	0.040	0.27	0.48	2

Calibration Point ( °C )	Measured Temperature ( °C )									Uncertainty  ( ± °C )
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
35.0	35.021	34.900	35.010	35.284	34.853	34.919	34.945	34.964	35.089	0.30

**Average\*** : The average of 30 values in each position.

**Temperature stability** : One-half of the greatest maximum difference of measured temperature at any one sensor.

**Temperature uniformity** : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

**Overall Variation** : The Difference of the maximum and minimum measured temperatures throughout observation.

**UUC\*** : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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

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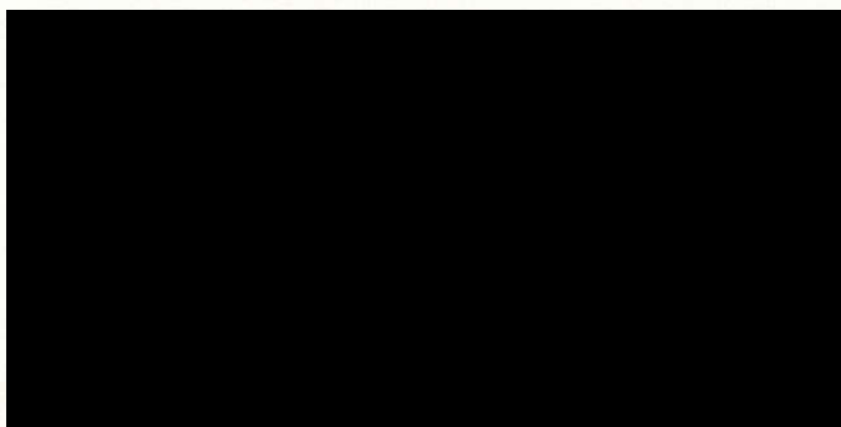


Cert. No.: 23TM1273

Page : 1 of 3

## Certificate of Calibration

Equipment :	Incubator
Manufacturer :	Envilab-Intelligent
Model :	-
Serial No. :	-
ID No. :	CHI-005
Submitted by :	Environment & Laboratory Co.,Ltd. 40 Soi Liangmueangnonthaburi 13, Talad Kwan, Mueang, Nonthaburi 11000
Location :	Room No. 204
Received Order :	24 August 2023
Calibration Date :	24 August 2023
Ambient Temperature :	( 26 ± 10 ) °C
Relative Humidity :	( 50 ± 30 ) %



The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0057741





Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2308-0600OC-1

Cert. No.: 23TM1273

Page : 2 of 3

**Procedure Used :-**

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector ( RTD ).

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

<u>Instrument</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due Date</u>
1 ) Data Acquisition	MY44035217	22LM170	TPA	16 Dec 2023

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

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

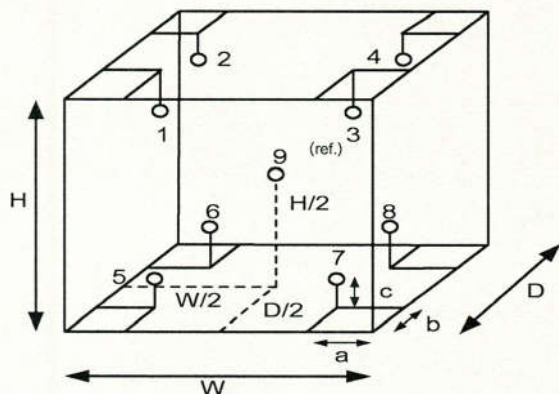
**Remark :** TPA : Technology Promotion Association ( Thailand - Japan )

**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Not Available

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	23	23
REL.Humid. ( % )	50	54
AC Supply ( Volt )	220	220



Position :	Ref. Std. ID No.:
1	18-10RTD-01
2	18-10RTD-02
3	18-10RTD-03
4	18-10RTD-04
5	18-10RTD-05
6	18-10RTD-06
7	18-10RTD-07
8	18-10RTD-08
9 (ref.)	18-10RTD-09

**Probe Installation Details :**

a = 5.0 cm  
b = 5.0 cm  
c = 5.0 cm

**Dimension of Chamber :**

D = 0.40 m  
W = 0.70 m  
H = 1.0 m  
Capacity = 0.28 m<sup>3</sup>





**Equipment :** Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2308-0600OC-1  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source  
**Fresh air setting :** Not Available

**Cert. No.:** 23TM1273

**Page :** 3 of 3

Calibration Point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Temperature stability ( ± °C )	Temperature uniformity ( °C )	Overall Variation ( °C )	Coverage Factor <i>k</i>
35.0	35.0	35.0	0.47	1.2	1.8	2

Calibration Point ( °C )	Measured Temperature ( °C )									Uncertainty  ( ± °C )
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
35.0	34.805	34.737	34.701	34.435	34.724	34.783	35.228	35.604	34.816	0.71

**Average\* :** The average of 30 values in each position.

**Temperature stability :** One-half of the greatest maximum difference of measured temperature at any one sensor.

**Temperature uniformity :** The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

**Overall Variation :** The Difference of the maximum and minimum measured temperatures throughout observation.

**UUC\* :** Unit Under Calibration

**Note :** The reported uncertainty of measurement was included stability and excluded uniformity .

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

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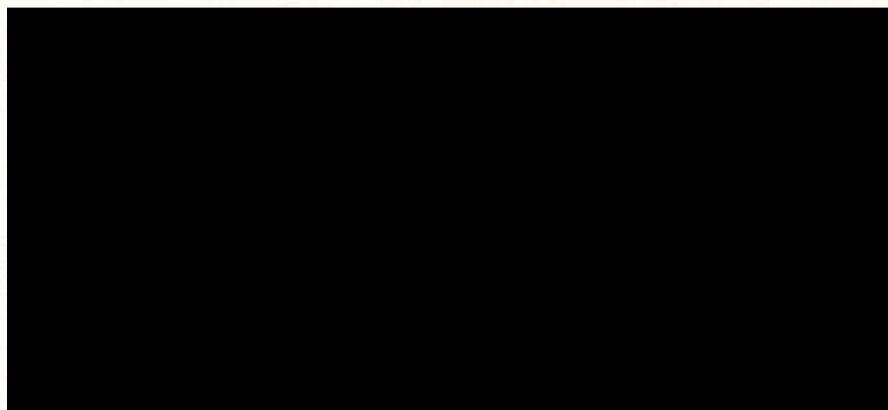


Cert.No.: 23CHO420

Page.: 1 of 3

## Certificate of Calibration

Equipment :	Spectrophotometer
Manufacturer :	Hach
Model :	DR 3900
Serial No. :	1988383
ID No. :	SPE-002
Condition As-Received:	Used Item
Received Date :	12 July 2023
Calibration Date :	12 July 2023
Reference :	2307-0094OC-11
Submitted by :	Environment & Laboratory Co.,Ltd. 40 Soi Liangmueangnonthaburi 13 Talad Kwan, Mueang, Nonthaburi 11000
Calibration Place :	Room No. 304
Ambient Temperature :	( 26.7 - 26.9 ) °C (On-Site)
Relative Humidity :	( 57.2 - 51.2 ) % (On-Site)
Calibration Procedure :	In - house method : CP-OCH4 based on ASTM E 275-01



The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0056486





Cert. No. : 23CHO420

Page : 2 of 3

**Condition of calibration result**

1. Reference Standard Material :

<u>Material</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due date</u>
1. Absorbance Standard set	32587	100509	28 Mar 2024
2. Absorbance Standard set	32590	100508	28 Mar 2024
3. Absorbance Standard set	8331	105939	28 Sep 2024
4. Wavelength Standard set	29829	94776	02 Sep 2023
5. Wavelength Standard set	29829	94777	02 Sep 2023

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

3. This certificate is traceable to the International System of Unit maintained at :

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

4. Spectral BandWidth : 5 nm

Scan Speed : - nm/min

**Calibration Results : without adjustment**

**Wavelength Accuracy**

<b>Certified Values of Reference Material ( nm )</b>	<b>UUC Reading ( nm )</b>	<b>Uncertainty of Measurement ( <math>\pm</math> nm )</b>	<b>Coverage Factor k</b>
361.40	361	0.59	2.00
447.20	446	0.59	2.00
537.00	536	0.59	2.00
638.00	637	0.59	2.00
740.51	741	0.59	2.00
807.04	807	0.59	2.00





Cert. No. : 23CHO420

Page : 3 of 3

**Calibration Results : without adjustment**

**Photometric Accuracy**

Wavelength (nm)	Certified Values of Reference Material ( Abs )	UUC Reading ( Abs )	Uncertainty of Measurement ( $\pm$ Abs )	Coverage Factor <i>k</i>
350.0	Zero	0.000	0.0046	2.00
	0.4246	0.423	0.0061	2.00
	Zero	0.000	0.0050	2.00
	0.6385	0.633	0.0055	2.00
440.0	Zero	0.000	0.0028	2.00
	0.5607	0.560	0.0030	2.00
	0.7336	0.733	0.0030	2.00
	1.0636	1.063	0.0030	2.00
546.1	Zero	0.000	0.0028	2.00
	0.5224	0.522	0.0028	2.00
	0.6856	0.684	0.0029	2.00
	0.9937	0.992	0.0028	2.00
635.0	Zero	0.000	0.0028	2.00
	0.5397	0.538	0.0028	2.00
	0.6832	0.680	0.0028	2.00
	0.9886	0.985	0.0028	2.00

**Remark**

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer
- The Potassium Dichromate filled cells are measured against a Perchloric acid blank.

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

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Cert. No.: 23TM1173

Page : 1 of 3

## Certificate of Calibration

Equipment :	Water Bath
Manufacturer :	Memmert
Model :	WB 22
Serial No. :	I505.0053
ID No. :	WAB-01
Submitted by :	Environment & Laboratory Co.,Ltd. 40 Soi Liangmueangnonthaburi 13, Talad Kwan, Mueang, Nonthaburi 11000
Location :	Room No. 303
Received Order :	12 July 2023
Calibration Date :	12 - 13 July 2023
Ambient Temperature :	( 26 ± 10 ) °C
Relative Humidity :	( 50 ± 30 ) %

Issue Date :

24 July 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0056487





**Equipment :** Water Bath  
**Condition As-Received :** Used Item  
**Reference :** 2307-0094OC-3

**Cert. No.:** 23TM1173

**Page :** 2 of 3

**Procedure Used :-**

Calibration were conducted using in-house calibration procedure CP-OT04 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer ( IPRT ).

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

<u>Instrument</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due Date</u>
1 ) Data Acquisition	MY44073381	23LM95	TPA	19 May 2024

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

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

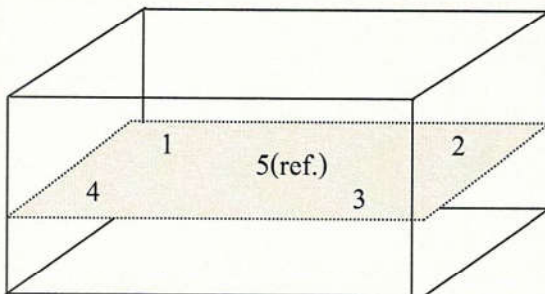
**Remark :** TPA : Technology Promotion Association ( Thailand - Japan )

**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

**Heat transfer medium used :** Water

	<b>Environmental</b>		<b>AC Voltage Supply</b>
	( °C )	( %R.H. )	
<b>Beginning of Calibration</b>	30	47	220
<b>Finished of Calibration</b>	31	50	221



Front

<b>Position :</b>	<b>Ref. Std. S/N.:</b>
1	4803988-006
2	4803988-007
3	4804539-014
4	4804539-015
5(ref.)	4804539-016





Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2307-0094OC-3  
**Result of Calibration :-** ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source

Cert. No.: 23TM1173

Page : 3 of 3

Calibration point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Average* Standard Reading ( °C )					Uncertainty  ( ± °C )
			Position					
			1	2	3	4	5 (ref.)	
44.5	44.5	44.5	44.507	44.503	44.498	44.509	44.502	0.15
60.0	60.0	60.0	59.914	59.928	59.912	59.899	59.894	0.15

Calibration point ( °C )	Uniformity ( °C )	Stability ( ± °C )	Coverage Factor <i>k</i>
44.5	0.039	0.023	2
60.0	0.098	0.042	2

**Average\*** : The average of 30 values in each position.

**Uniformity** : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

**Stability** : One-half of the greatest maximum difference of measured temperature at any one probe.

**UUC\*** : Unit Under Calibration

**Note** : The reported uncertainty of measurement was included stability and excluded uniformity.

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

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## Certificate of Calibration

Cert.No.: 24CG774

Page.: 1 of 2

Equipment :	Burette
Capacity :	50 mL
Serial No. :	-
ID. No. :	BUR-005
Manufacturer :	Witeg
Made in :	Germany
Submitted by :	Environment & Laboratory Co.,Ltd. 40 Soi Liangmueangnonthaburi 13 Talad Kwan, Mueang, Nonthaburi 11000
Ambient Temperature :	(20 ± 2.5) °C
Relative Humidity :	(50 ± 10) %
Barometric Pressure :	760 mmHg
Calibration Procedure :	ASTM E 542 - 01

**The Uncertainties are for a confidence probability of approximately 95%**

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**Equipment :** Burette  
**Received Date :** 16 February 2024  
**Condition As-Received :** Used Item  
**Calibration Date :** 20 February 2024  
**Reference :** 2402-0505DC-6

**Cert.No.:** 24CG774

**Page.:** 2 of 2

**Condition of this result of calibration**

1. Reference Standard Instruments :

<u>Instruments</u>	<u>Model</u>	<u>Serial No.</u>	<u>ID. No.</u>	<u>Certificate No.</u>	<u>Traceability</u>	<u>Due date</u>
1) Balance	XP205DR	1126143764	140RC004	23MM538	TPA	15 Sep 2024
2) Thermo-Hygrograph	THDX-CE	00016540	140EC001	23H1275	TPA	09 June 2024
3) Thermometer	-	0834181	140EC005	23I948	TPA	10 Aug 2024

This certification is traceable to SI Unit

2. The certificate is valid only to the item calibrated on date and place of calibration.  
3. True value is converted to true volume at the standard temperature of 20 °C

**Calibration result :**

<b>Nominal capacity ( mL )</b>	<b>Reading ( mL )</b>	<b>Uncertainty ( ± mL )</b>	<b>k Factor</b>
50	49.9765	0.010	2.00

**Remark** mL = cm<sup>3</sup>

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

-o0o-





**CRYSTAL CALIBRATION SALES AND SERVICE CO., LTD.**

45/48 Soi Salathammasop31, Salathammasop Rd.,  
Salathammasop, Thawewatthana, Bangkok 10170 Thailand  
Tel : 0-2408-8474-5 Fax : 0-2408-8477 Email : info@crystalcal.com www.crystalcal.com



## CERTIFICATE OF CALIBRATION

**Certificate No. : 23-0879-019**

**Issue Date** : 30 June 2023

**Work Order No. : 23/0879**

**Customer Name** : BUREAU VERITAS AQ LAB (THAILAND) COMPANY LIMITED  
111 Thailand Science Park, Moo 9 Paholyotin Road,  
Klong Nueng, Klong Luang, Pathumthani 12120, Thailand

**Date of Received** : 28 June 2023

**Date of Calibration** : 28 June 2023

**Instrument Details** :

<b>Description</b>	: Water Bath
<b>Manufacturer</b>	: ThremoFisher
<b>Model</b>	: N/A
<b>Serial No.</b>	: 0152187501160414
<b>ID No.</b>	: CHM000205
<b>Resolution</b>	: 0.1 °C
<b>Location</b>	: Laboratory

**Calibration Method** : This instrument was calibrated by insert standard thermometer into the liquid bath according to calibration procedure CWI-T-11 in-house methods based on ASTM E715-80 (Reapproved 2006)

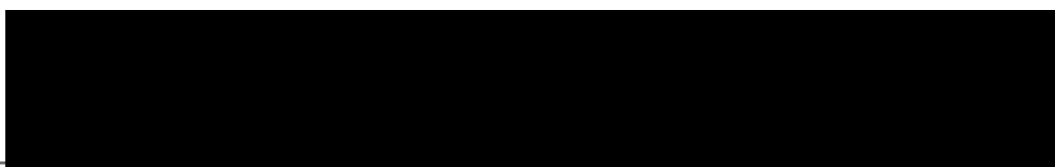
**Environmental Conditions :**

**Temperature** : Area Monitoring between 15°C to 40°C  
**Humidity** : Area Monitoring between 30%RH to 85%RH  
**Line Voltage** : Area Monitoring 220 VAC ± 10%

**Traceability of Measurement :**

This certificate of calibration documents the traceability to national standard, which realize the unit of measurement according to the International system of Units (SI) and The temperature scale in use at this laboratory is The International Temperature scale of 1990.

**Calibrated by :**



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## CERTIFICATE OF CALIBRATION

Certificate No. : 23-0879-019

Issue Date : 30 June 2023

Work Order No. : 23/0879

### Details of calibration

#### 1. Reference Standards Instrument

Instrument	Model	Serial No. / ID No.	Certificate No.	Due Date
Data Acquisition unit	34972A	MY59002085	22-1146-021	22 November 2023
Sensor type	RTD	Channel 101 to 106	22-1146-021	22 November 2023

#### 2. Certificate traceble

: This certificate traceable to The International System of Unit refer to  
Crystal Calibration Sales and Service Co., Ltd. , NAC Calibration No. 0260

#### 3. Condition of item

: Used

#### 4. Calibration site

: On-site

#### 5. Result of Calibration

: Without Adjustment

#### 6. Evaluate Condition

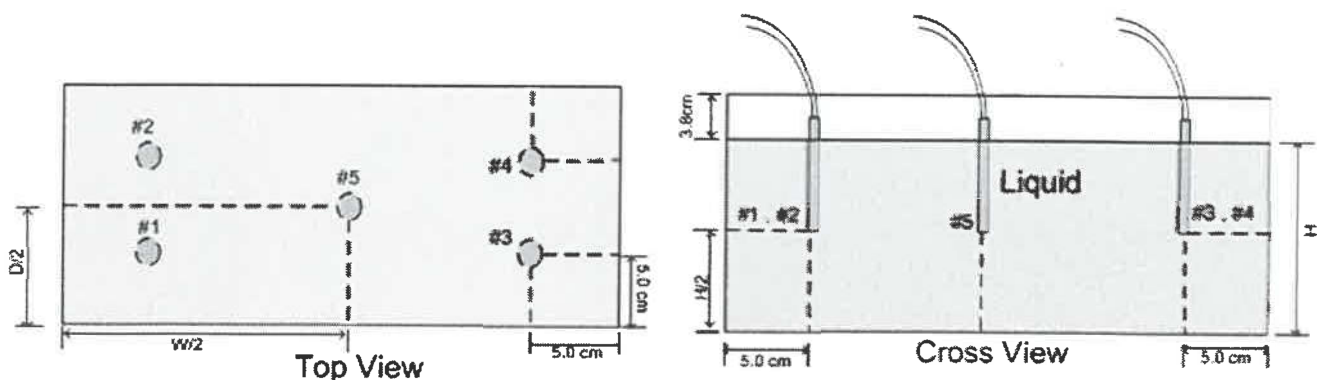
: Time Constant : - Hour 33 Minute At Cal. point 44.5 °C  
Type of Control : PID Control

Testing liquid bath use media is Water

#### 7. Calibration note

: The results reported in this certificate refer to the condition of instrument on  
the process into the standby state of Liquid Bath

#### 8. Sensors Installation Diagram



Position Diagrams

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**CERTIFICATE OF CALIBRATION**

Issue Date : 30 June 2023

Certificate No. : 23-0879-019

Work Order No. : 23/0879

**Result of Temperature Distribution and Performance Check**

Table 1 : Reporting of Temperature

Calibration point (°C)	Average Measured Temperature (°C) @ Sensor No. (Sensor No.5 is REF)					Uncertainty ± (°C)
	#1	#2	#3	#4	#5	
44.5	44.50	44.50	44.50	44.50	44.51	0.13

Table 2 : Reporting of Characterization Result

Indicator Set point (°C)	Indicator Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
	MAX	MIN	Average			
44.4	44.4	44.4	44.4	0.04	0.07	0.07

**Note :**

Calibrate items in good condition and this report customer request and accepted in certificate

The reference sensor is preferably located at the center of bath

The measured temperature data readout by software "Benchlink Datalogger 3"

The quoted uncertainty includes "Stability" and excludes "Loading effect (20% of Temp Uniformity)"

Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the bath under steady state conditions.

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

Indicating Temperature - the average reading of indicating device that forms the integral part of the enclosure.

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

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%.

--END--





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## CERTIFICATE OF CALIBRATION

Certificate No. : 23-0879-008

Issue Date : 30 June 2023

Work Order No. : 23/0879

Customer Name : BUREAU VERITAS AQ LAB (THAILAND) COMPANY LIMITED  
111 Thailand Science Park, Moo 9 Paholyotin Road,  
Klong Nueng, Klong Luang, Pathumthani 12120, Thailand

Date of Received : 26 June 2023

Date of Calibration : 26 June 2023

Instrument Details : **Description** : Temperature Controlled Enclosures [Incubator]  
**Manufacturer** : memmert  
**Model** : INE 500  
**Serial No.** : E512.0738  
**ID No.** : CHM000151  
**Resolution** : 0.1 °C  
**Location** : Laboratory

Calibration Method : This instrument was calibrated by insert standard thermometer into the chamber according to calibration procedure no. CWI-T-10 follow up to TLAS G-20-1/02-08 (E) : Guidelines for Calibration and Checks of Temperature Controlled Enclosures.

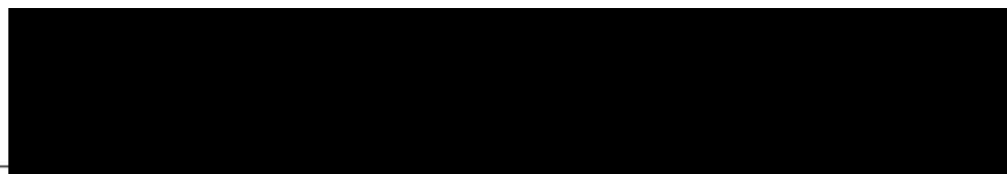
Environmental Conditions :

**Temperature** : Area Monitoring between 15°C to 40°C  
**Humidity** : Area Monitoring between 30%RH to 85%RH  
**Line Voltage** : Area Monitoring 220 VAC  $\pm$  10%

Traceability of Measurement :

This certificate of calibration documents the traceability to national standard, which realize the unit of measurement according to the International system of Units (SI) and The temperature scale in use at this laboratory is The International Temperature scale of 1990.

Calibrated by :



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## CERTIFICATE OF CALIBRATION

Issue Date : 30 June 2023

Certificate No. : 23-0879-008

Work Order No. : 23/0879

### Details of Calibration

#### 1. Reference Standards Instrument

Instrument	Model	Serial No./Ins No.	Certificate No.	Due Date
Data Acquisition unit	34972A	MY59002085	22-1146-021	22 November 2023
Sensor type	RTD	RTD# 101-109	22-1146-021	22 November 2023

2. Certificate traceable : This certificate traceable to The International System of Unit refer to  
 Crystal Calibration Sales and Service Co., Ltd. , NAC Calibration No. 0260
3. Condition of item : Used
4. Calibration site : On - Site
5. Result of Calibration : Without adjustment
6. Evaluate Condition : Time Constant : - Hour 33 Minute At cal. point 41.5 °C  
 Air vent : Off  
 Fan speed status : None Fan Speed
7. Calibration note : The results reported in this certificate refer to the condition of instrument on  
 the process into the steady state of chamber
8. Sensors Installation Diagram : When ; Sensor installation location in Chamber @ Working Space  
 A = Distance between sensor and wall of chamber is 5 cm
9. Dimensions of chamber : W = 0.56 m ; D = 0.4 m ; H = 0.48 m

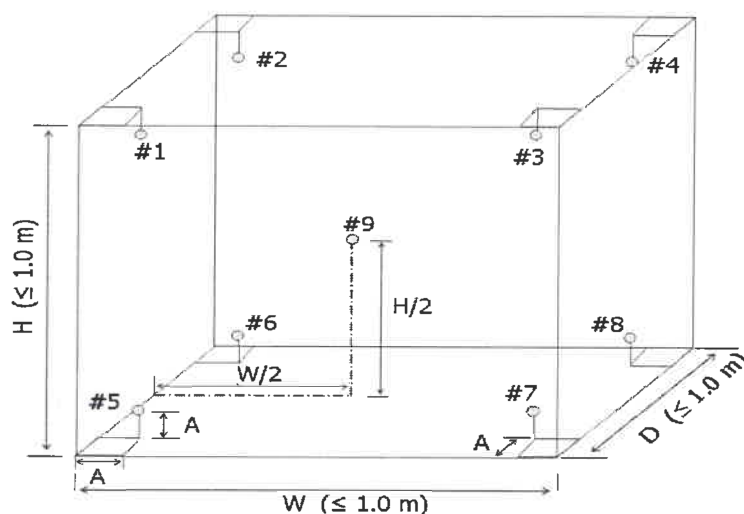


Diagram of Chamber



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## CERTIFICATE OF CALIBRATION

Issue Date : 30 June 2023

Certificate No. : 23-0879-008

Work Order No. : 23/0879

### Result of Temperature Distribution and Performance Check

Table1 : Reporting of Temperature Distribution

Calibration point (°C)	Average Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ± (°C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
41.5	41.91	41.99	41.77	41.86	41.62	42.18	41.66	41.76	41.80	0.29
42.0	42.46	42.52	42.29	42.39	42.16	42.66	42.19	42.27	42.33	0.26

Table 2 : Reporting of Performance check

Indicator Set Point (°C)	Indicator Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
	MAX	MIN	Average			
41.5	41.5	41.5	41.5	0.14	0.51	0.74
42.0	42.0	42.0	42.0	0.10	0.44	0.64

### Note

Calibrate items it good condition and this report customer request and accepted in certificate

The reference sensor is preferably located of the geometric center of chamber

The measured temperature data readout by software "Benchlink Datalogger 3"

The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions.

Overall Variation - The difference of the maximum and minimum measured temperatures througout observation time.

Indicating Temperature - the average reading of indicating device that forms the integral part of the enclosure.

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

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





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## CERTIFICATE OF CALIBRATION

Certificate No. : 23-0879-010

Issue Date : 30 June 2023

Work Order No. : 23/0879

Customer Name : BUREAU VERITAS AQ LAB (THAILAND) COMPANY LIMITED  
111 Thailand Science Park, Moo 9 Paholyotin Road,  
Klong Nueng, Klong Luang, Pathumthani 12120, Thailand

Date of Received : 26 June 2023

Date of Calibration : 26 June 2023

Instrument Details : Description : Temperature Controlled Enclosures [Incubator]  
Manufacturer : memmert  
Model : IN110  
Serial No. : D415.0797  
ID No. : CHM000181  
Resolution : 0.1 °C  
Location : Laboratory

Calibration Method : This instrument was calibrated by insert standard thermometer into the chamber according to calibration procedure no. CWI-T-10 follow up to TLAS G-20-1/02-08 (E) : Guidelines for Calibration and Checks of Temperature Controlled Enclosures.

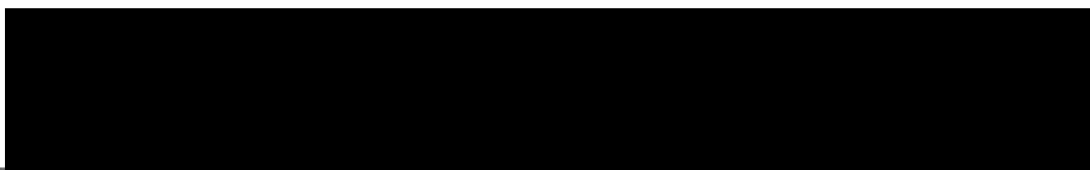
### Environmental Conditions :

Temperature : Area Monitoring between 15°C to 40°C  
Humidity : Area Monitoring between 30%RH to 85%RH  
Line Voltage : Area Monitoring 220 VAC  $\pm$  10%

### Traceability of Measurement :

This certificate of calibration documents the traceability to national standard, which realize the unit of measurement according to the International system of Units (SI) and The temperature scale in use at this laboratory is The International Temperature scale of 1990.

Calibrated by :



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## CERTIFICATE OF CALIBRATION

Issue Date : 30 June 2023

Certificate No. : 23-0879-010

Work Order No. : 23/0879

### Details of Calibration

#### 1. Reference Standards Instrument

Instrument	Model	Serial No./Ins No.	Certificate No.	Due Date
Data Acquisition unit	34972A	MY49024826	22-1485-003	20 November 2023
Sensor type	RTD	RTD# 301-308, 310	22-1485-003	20 November 2023

2. Certificate traceable : This certificate traceable to The International System of Unit refer to  
Crystal Calibration Sales and Service Co., Ltd. , NAC Calibration No. 0260
3. Condition of item : Used
4. Calibration site : On - Site
5. Result of Calibration : Without adjustment
6. Evaluate Condition : Time Constant : - Hour 33 Minute At cal. point 35 °C  
Air vent : Off  
Fan speed status : None Fan Speed
7. Calibration note : The results reported in this certificate refer to the condition of instrument on  
the process into the steady state of chamber
8. Sensors Installation Diagram : When ; Sensor installation location in Chamber @ Working Space  
A = Distance between sensor and wall of chamber is 5 cm
9. Dimensions of chamber : W = 0.56 m ; D = 0.4 m ; H = 0.48 m

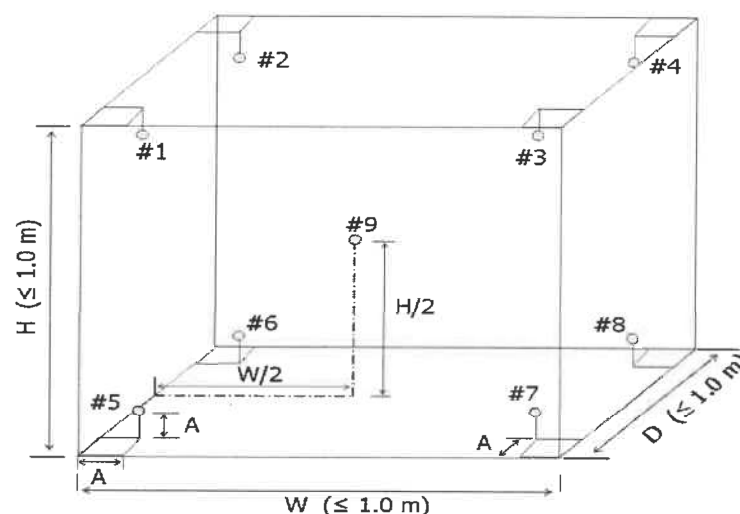


Diagram of Chamber



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## CERTIFICATE OF CALIBRATION

Issue Date : 30 June 2023

Certificate No. : 23-0879-010

Work Order No. : 23/0879

### Result of Temperature Distribution and Performance Check

Table1 : Reporting of Temperature Distribution

Calibration point (°C)	Average Measured Temperature (°C) @ Sensor No.									Uncertainty
	(Sensor No.9 is REF)									
	#1	#2	#3	#4	#5	#6	#7	#8	#9	± (°C)
35.0	35.05	35.03	35.04	35.07	34.80	34.87	34.78	34.86	35.07	0.26

Table 2 : Reporting of Performance check

Indicator Set Point (°C)	Indicator Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
	MAX	MIN	Average			
34.8	34.8	34.8	34.8	0.11	0.33	0.48

### Note

Calibrate items it good condition and this report customer request and accepted in certificate

The reference sensor is preferably located of the geometric center of chamber

The measured temperature data readout by software "Benchlink Datalogger 3"

The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions.

Overall Variation - The difference of the maximum and minimum measured temperatures throughtout observation time.

Indicating Temperature - the average reading of indicating device that forms the integral part of the enclosure.

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

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





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## CERTIFICATE OF CALIBRATION

Certificate No. : 23-0420-001

Issue Date : 21 March 2023

Work Order no.: 23/0420

Customer Name : BUREAU VERITAS AQ LAB (THAILAND) COMPANY LIMITED  
111 Thailand Science Park, Moo 9 Paholyotin Road,  
Klong Nueng, Klong Luang, Pathumthani 12120, Thailand

Date of Received : 21 March 2023

Date of Calibration : 21 March 2023

Instrument Details : Description : Autoclave  
Manufacturer : HIRAYAMA  
Model : HV-110 II  
Serial No. : 34819080032  
ID No. : CHM000199  
Resolution : 0.1 °C  
Location : Laboratory

Calibration Method : This instrument was calibrated by insert Temperature data logger into the chamber of autoclave according to calibration procedure CWI-T-12 in-house methods based on BS 2646 : 1993 part 5 clause 3.1

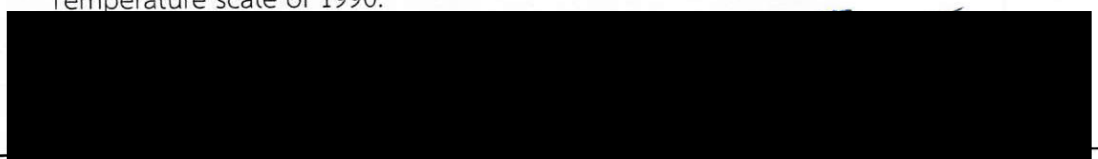
### Environmental Conditions

Temperature : Area Monitoring between 15°C to 40°C  
Humidity : Area Monitoring between 30%RH to 85%RH  
Line Voltage : Area Monitoring 220 VAC  $\pm$  10%

### Traceability of Measurement

: This certificate of calibration documents the traceability to national standard, which realize the unit of measurement according to the International system of Units (SI) and The temperature scale in use at this laboratory is The International Temperature scale of 1990.

Calibrated by :



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## CERTIFICATE OF CALIBRATION

Certificate No. : 23-0420-001

Work Order No. : 23/0420

Issue Date : 21 March 2023

### Details of Calibration

#### 1. Reference Standards Instrument

Instrument	Serial No.	Certificate No.	Due Date
Temperature Data Logger Type RTD	R14466	22-1388-001	11 October 2023
	R14467	22-1388-001	11 October 2023
	R14469	22-1388-001	11 October 2023

2. Certificate traceable : This certificate traceable to The International System of Unit refer to  
Crystal Calibration Sales and Service Co., Ltd. , NAC Calibration No. 0260

3. Condition of item : Used

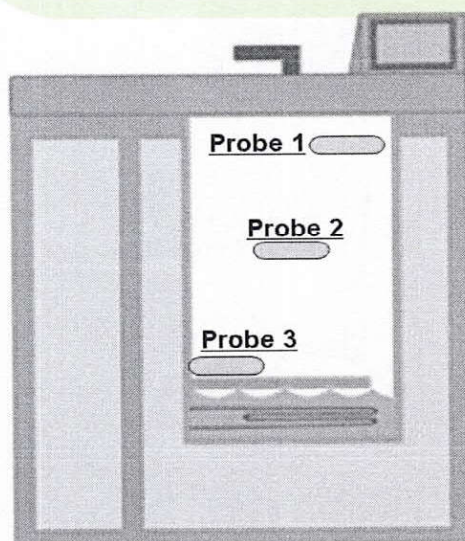
4. Calibration site : On-site

5. Result of Calibration : Without Adjustment

6. Evaluate Condition : Time Constant : 20 Minutes At cal. point 115 °C  
Calibration process record temperature data at sterilization time

7. Calibration note : The results reported in this certificate refer to the condition of instrument on  
the process into the standby state of chamber

8. Sensors Installation Diagram : Probe 1 : Installation Attached to the load temperature probe, within 20 mm  
Probe 2 : Installation in the half of upper the Chamber autoclave  
Probe 3 : Installation in the Chamber drain, within 100 mm



Position Diagrams





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## CERTIFICATE OF CALIBRATION

Certificate No. : 23-0420-001

Work Order No. : 23/0420

Issue Date : 21 March 2023

### Result of Temperature Distribution and Performance Check

Table1 : Reporting of Temperature within chamber autoclaves

Calibration point ( °C )	Sterilization time ( Minutes )	Average Measured Temperature (°C) @ Sensor No. (Sensor No.2 is REF)			Uncertainty ± ( °C )
		#1	#2	#3	
115.0	20	115.46	115.44	115.49	0.45
118.0	15	118.52	118.51	118.55	0.45
121.0	15	121.55	121.52	121.57	0.45

Table 2 : Reporting of Characterization within chamber autoclaves

Indicator Set point ( °C )	Indicator Reading (°C)				Stability ± ( °C )	Uniformity ( °C )	Overall variation ( °C )
	MAX	MIN	Average	MPa			
115.0	115.7	115.6	115.7	0.071	0.29	0.09	0.60
118.0	118.8	118.7	118.8	0.089	0.21	0.06	0.45
121.0	121.8	121.7	121.8	0.108	0.20	0.08	0.45

#### Note :

Calibrate items it good condition and this report customer request and accepted in certificate

Temperature Data Logger has setting interval time is 5 seconds per record data

The measured temperature data readout by software "Madgetech Data Logger Software"

The quoted uncertainty include " Stability " and Loading effect (20% of Temp Uniformity) "

Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the bath under steady state conditions.

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

Indicating Temperature - the average reading of indicating device that forms the integral part of the enclosure.

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

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%.



## ภาคผนวก ข

หนังสือรับรองห้องปฏิบัติการวิเคราะห์เอกซน





ที่ อก ๐๓๑๐(๑)/ ๑๖๙๙

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๓ กุมภาพันธ์ ๒๕๖๗

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท ทีเอ็นพี เอ็นไวรอนเมนท์ จำกัด

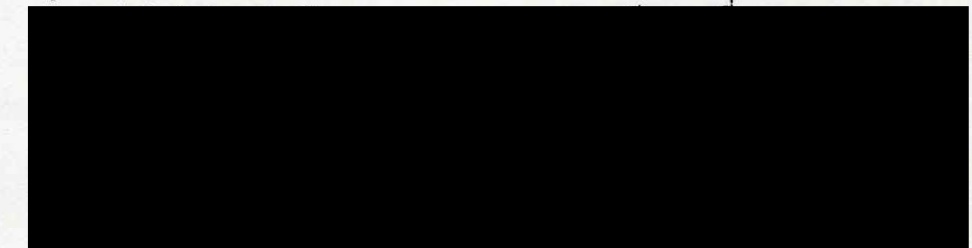
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๑๙ ธันวาคม ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
บริษัท ทีเอ็นพี เอ็นไวรอนเมนท์ จำกัด จำนวน ๒ แผ่น

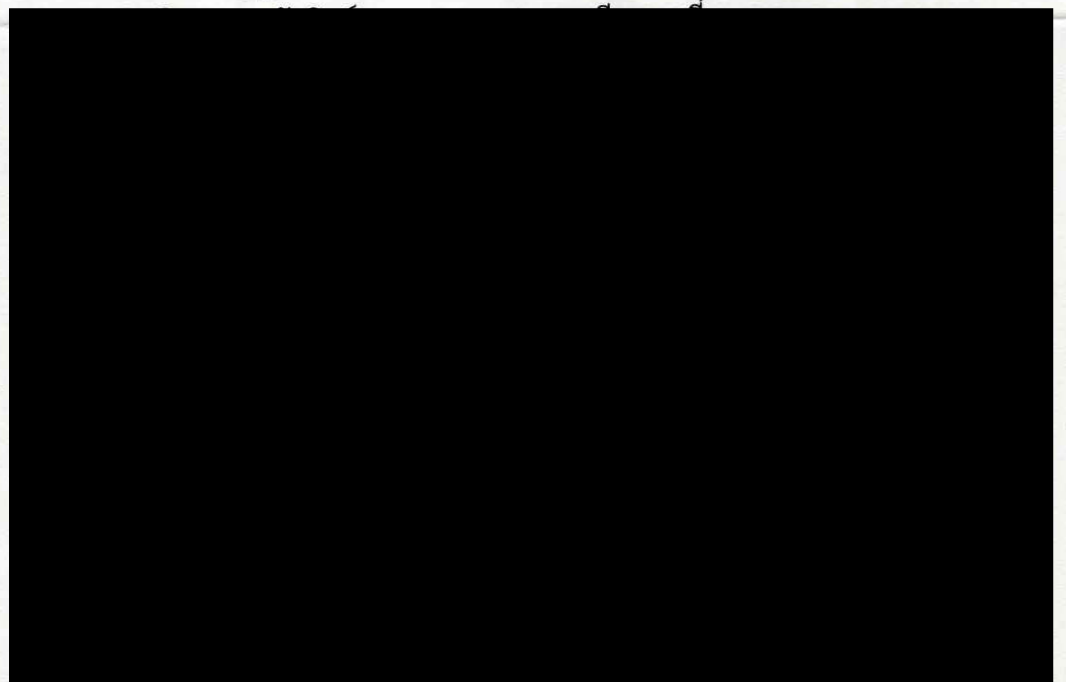
ตามหนังสือที่อ้างถึง บริษัท ทีเอ็นพี เอ็นไวรอนเมนท์ จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียน  
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๓๑๘ สถานที่ตั้งเลขที่ ๓๓๒/๑๗๓ หมู่ที่ ๓ ตำบลบางรักพัฒนา  
อำเภอบางบัวทอง จังหวัดนนทบุรี ต่อกรมโรงงานอุตสาหกรรม นั้น

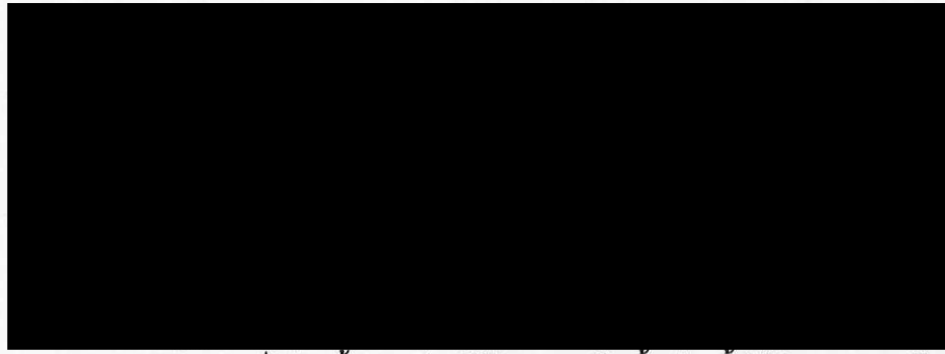
กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ทีเอ็นพี เอ็นไวรอนเมนท์ จำกัด ต่ออายุหนังสือ  
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์



ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์



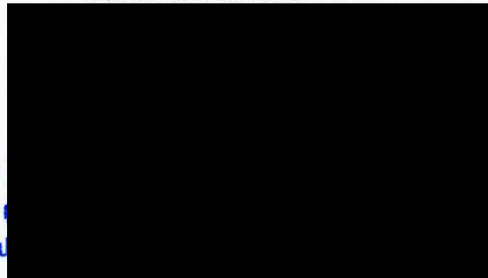


ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย และ  
สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๑๔ มกราคม ๒๕๗๐ หากประสงค์จะต่ออายุหนังสือ  
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์  
กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th





เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ทีเอ็นพี เอ็นไวรอนเม้นท์ จำกัด

เลขทะเบียน ว-๓๑๘

ที่ อก ๐๓๑๐(๑)/ ๑ ๖ ๙ ๙

ลงวันที่ ๒๓ กุมภาพันธ์ ๒๕๖๗

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๑ รายการ

น้ำเสีย จำนวน 7 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method <sup>[2]</sup> 2) 5-Day BOD Test, Membrane Electrode Method <sup>[2]</sup>
2	Oil & Grease	Liquid-Liquid, Partition-Gravimetric Method <sup>[2]</sup>
3	pH	Electrometric Method <sup>[2]</sup>
4	Sulfide	Iodometric Method <sup>[2]</sup>
5	Temperature	Laboratory and Field Methods <sup>[2]</sup>
6	Total Dissolved Solids	Dried at 180 °C <sup>[2]</sup>
7	Total Suspended Solids	Dried from 103 to 105 °C <sup>[2]</sup>

น้ำใต้ดิน จำนวน 1 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	pH	Electrometric Method <sup>[2]</sup>

อากาศเสีย (ปล่องระบาย) จำนวน 2 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Opacity	Ringelmann's Method <sup>[1]</sup>
2	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method <sup>[3]</sup>

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 1 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	pH	Electrometric Method <sup>[4,5]</sup>

เอกสารอ้างอิง...

**เอกสารอ้างอิง**

1. กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2549. เรื่อง กำหนดค่าปริมาณเขม่าควันที่เจือปนในอากาศที่ระบายออกจากปล่องของหม้อน้ำโรงสีข้าวที่ใช้แก๊สเป็นเชื้อเพลิง.

ราชกิจจานุเบกษา. 4 ธันวาคม 2549. เล่มที่ 123 ตอนพิเศษ 125ง.

2. APHA, AWWA, WEF. **Standard Methods for the Examination of Water and Wastewater.** 24<sup>th</sup> ed. Washington, DC: APHA, 2023.

3. United States Environmental Protection Agency. **Standards of Performance for New Stationary Sources.** 40 CFR 60. Appendix A, 2023.

4. United States Environmental Protection Agency. Test Methods for Evaluating Solid Waste Physical/Chemical Methods. **pH Electrometric Measurement. SW-846 Method 9040C,** 2004.

5. United States Environmental Protection Agency. Test Methods for Evaluating Solid Waste Physical/Chemical Methods. **Soil and Waste pH. SW-846 Method 9045D,** 2004





๒๓ กันยายน ๒๕๖๗

เรื่อง เปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ทีเอ็นพี เอ็นไวรอนเมนต์ จำกัด

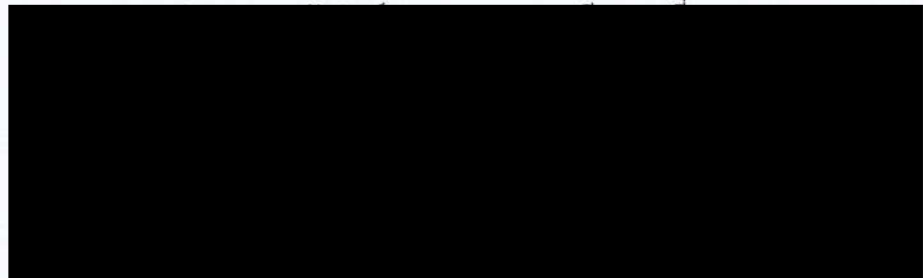
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๒๖ กรกฎาคม ๒๕๖๗

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์  
บริษัท ทีเอ็นพี เอ็นไวรอนเมนต์ จำกัด จำนวน ๑ แผ่น

ตามคำขอที่อ้างถึง บริษัท ทีเอ็นพี เอ็นไวรอนเมนต์ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน  
เลขทะเบียน ว-๓๑๘ สถานที่ตั้งเลขที่ ๓๓๒/๑๗๓ หมู่ที่ ๓ ตำบลบางรักพัฒนา อำเภอบางบัวทอง จังหวัดนนทบุรี  
ขอเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

ก. ให้ยกเลิกเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๖ ราย

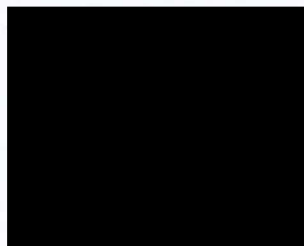


ข. ให้เพิ่มขอบข่ายสารมลพิษที่วิเคราะห์ในน้ำ/น้ำเสีย ตามสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
คือในวันที่ ๑๔ มกราคม ๒๕๗๐ ทั้งนี้สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงาน  
อุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th





เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์

บริษัท ทีเอ็นพี เอ็นไวรอนเม้นท์ จำกัด

เลขทะเบียน ว-๓๑๘

ที่ อก ๐๓๑๐(๑)/ ๕๖๖ ๘

ลงวันที่ ๒๓ กันยายน ๒๕๖๗

ขอขยายสารมลพิษที่ได้รับการขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓ รายการ

น้ำ/น้ำเสีย จำนวน 3 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method
2	Chromium (VI)	Colorimetric Method
3	Free Chlorine	Iodometric Method

เอกสารอ้างอิง

APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 24<sup>th</sup> ed. Washington DC: APHA Press; 2023.



ใบรับรองเลขที่ 23-LB0055  
(Certificate No.)

## ใบรับรองระบบงาน (Certificate of Accreditation)

อาศัยอำนาจตามความในพระราชบัญญัติการมาตรฐานแห่งชาติ พ.ศ. ๒๕๕๑  
(By Virtue of National Standardization Act B.E. 2551 (2008))

เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม  
(Secretary-General, Thai Industrial Standards Institute)

ออกใบรับรองฉบับนี้ให้  
(Issues this certificate to)

บริษัท ทีเอ็นพี เอ็นไวรอนเม้นท์ จำกัด  
(TNP ENVIRONMENT CO.,LTD.)

ตั้งอยู่เลขที่  
(Address)

๓๓๒/๑๗๓ หมู่ที่ ๓ ตำบลบางรักพัฒนา อำเภอบางบัวทอง จังหวัดนนทบุรี  
332/173 Moo 3, Bang Rak Phatthana, Bang Bua Thong, Nonthaburi

ได้รับการรับรองความสามารถ  
(Certificate of competence)

ตามมาตรฐานเลขที่ มอก. ๑๗๐๒๕ - ๒๕๖๑  
(Standard No. TIS 17025-2561 (2018) (ISO/IEC 17025: 2017))

ข้อกำหนดทั่วไปว่าด้วยความสามารถของ ห้องปฏิบัติการทดสอบและห้องปฏิบัติการสอบเทียบ  
General requirements for the competence of testing and calibration laboratories

หมายเลขการรับรองที่ ทดสอบ ๑๖๗๙  
(Accreditation No. Testing 1679)

โดยมีรายละเอียดสาขาและขอบข่ายที่ได้ใบรับรอง แสดงไว้ใน QR CODE และ [www.tisi.go.th](http://www.tisi.go.th)  
(Details of the scheme and scope of the certificate are shown in QR CODE and [www.tisi.go.th](http://www.tisi.go.th))

ออกให้ ณ วันที่ ๒๘ ธันวาคม พ.ศ. ๒๕๖๕  
(Issue date : 28 December B.E. 2565 (2022))

(นายเอกนิติ รมยานนท์)

รองเลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

ปฏิบัติราชการแทน

เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม



e1328e0a



รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ

(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 23-LB0055

(Certification No.23-LB0055)



ชื่อห้องปฏิบัติการ  
(Laboratory Name)

บริษัท ทีเอ็นพี เอ็นไวรอนเม้นท์ จำกัด  
(TNP ENVIRONMENT CO.,LTD.)

หมายเลขการรับรองที่  
(Accreditation No.)

ทดสอบ 1679  
(Testing 1679)

ฉบับที่ 02  
(Issue No. 02)

ออกให้ตั้งแต่วันที่ 18 พฤศจิกายน พ.ศ. 2567  
(Valid from) (18 November B.E. 2567 (2024))

ถึงวันที่ 18 ธันวาคม พ.ศ. 2570  
(Until) (18 December B.E. 2570 (2027))

สถานภาพห้องปฏิบัติการ  
(Laboratory status)

☒ ถาวร  
(Permanent)

☐ นอกสถานที่  
(Site)

☐ ชั่วคราว  
(Temporary)

☐ เคลื่อนที่  
(Mobile)

☐ หลายสถานที่  
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาส่งแวดล้อม (environmental field)</p> <p>น้ำและน้ำเสีย (water and wastewater)</p>	<p>- pH 2.0 to 10.0</p> <p>- Total suspended solids (TSS) 5.0 mg/L to 20 000 mg/L</p> <p>- Total dissolved solids (TDS) 10 mg/L to 20 000 mg/L</p> <p>- Total solids (TS) 10 mg/L to 20 000 mg/L</p> <p>- Chemical Oxygen Demand (COD) 10 mg/L to 10 000 mg/L</p>	<p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 24<sup>th</sup> edition, 2023, part 4500-H<sup>+</sup> B</p> <p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 24<sup>th</sup> edition, 2023, part 2540 D</p> <p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 24<sup>th</sup> edition, 2023, part 2540 C</p> <p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 24<sup>th</sup> edition, 2023, part 2540 B</p> <p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 24<sup>th</sup> edition, 2023, part 5220 C</p>



รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ

(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 23-LB0055

(Certification No. 23-LB0055)



ฉบับที่ 02

(Issue No. 02)

ออกให้ตั้งแต่วันที่ 18 พฤศจิกายน พ.ศ. 2567

(Valid from)

(18 November B.E. 2567 (2024))

ถึงวันที่ 18 ธันวาคม พ.ศ. 2570

(Until) (18 December B.E. 2570 (2027))

สถานภาพห้องปฏิบัติการ

(Laboratory status)

☒ ถาวร

(Permanent)

☐ นอกสถานที่

(Site)

☐ ชั่วคราว

(Temporary)

☐ เคลื่อนที่

(Mobile)

☐ หลายสถานที่

(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสังแวดล้อม (environmental field)</p> <p>น้ำและน้ำเสีย (ต่อ) (water and wastewater) ((Cont.))</p>	<p>- Total hardness 1 mg/L to 10 000 mg/L (expressed as CaCO<sub>3</sub>)</p>	<p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 24<sup>th</sup> edition, 2023, part 2340 C</p>
<p>สาขาโคกภัณฑ์ (consumer products field)</p> <p>น้ำดื่ม (drinking water)</p>	<p>- pH 2.0 to 10.0</p> <p>- Total dissolved solids (TDS) 10 mg/L to 20 000 mg/L</p> <p>- Total solids (TS) 10 mg/L to 20 000 mg/L</p> <p>- Total hardness 1 mg/L to 10 000 mg/L (expressed as CaCO<sub>3</sub>)</p>	<p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 24<sup>th</sup> edition, 2023, part 4500-H<sup>+</sup> B</p> <p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 24<sup>th</sup> edition, 2023, part 2540 C</p> <p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 24<sup>th</sup> edition, 2023, part 2540 B</p> <p>- Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 24<sup>th</sup> edition, 2023, part 2340 C</p>

กระทรวงอุตสาหกรรมสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

(Ministry of Industry, Thai Industrial Standards Institute)

# Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2015

This is to certify that:

TNP ENVIRONMENT Co., Ltd.  
332/173 Moo 3,  
Bangrukphattana,  
Bangbuangtong,  
Nonthaburi  
11110  
Thailand

บริษัท ทีเอ็นพี เอ็นไวรอนเมนต์ จำกัด  
332/173 หมู่ 3,  
ตำบลบางรักพัฒนา  
อำเภอบางบัวทอง  
จังหวัดนนทบุรี  
11110  
ประเทศไทย

Holds Certificate Number:

**FS 749573**

and operates a Quality Management System which complies with the requirements of ISO 9001:2015 for the following scope:

The provision of water quality, ambient air quality, noise level, vibration level monitoring services and monitoring report.

ให้บริการติดตามตรวจสอบคุณภาพน้ำ, คุณภาพอากาศในบรรยากาศทั่วไป, ระดับเสียง, ความสั่นสะเทือนและจัดทำรายงานผลการปฏิบัติตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม

For and on behalf of BSI:

  
Chris Cheung, Head of Compliance & Risk - Asia Pacific

Original Registration Date: 2021-09-25

Effective Date: 2021-09-25

Latest Revision Date: 2021-09-25

Expiry Date: 2024-09-24

Page: 1 of 1



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ที่ อก ๐๓๒๐/ ๕๖๓๙



กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๑ มิถุนายน ๒๕๖๗

เรื่อง เปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอสจีเอส (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๒๑ มีนาคม ๒๕๖๗

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษ บริษัท เอสจีเอส  
(ประเทศไทย) จำกัด จำนวน ๑๔ แผ่น

ตามคำขอฯ ที่อ้างถึง บริษัท เอสจีเอส (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน  
เลขทะเบียน ว-๑๙๗ สถานที่ตั้งเลขที่ ๑/๒๐๙ และ ๑/๒๑๑ หมู่ที่ ๑ ตำบลบ้านฉาง อำเภอบ้านฉาง จังหวัดระยอง  
แจ้งขอเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษในน้ำเสีย น้ำใต้ดิน และสิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้อยกเลิกขอบข่ายรายการสารมลพิษในน้ำเสีย น้ำใต้ดิน และสิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว  
ตามรายการเอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชนที่ อก ๐๓๒๐/๑๖๐๔๑  
ลงวันที่ ๑ พฤศจิกายน ๒๕๖๕

๒. ให้วิเคราะห์สารมลพิษตามขอบข่ายที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๔๔ รายการ  
และน้ำใต้ดิน จำนวน ๑๒๓ รายการ และสิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน ๓๗ รายการ รวมทั้งสิ้นจำนวน  
๒๐๔ รายการ ตามเอกสารแนบท้ายหนังสือเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษ ดังสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์  
เอกชนในวันที่ ๑๒ ตุลาคม ๒๕๖๘

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายพรยศ กลั่นกรอง)

รองอธิบดี ปฏิบัติราชการแทน  
อธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก

โทร. ๐ ๓๓๑๓ ๖๐๕๕ ต่อ ๕๐๐๑-๒

ไปรษณีย์อิเล็กทรอนิกส์ [eirw@diw.mail.go.th](mailto:eirw@diw.mail.go.th)





เอกสารแนบท้ายหนังสือเปลี่ยนแปลงเอกสารอ้างอิงวิธีวิเคราะห์สารมลพิษ

บริษัท เอสจีเอส (ประเทศไทย) จำกัด

เลขทะเบียน ว-๑๙๗

ที่ ออก ๐๓๒๐/๕๖๓๙

ลงวันที่ ๑๑ มิ.ย. ๒๕๖๗

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๐๔ รายการ  
น้ำเสีย จำนวน 44 รายการ

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
2	Arsenic	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
3	Barium	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
4	$\alpha$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
5	$\beta$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
6	$\delta$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
7	$\gamma$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
8	Biochemical Oxygen Demand	5-Day BOD Test, Membrane Electrode Method <sup>[3]</sup>
9	Cadmium	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
10	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method <sup>[3]</sup>
11	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
12	Color	ADMI Weighted-Ordinate Spectrophotometric Method <sup>[3]</sup>
13	Copper	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
14	Cyanide	Distillation, Colorimetric Method <sup>[3]</sup>
15	p,p'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
16	p,p'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
17	o,p'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
18	p,p'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
19	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
20	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
21	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
22	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
23	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
24	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
25	Formaldehyde	Distillation, Colorimetric Method <sup>[2]</sup>
26	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
27	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
28	Hexavalent Chromium	Filtration, Colorimetric Method <sup>[3]</sup>
29	Lead	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
30	Manganese	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
31	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[3]</sup>
32	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method <sup>[3]</sup>
33	Nickel	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
34	Oil and Grease	Liquid-Liquid, Partition-Gravimetric Method <sup>[3]</sup>
35	pH	Electrometric Method <sup>[3]</sup>
36	Phenols	Distillation, Direct Photometric Method <sup>[3]</sup>
37	Selenium	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
38	Temperature	Field Method <sup>[3]</sup>
39	Total Chromium	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
40	Total Dissolved Solids	Dried at 180 °C <sup>[3]</sup>
41	Total Kjeldahl Nitrogen	Digestion, Distillation, Titrimetric Method <sup>[3]</sup>
42	Total Suspended Solids	Dried at 103-105 °C <sup>[3]</sup>
43	Trivalent Chromium	Digestion, Inductively Coupled Plasma Method; Filtration, Colorimetric Method, Calculation <sup>[3]</sup>
44	Zinc	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>

น้ำใต้ดิน จำนวน 123 รายการ

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
2	Acetone	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
5	Antimony	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
6	Arsenic	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
8	Barium	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
9	Benzene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
10	Benzo(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
13	Benzoic acid	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[2]</sup>
15	Benzo(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
16	Beryllium	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
18	Bis(2-Ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
19	Bromodichloromethane	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
20	Bromoform	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>



ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
21	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
22	Cadmium	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
23	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
24	Carbon disulfide	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
25	Carbon tetrachloride	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
26	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
27	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
28	Chlorobenzene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
29	Chlorodibromomethane	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
30	Chloroform	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
31	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
32	Chromium	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
33	Chromium (III)	Digestion, Inductively Coupled Plasma Method ; Filtration, Colorimetric Method; Calculation <sup>[3]</sup>
34	Chromium (VI)	Filtration, Colorimetric Method <sup>[3]</sup>
35	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
36	Cyanide	Distillation, Colorimetric Method <sup>[3]</sup>
37	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
38	DDD	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
39	DDE	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
40	DDT	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
41	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
42	Di-n-Butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
43	1,2-Dichlorobenzene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
44	1,3-Dichlorobenzene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
45	1,4-Dichlorobenzene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
46	3,3-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
47	1,1-Dichloroethane	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
48	1,2-Dichloroethane	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
49	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
50	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
51	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
52	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
53	1,2-Dichloropropane	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
54	1,3-Dichloropropane	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
55	1,3-Dichloropropene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
56	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
57	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
58	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
59	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
60	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
61	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
62	Di-n-octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
63	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
64	Endrin	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
65	Ethylbenzene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
66	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
67	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
68	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>



ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
69	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
70	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
71	Hexachloro-1,3-butadiene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
72	$\alpha$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
73	$\beta$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
74	$\gamma$ -HCH	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
75	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
76	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
77	n-Hexane	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
78	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
79	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
80	Lead	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
81	Manganese	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
82	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[3]</sup>
83	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
84	Methyl Bromide	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
85	Methylene Chloride	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
86	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
87	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
88	Methyl tert-butyl ether	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
89	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
90	Nickel	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
91	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
92	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
93	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
94	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
95	pH	Electrometric Method <sup>[3]</sup>
96	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
97	Phenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
98	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
99	Selenium	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
100	Silver	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
101	Styrene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
102	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
103	Tetrachloroethylene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
104	Toluene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
105	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
106	TPH (C <sub>5</sub> -C <sub>8</sub> )	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
107	TPH (C <sub>8</sub> -C <sub>16</sub> )	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
108	TPH (C <sub>16</sub> -C <sub>35</sub> )	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
109	1,2,4-Trichlorobenzene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
110	1,1,1-Trichloroethane	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
111	1,1,2-Trichloroethane	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
112	Trichloroethylene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
113	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
114	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
115	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
116	Vanadium	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>
117	Vinyl acetate	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>



ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
118	Vinyl chloride	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
119	m-Xylene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
120	o-Xylene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
121	p-Xylene	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
122	Xylene (Total)	Purge and Trap Gas Chromatographic / Mass Spectrometric Method <sup>[3]</sup>
123	Zinc	Digestion, Inductively Coupled Plasma Method <sup>[3]</sup>

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 37 รายการ

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
7	Chlordane	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
8	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction Colorimetric Method; Calculation <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method <sup>[7,8]</sup>
9	Chromium (VI)	1) Waste Extraction, Digestion, Colorimetric Method <sup>[9,10]</sup> 2) Alkaline Digestion, Colorimetric Method <sup>[9,10]</sup>
10	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>
11	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup>
12	Dieldrin	2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup> Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
13	DDD	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
14	DDE	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
15	DDT	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
16	2,4-D (2,4-Dichlorophenoxyacetic acid)	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
17	Endrin	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
18	Heptachlor	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
19	Kepone	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>
21	Lindane	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>

ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[1,11]</sup> 2) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[11]</sup>
23	Methoxychlor	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
24	Mirex	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>
26	Polychlorinated Biphenyls (PCBs)	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
27	Pentachlorophenol	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
28	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>
29	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>
30	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>
31	Silvex; 2,4,5-Trichlorophenoxypropionic acid	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>



ลำดับ ที่	สารมลพิษ	วิธีวิเคราะห์
33	Total Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction Colorimetric Method; Calculation <sup>[1,9,10]</sup> 2) Digestion, Inductively Coupled Plasma-Atomic Emission Spectrometry Method Method <sup>[7,8]</sup>
34	Toxaphene	Ultrasonic Extraction, Gas Chromatographic Method <sup>[4,5,6]</sup>
35	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method <sup>[12,13]</sup>
36	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>
37	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method <sup>[1,8]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[7,8]</sup>

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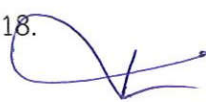
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ที่ อก ๐๓๑๐(๑)/ ๕๓๖๒

กรมโรงงานอุตสาหกรรม  
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท  
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๐๔ มิถุนายน ๒๕๖๗

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอ็นไวรอนเม้นท์ แอนด์ แลบลอราตอรี จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๑๐ เมษายน ๒๕๖๗

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
บริษัท เอ็นไวรอนเม้นท์ แอนด์ แลบลอราตอรี จำกัด จำนวน ๒ แผ่น

ตามคำขอที่อ้างถึง บริษัท เอ็นไวรอนเม้นท์ แอนด์ แลบลอราตอรี จำกัด ขอต่ออายุหนังสือรับขึ้น  
ทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๒๙ สถานที่ตั้งเลขที่ ๔๐ ซอยเลี้ยวเมืองนนทบุรี ๑๓  
ตำบลตลาดขวัญ อำเภอเมืองนนทบุรี จังหวัดนนทบุรี ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอ็นไวรอนเม้นท์ แอนด์ แลบลอราตอรี จำกัด ต่ออายุ  
หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน

- |                           |                            |
|---------------------------|----------------------------|
| ๑) นายวิริยะ มีสงฆ์       | ทะเบียนเลขที่ ว-๐๒๙-ค-๐๐๐๑ |
| ๒) นางสาวอลิสา ทรงสวัสดิ์ | ทะเบียนเลขที่ ว-๐๒๙-ค-๐๐๐๒ |
| ๓) นางสาวอุไร ศรีเนตร     | ทะเบียนเลขที่ ว-๐๒๙-ค-๐๐๐๓ |
| ๔) นายพิสิษฐ์ บุญนาค      | ทะเบียนเลขที่ ว-๐๒๙-ค-๐๐๐๔ |

ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน

- |                               |                            |
|-------------------------------|----------------------------|
| ๑) นางสาวเย็นฤดี พันธุ์แก้ว   | ทะเบียนเลขที่ ว-๐๒๙-จ-๐๐๐๑ |
| ๒) นางสาวเสาวณีย์ เมืองทา     | ทะเบียนเลขที่ ว-๐๒๙-จ-๐๐๐๒ |
| ๓) นางสาวพัชรภรณ์ แจ่มดาว     | ทะเบียนเลขที่ ว-๐๒๙-จ-๐๐๐๓ |
| ๔) นางสาวพัทธสนีย์ กิ่งทอง    | ทะเบียนเลขที่ ว-๐๒๙-จ-๐๐๐๔ |
| ๕) นางสาวพัชรดา เกษามา        | ทะเบียนเลขที่ ว-๐๒๙-จ-๐๐๐๕ |
| ๖) นางสาวฐิติมา บัวระพา       | ทะเบียนเลขที่ ว-๐๒๙-จ-๐๐๐๖ |
| ๗) นางสาวพัชร โตสกุล          | ทะเบียนเลขที่ ว-๐๒๙-จ-๐๐๐๗ |
| ๘) นางสาวฐิติกา อยู่เย็น      | ทะเบียนเลขที่ ว-๐๒๙-จ-๐๐๐๘ |
| ๙) นางสาวกัญญารัตน์ สืบสาย    | ทะเบียนเลขที่ ว-๐๒๙-จ-๐๐๐๙ |
| ๑๐) นางสาวธมลวรรณ แจ่มกระจ่าง | ทะเบียนเลขที่ ว-๐๒๙-จ-๐๐๑๐ |
| ๑๑) นางสาวมนทิตา เศรษฐรักษ์   | ทะเบียนเลขที่ ว-๐๒๙-จ-๐๐๑๑ |

ค. ขอบข่ายชนิดสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำ/น้ำเสีย ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้...



หนังสือฉบับนี้จะหมดอายุในวันที่ ๑๘ เมษายน ๒๕๖๑ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรม ภายใน ๖๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



(นายพรยศ กลั่นกรอง)

รองอธิบดี ปฏิบัติราชการแทน

อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอ็นไวรอนเม้นท์ แอนด์ แล็บอราตอรี จำกัด

เลขทะเบียน ว-๐๒๙

ที่ อก ๐๓๑๐(๑)/ ๕๓๖๒

ลงวันที่ ๐๕ มิถุนายน ๒๕๖๗

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๖ รายการ

น้ำ/น้ำเสีย จำนวน 26 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[2]</sup>
		2) Digestion, Inductively Coupled Plasma Method <sup>[2]</sup>
2	Barium	Digestion, Inductively Coupled Plasma Method <sup>[2]</sup>
3	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method <sup>[2]</sup>
		2) 5-Day BOD Test, Membrane Electrode Method <sup>[2]</sup>
4	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method <sup>[2]</sup>
		2) Digestion, Inductively Coupled Plasma Method <sup>[2]</sup>
5	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method <sup>[2]</sup>
6	Color	ADMI Weighted-Ordinate Spectrophotometric Method <sup>[2]</sup>
7	Copper	1) Digestion, Direct Air-Acetylene Flame Method <sup>[2]</sup>
		2) Digestion, Inductively Coupled Plasma Method <sup>[2]</sup>
8	Cyanide	Distillation, Colorimetric Method <sup>[2]</sup>
9	Formaldehyde	Distillation, Colorimetric Method <sup>[1]</sup>
10	Free Chlorine	Iodometric Method <sup>[2]</sup>
11	Hexavalent Chromium	Colorimetric Method <sup>[2]</sup>
12	Lead	1) Digestion, Direct Air-Acetylene Flame Method <sup>[2]</sup>
		2) Digestion, Inductively Coupled Plasma Method <sup>[2]</sup>
13	Manganese	1) Digestion, Direct Air-Acetylene Flame Method <sup>[2]</sup>
		2) Digestion, Inductively Coupled Plasma Method <sup>[2]</sup>
14	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method <sup>[2]</sup>
15	Nickel	1) Digestion, Direct Air-Acetylene Flame Method <sup>[2]</sup>
		2) Digestion, Inductively Coupled Plasma Method <sup>[2]</sup>
16	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method <sup>[2]</sup>
		2) Soxhlet Extraction Method <sup>[2]</sup>
17	pH	Electrometric Method <sup>[2]</sup>
18	Phenols	Distillation, Direct Photometric Method <sup>[2]</sup>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method <sup>[2]</sup>
20	Sulfide	2) Digestion, Inductively Coupled Plasma Method <sup>[2]</sup> 1) Iodometric Method <sup>[2]</sup> 2) Methylene Blue Method <sup>[2]</sup>
21	Temperature	Laboratory and Field Methods <sup>[2]</sup>
22	Total Dissolved Solids	Dried at 180 °C <sup>[2]</sup>
23	Total Kjeldahl Nitrogen	Macro-Kjeldahl Method <sup>[2]</sup>
24	Total Suspended Solids	Dried at 103-105 °C <sup>[2]</sup>
25	Trivalent Chromium	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation <sup>[2]</sup> 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation <sup>[2]</sup>
26	Zinc	1) Digestion, Direct Air-Acetylene Flame Method <sup>[2]</sup> 2) Digestion, Inductively Coupled Plasma Method <sup>[2]</sup>

#### เอกสารอ้างอิง

1. สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ: เรือนแก้วการพิมพ์, 2547.
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๖ ๙ มกราคม ๒๕๖๗

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท บุโร เวอร์ริทส์ เอคิว แล็บ (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน  
ลงวันที่ ๑๖ ตุลาคม ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน  
บริษัท บุโร เวอร์ริทส์ เอคิว แล็บ (ประเทศไทย) จำกัด จำนวน ๒ แผ่น

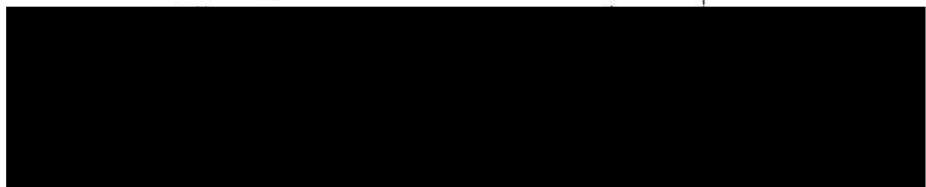
ตามหนังสือที่อ้างถึง บริษัท บุโร เวอร์ริทส์ เอคิว แล็บ (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๓๑๓ สถานที่ตั้งเลขที่ ๑๑๑ หมู่ที่ ๙ อาคารสำนักงานกลาง อุทยานวิทยาศาสตร์แห่งประเทศไทย ชั้นที่ ๑ และชั้นที่ ๒ ห้องเลขที่ P-๑๐๓ และ P-๒๐๔C-E ถนนพหลโยธิน ตำบลคลองหนึ่ง อำเภอคลองหลวง จังหวัดปทุมธานี ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท บุโร เวอร์ริทส์ เอคิว แล็บ (ประเทศไทย) จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์



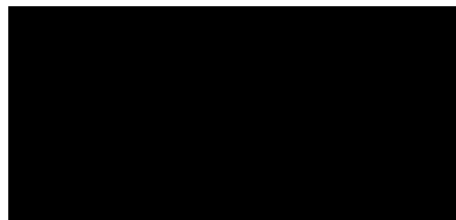
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์



ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๑๒ พฤศจิกายน ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ



กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท บุโร เวอร์ทิส เอคว แล็บ (ประเทศไทย) จำกัด เลขทะเบียน ว-๓๑๓

ที่ ออก ๐๓๑๐(๑)/ ๕ ๑ ๗ ลงวันที่ ๑๙ มกราคม ๒๕๖๗

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๕ รายการ

น้ำเสีย จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
2	Arsenic	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method
3	Barium	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method
4	$\alpha$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
5	$\beta$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
6	$\delta$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
7	$\gamma$ -BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
8	Cadmium	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method
9	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
10	Chromium	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method
11	Color	ADMI Weighted-Ordinate Spectrophotometric Method
12	Copper	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method
13	o,p'-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
14	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
15	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
16	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
17	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
18	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
19	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
20	Endosulfan sulfate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
21	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
22	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
23	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
24	Lead	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method
25	Manganese	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method
26	Mercury	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method
27	Mirex	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
28	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method
29	Nickel	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method
30	pH	Electrometric Method
31	Selenium	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method
32	Total Dissolved Solids	Dried at 180 °C
33	Total Kjeldahl Nitrogen	Macro-Kjeldahl Method
34	Total Suspended Solids	Dried from 103 to 105 °C
35	Zinc	Digestion, Inductively Coupled Plasma/Mass Spectrometric Method

#### เอกสารอ้างอิง

APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 24<sup>th</sup> ed. Washington, DC: APHA, 2023.