

**INDUCTIBELY COUPLED PLASMA SPECTROMETER**

**Model : Prodigy 7**

**Serial No. : P70177**



บริษัท แอปพลิเคชัน ดีไซน์ จำกัด  
Application Define Company Limited  
9/4 ซอย บางนาภิรมย์ 9 แขวง บางนา เขต คลองเตย กรุงเทพมหานคร 10170  
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เลขประจำตัวผู้เสียภาษี 010556032401

## CERTIFICATE OF INSTRUMENT PERFORMANCE

### INSTRUMENT:

BRAND:

MODEL:

SERIAL NO.

CUSTOMER:

### CHECKING:

INDUCTIVELY COUPLED PLASMA SPECTROMETER

Teladyne Leeman Labs

Prodigy 7

P70177

Eastern Tital Consulting 1982 Co., Ltd

### SPECTROMETER

Wavelength Accuracy check by use emission line of Hg Lamp

Mercury line 253.652 nm.

Plasma View (Dual View)

CMOS Detector check

Align View by Mn line 257.610 nm.

### RF GENERATOR

Incident Power 1,200 ±10 Watt Reading = ...1.2... Watt

### SAMPLE INTRODUCTION

Plasma Torch, Injector, Spray chamber, Nebulizer

Peristaltic pump & Tubing

### EXHAUSTING & COOLING SYSTEM

Safety Interlock Switch (Door, Argon pressure, Water pressure)

Cooling System, water flowrate & low pressure switch

Flowrate of Air blower

### COMPUTER & SOFTWARE

Plasma Ignition software & Analytical Software

### ANALYTICAL TEST

Full Frame Capture & Echellogram check

Calibration Curve & QC Test

DATE:

December 21, 2021

Mr. Somchai Chumyung

Engineer Sign



## PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีทีแอล คอนซัลติ้ง 1982 จำกัด

Instrument: ICP-OES Model: Prodigy 7

Date: December 21, 2021

SN: P70177

### 1. Gas Supply /Water Re-circulator/Exhaust Hood Check:

Gas system: ตรวจสอบแก๊สและการทำงาน Argon Pressure: 55 psi Leak inspected (✓) No leak Nitrogen Pressure: - psi Leak inspected (✓) No leak Oxygen Pressure: - psi Leak inspected (✓) No leak	
(✓) Change camera purge gas Dehydrator (1 times /years) Next time replacement 24.02.22 เปลี่ยนตัวควบคุมความชื้นแก๊ส ทุก 1 ปี	
Water Chiller: RF generator flow rate 444 LPM Temperature 2.6 C ตรวจสอบอุณหภูมิ Leak inspected (✓) No leak ตรวจสอบการรั่วซึม	
Water Chiller: Camera (✓) check water level and refill ตรวจสอบระดับน้ำและเติมน้ำ (✓) change water เปลี่ยนน้ำ Temperature -3.9 °C ตรวจสอบอุณหภูมิ	
Exhaust Hood Flow rate 630 CFM (system request > 150)	

COPY

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีซีที เทคโนโลยี จำกัด 1992 จำกัด  
Instrument: ICP-OES Model: Prodigy 7  
Date: December 21, 2021  
S/N: P70177

2. Computer & Software Check

Description	Status
Interface Cable USB (✓) No broken	OK
Software Version	OK
(✓) Operation function check :	OK
(✓) Open /Save /Edit method	OK
(✓) Instrument Control	OK
(✓) Sequence	OK
(✓) Full Frame Capture (Echelle Mode)	OK
(✓) Auto alignment /Hg alignment	OK
(✓) Calibration Curve	OK
(✓) Re-Calculation	OK
(✓) Print Report	OK

COPY

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีซีที เทคโนโลยี จำกัด 1992 จำกัด  
Instrument: ICP-OES Model: Prodigy 7  
Date: December 21, 2021  
S/N: P70177

3. Instrument Control

Description	Status
Optical view position: ตรวจสอบตำแหน่งหลอดไฟและเลนส์	
Hg Lamp Deltas	
X -1 Y -6	OK
XUV 0	OK
Axial peak positions X3326 Y1205	OK
Radial peak positions X4111 Y1185	OK
Hg lamp peak positions X2245 Y2615	OK
Plasma Control ตรวจสอบการทำงานของพลาสมา	
(✓) Auto Start	OK
(✓) Extinguish	OK
(✓) RF power setting	OK
(✓) Igniter	OK
(✓) Air Knife	OK
Torch Gas ตรวจสอบการทำงานของแก๊สในเตาเผา	
(✓) Coolant /Plasma Flow control	OK
(✓) Aux Flow	OK
(✓) Nebulizer Flow	OK
(✓) Optimize sample introduction function	OK
(✓) Peristaltic pump control	OK
(✓) Auto sampler Control	OK
(✓) Camera Support Module	OK
(✓) Diagnostic	OK

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PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีทีแอล จำกัด 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

4. Cleaning & Replacement

Description	Status
✓ O-Ring Torch replacement	OK
✓ Pump Tubing replacement	OK
✓ Glassware cleaning (Torch, Nebulizer, Spray chamber)	OK
✓ Lube the roll peristaltic pump	OK
✓ Optical windows cleaning	OK
✓ Camera Water Re-circulator (water change/ refilled)	OK
✓ RF Generator Water Re-circulator (water change/ refilled)	OK
✓ Cleaning Electronics Board with spray cleaner	OK
✓ Cleaning dust inside Unit	OK
✓ Cleaning dust filter	OK

5. Safety Interlock

Description	Status
✓ Door switch	OK
✓ RF Water Re-circulator	OK
✓ Camera Water Re-circulator	OK
✓ Camera purge gas	OK
✓ Argon pressure	OK
✓ Nitrogen pressure	OK

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PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีทีแอล จำกัด 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

6. Hardware Check with SALSA.EXE Diagnostics

Power Supply	Value	Status
-12 VDC (11 - 14.5 VDC)	-13.87 V	OK
+12 VDC (11 - 14.5 VDC)	12.01 V	OK
+3.3VDC	3.28 V	OK
+5.0 VDC	4.44 V	OK
+13.5 VDC	13.44 V	OK

Plasma Generator	Value	Status
ICP Current 0.500A = 1kW	0.50 A	OK
ICP Ref 5.0Vdc = 1kW	5.41 V	OK
ICP Current 0.00 Vdc = 0kW	0	OK
ICP Ref 0.00Vdc = 0kW	0	OK
RF Water (Hz) OFF	0	OK
RF Water (Hz) ON	25	OK
Air Knife Pres. (0.00V) OFF	0	OK
Air Knife Pres. (3.0 - 7.0 V) ON	3.87 V	OK
Neb 25 @ setting of 25 PSI	25	OK
Cool 18 @ setting of 18 LPM	18	OK
Aux 0.6 @ setting of 6 LPM	0.6	OK
Pump Current (0.000 A) OFF	0	OK
Pump Voltage (0.000 V) OFF	0	OK
Pump Current (0.8 to 4.0A) ON	1.02 A	OK
Pump Voltage (8 to 13 V) ON	14.52 V	OK

Set Points	Value	Status
Air In Set Point 32°C	32	OK
Cam Tec Temperature -32°C	-32	OK
On Purge Low 0.77 LPM	0.77	OK
On Purge High 15.50 LPM	15.5	OK
Cam Wtr T 28°C	28.02	OK

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### PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีทีที,ไทย เทคโนโลยีส์ 1992 จำกัด	Date: December 21, 2021
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

#### 7. Ma Check for performance Test

	Condition for performance Test	Condition Test	Status
Standard	1 ppm, 5 ppm, 10 ppm	10 ppm	ok
Power plasma	1.20 kw	1.2	ok
Plasma gas	16.0 LPM	16	ok
Auxiliary Gas	0.8 LPM	0.8	ok
Nebulizer	1.2 LPM	25 psi	ok
Pump Speed	25 RPM	25	ok
Integration time	15 s Axial, 5 s Radial	10 s, 5 s	ok
Nebulizer Type	Seaspray, Conical, Meinhard	Conical	ok
Intensity first performance	1 ppm $\geq$ 4,000,000 5 ppm $\geq$ 15,000,000 10 ppm $\geq$ 50,000,000	64,343,926	ok

Engineer Sign	
	
	 <b>TELEDYNE LEEMAN LABS</b> Everywhereyoulook

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**STANDARD WEIGHT 50 g**



AMARC  
ASIA MEDICAL AND  
AGRICULTURAL LABORATORY  
AND RESEARCH CENTER

Page 2 of 3

Certificate No. : 22-052238  
Sample Code : 22-19150-003

## REPORT OF CALIBRATION

Equipment : Standard Weight 50 g  
Manufacturer : METTLER TOLEDO  
Class : F1  
Serial No. : N/A  
ID No. : LABE 10/1

Result of Calibration : ☒ Without adjustment ☐ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature ( $t_{ref}$ ) of 20°C, the conventional mass is the mass of a reference weight of a density ( $\rho_{ref}$ ) of 8000 kg.m<sup>-3</sup> which it balances in air of a reference density ( $\rho_0$ ) of 1.2 kg.m<sup>-3</sup>

Description	Deviation	Conventional	Expanded	Maximum	ID No.
		Mass	Uncertainty	Permissible Error	
	(mg)		(mg)	± (mg)	
50 g	-0.324	49.999676 g	0.10	0.30	LABE 10/1

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2.0$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

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Effective Date: 15/10/21  
FM-CL-064



Page 1 of 3

Certificate No. : 22-052238  
Sample Code : 22-19150-003

## CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
883 Moo 11, Sukhapibean 8 Rd., Nongkham,  
Siracha, Chonburi 20230

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

Equipment : Standard Weight 50 g

Manufacturer : METTLER TOLEDO

Class : F1

Serial No. : N/A

ID No. : LABE 10/1

Date of Receipt : 18 May 2022

Date of Calibration : 30 May 2022

Calibrated by : Mr. Somwang Sangdee  
Scientist

Approved by

Signed for Director

Issue date : 31 May 2022

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

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

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

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NSC-TS-1757025  
CALIBRATION 0152

Page 3 of 3

Certificate No. : 22-052238

Sample Code : 22-19150-003

## REPORT OF CALIBRATION

### Condition of Calibration

1. Ambient Conditions : Temperature  $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$ , Relative humidity  $50\% \pm 10\%$  and air density  $1.20 \text{ kg/m}^3$
2. Calibration Method : Direct comparison weighing according to OIML R111-1 : 2004(E)
3. Reference standard instrument

Instrument	Class	ID.No.	Certificate No.	Due Date
1) Standard Weight 1 mg to 1 kg	E2	LB-WE-79	21-079366	22 September 2022

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

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited  
(Instrument number 1).

5. Condition of Calibration Item: Normal

### 6. Description of Calibrated Item :

Type and Nominal Value :	Standard Weight 50 g
Shape :	Cylindrical weight with knob
Material :	Stainless steel
Case :	Wooden Box
Comments :	Recalibration

- End of Report -

*Signature*

**GOPY**



**STANDARD WEIGHT 100 g**



Certificate No. : 22-052239  
Sample Code : 22-19150-004

## REPORT OF CALIBRATION

Equipment : Standard Weight 100 g  
Manufacturer : N/A  
Class : N/A  
Serial No. : N/A  
ID No. : LABE 10/2

Result of Calibration : ☒ Without adjustment ☐ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature ( $t_{ref}$ ) of 20°C, the conventional mass is the mass of a reference weight of a density ( $\rho_{ref}$ ) of 8000 kg.m<sup>-3</sup> which it balances in air of a reference density ( $\rho_a$ ) of 1.2 kg.m<sup>-3</sup>

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	Maximum Permissible Error $\pm$ (mg)	ID No.
100 g	-0.171	99.999829 g	0.16	0.50	LABE 10/2

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2.0$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

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Effective Date: 15/10/21  
FM-CL-064



Certificate No. : 22-052239  
Sample Code : 22-19150-004

## CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
663 Moo 11, Sukhapiban 8 Rd., Nongkham,  
Sriracha, Chonburi 20230

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

Equipment : Standard Weight 100 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/2

Date of Receipt : 18 May 2022

Date of Calibration : 30 May 2022

Calibrated by : Mr. Somwang Sangdee  
Approved by : ( Mr. Somchai Neampunt )  
Scientist  
Signed for Director

Issue date : 31 May 2022

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

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

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

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FM-CL-07



Certificate No. : 22-052239  
Sample Code : 22-19150-004

## REPORT OF CALIBRATION

### Condition of Calibration

1. Ambient Conditions : Temperature  $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$ , Relative humidity  $50\% \pm 10\%$  and air density  $1.18 \text{ kg/m}^3$
2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)
3. Reference standard instrument

Instrument	Class	ID No.	Certificate No.	Due Date
1) Standard Weight 1 mg to 1 kg	E2	LB-WE-79	21-079366	22 September 2022

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

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited  
(Instrument number 1).

5. Condition of Calibration item: Normal

6. Description of Calibrated item :	
Type and Nominal Value :	Standard Weight 100 g
Shape :	Cylindrical weight with knob
Material :	Stainless steel
Case :	Wooden Box
Comments :	Recalibration

- End of Report -

*Signature*

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**STANDARD WEIGHT 50 g**

50





Certificate No. : 22-052237  
Sample Code : 22-19150-002

## CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiban 8 Rd., Nongkham,  
Sriracha, Chonburi 20230

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

Equipment : Standard Weight 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

Date of Receipt : 18 May 2022

Date of Calibration : 30 May 2022

Calibrated by : Mr. Somwang Sangdee  
Scientist  
Issue date : 31 May 2022

Approved by : ( Mr. Somchai Neampunt )

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

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

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

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Effective Date: 15/10/21



Certificate No. : 22-052237  
Sample Code : 22-19150-002

## REPORT OF CALIBRATION

Equipment : Standard Weight 50 g

Manufacturer : N/A

Class : N/A

Serial No. : N/A

ID No. : LABE 10/4

Result of Calibration : ☒ Without adjustment ☐ Adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature ( $t_{ref}$ ) of 20°C, the conventional mass is the mass of a reference weight of a density ( $\rho_{ref}$ ) of 8000 kg.m<sup>-3</sup>, which it balances in air of a reference density ( $\rho_a$ ) of 1.2 kg.m<sup>-3</sup>

Description	Deviation	Conventional	Expanded	Maximum	ID No.
		Mass	Uncertainty	Permissible Error	
	(mg)		(mg)	± (mg)	
50 g	-0.111	49.999869 g	0.10	0.30	LABE 10/4

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2.0$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

Signed for Director  
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Effective Date: 15/10/21



Certificate No. : 22-052237

Sample Code : 22-19150-002

## REPORT OF CALIBRATION

## Condition of Calibration

1. Ambient Conditions : Temperature 20 °C ± 1.5°C, Relative humidity 50% ± 10% and air density 1.18 kg/m<sup>3</sup>
  2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)
  3. Reference standard instrument
- | Instrument                      | Class | ID No.   | Certificate No. | Due Date          |
|---------------------------------|-------|----------|-----------------|-------------------|
| 1) Standard Weight 1 mg to 1 kg | E2    | LB-WE-79 | 21-079386       | 22 September 2022 |
4. This certification is traceable to the International System of Unit maintained at : -

Asia Medical and Agricultural Laboratory and Research Center Public Company Limited

(Instrument number 1).

5. Condition of Calibration item: Normal

## 6. Description of Calibrated Item

Type and Nominal Value :	Standard Weight 50 g
Shape :	Cylindrical weight with knob
Material :	Stainless steel
Case :	Wooden Box
Comments :	Recalibration

- End of Report -

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**THERMO-HYGROMETER**

**Model : 608-H1**

**Serial No. : 45106737**



## CERTIFICATE OF CALIBRATION

Page 1 of 2

NSC-TSI-TS17025  
CALIBRATION 0152Certificate No. : 22-068062  
Sample Code : 22-24591-002Customer : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiban 8 Rd., Nongkham,  
Sriracha, Chonburi : 20230Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited  
(Calibration laboratory)Equipment : Digital thermo-hygrometer  
Manufacturer : testo  
Serial No. : 45106737  
Date of Receipt : 22 June 2022  
Model : 608-H1  
ID No. : LABE 09/7  
Date of Calibration : 24 June 2022

## Condition of Calibration

1. Environment
- 1.1 Ambient temperature : 23.0 °C ± 3.0 °C
- 1.2 Relative humidity : 55.0 % ± 15.0 %

## 2. Calibration method

- 2.1 In-house method: WI-CL-048 By comparison with thermometer standard / chilled mirror hygrometer in controlled chamber.
- 2.2 The calibration by comparison unit under calibration (UUC) to the thermometer standard / chilled mirror hygrometer in a chamber at the controlled temperature / relative humidity.

## 3. Reference standard instrument

Instrument	Model	ID No.	Certificate No.	Due Date
3.1 Chilled Mirror	Optidew Vision	LB-DP-01 & LB-DP-01 (DP)	TH-0014-22	16 February 2023
3.2 Digital Thermometer	Optidew Vision	LB-DP-01 & LB-DP-01 (Temp.)	22-029548	14 March 2023
3.3 Digital Thermometer	34972A	LB-DA-07 with RTD-88	21-072473	13 September 2022

4. This certificate is traceable to the international system of unit (SI Unit).
- 4.1 Instrument No. 3.1 through National Institute of Metrology (Thailand).
- 4.2 Instrument No. 3.2 and 3.3 through Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.

5. This result of calibration was found accurate as shown on date and place of calibration only.
6. Condition of calibration item : Normal

Calibrated by

Miss Pomsuda Lohabai  
Scientist

Approved by

(Mr. Somchai Neampunt)

Issue date

27 June 2022

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

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

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

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## REPORT OF CALIBRATION

Page 2 of 2

NSC-TSI-TS17025  
CALIBRATION 0152Certificate No. : 22-068062  
Sample Code : 22-24591-002

## Results of Calibration

Temperature measurement  
Resolution : 0.1 °C  
Range : 0 °C to 50 °C

Calibration point °C	Average of standard reading		Unit under calibration		Expanded uncertainty °C
	Controlled humidity %RH	Temperature °C	Average reading °C	Correction value °C	
20	50	20.00	20.2	- 0.20	± 0.39
25	50	25.00	24.9	+ 0.10	± 0.39
30	50	30.00	29.8	+ 0.20	± 0.39

## Humidity measurement

Resolution : 0.1 %RH  
Range : 10 %RH to 95 %RH

Calibration point %RH	Average of standard reading		Unit under calibration		Expanded uncertainty %RH
	Air temperature °C	Calculated humidity %RH	Average reading %RH	Correction value %RH	
45	25.00	45.13	51.4	- 6.27	± 1.3
60	25.00	60.03	66.5	- 6.47	± 1.5
75	25.00	75.20	81.5	- 6.30	± 1.7

## Notes

- Calibration results without adjustment.

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS MD003.

- End of Report -

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TEL 02-516-2422  
FAX 02-516-8949  
Rev. 01  
Effective Date 15/10/21



**UV/VIS SPECTROPHOTOMETER**

**Model : UV – 1800**

**Serial No. : A11635101643CD**



Bara Scientific Co., Ltd.  
968 U Chu Ling Building Floor7 Rama4 Road  
Silom Bangkok Thailand 10500  
Tel : 02-6324300 Fax : 02-6375496-7  
www.barascientific.com



# Certificate of Calibration

Number of Page(s) 1 of 3

Certificate No.  
Equipment  
Model  
Manufacturer  
Serial No.  
ID No.  
Date of receipt  
Date of calibration  
Date of issue

BSCC-JUV-167/22  
UV/vis Spectrophotometer  
UV-1800  
Shimadzu  
A11635101643 CD  
LABE 03/2  
18 May 2022  
18 May 2022  
25 May 2022

Customer name  
Address

Eastern Thal Consulting 1992 Co., Ltd.  
683 Moo 11, Sukkaphibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230.

Temperature  
Humidity

(23.8-24.5) °C (On site)  
(47.6-48.3) %RH (On site)

Equipment condition

Good Operation

Calibration Location

Analysis Department.

Calibration Procedure

In-house method WI-UV-702-01 based on ASTM E275-01

Traceability

Wavelength Accuracy is traceable to certificate No. 96367 and 96366  
Photometric Accuracy is traceable to certificate No. 99825 and 100147  
Stray Light is traceable to certificate No. 96346  
The above certificate are traceable to SI unit through Siarna Scientific Ltd.  
(UKAS accredited calibration laboratory NO. 0859)

Calibrated by

Mr.Kanchit Choothep

Approved by

Mr.Kanchit Choothep  
Technical Manager

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.  
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced  
except in full, without written approval of the Bara Scientific Co., Ltd.

FM-UV-706-02 Rev.01 (230163)



Bara Scientific Co., Ltd.  
968 U Chu Ling Building Floor7 Rama4 Road  
Silom Bangkok Thailand 10500  
Tel : 02-6324300 Fax : 02-6375496-7  
www.barascientific.com



# Certificate of Calibration

Number of Page(s) 2 of 3

Certificate No. BSCC-JUV-167/22

Calibration Results:

1.Wavelength Accuracy

Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (±nm)
287.71	287.80	0.09	0.18
445.82	445.95	0.13	0.18
536.52	536.60	0.08	0.18
741.02	741.00	-0.02	0.18
879.41	879.40	-0.01	0.18

2.Photometric Accuracy (UV)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
235	0.0000	0.0000	0.0000	0.0075
	0.7311	0.7321	0.0010	0.0075
257	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
313	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
350	0.0000	0.0000	0.0000	0.0075
	0.6306	0.6314	0.0008	0.0075

\*CNR = Customer not request

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.  
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced  
except in full, without written approval of the Bara Scientific Co., Ltd.

FM-UV-706-02 Rev.01 (230163)



Bara Scientific  
988 U Chu Liang Building Floor 7 Rama 4 Road  
Siam Bangkok Bangkok Thailand 10500  
Tel : 02-6324300 Fax : 02-6375486-7  
www.barascientific.com



# Certificate of Calibration

Certificate No. BSCC-UV-167/22

Number of Page(s) 3 of 3

## Calibration Results:

### 3. Photometric Accuracy (Visible)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
420.0	0.0000 0.5472 0.7637 1.0480	0.0000 0.5481 0.7636 1.0497	0.0000 0.0009 -0.0001 0.0017	0.0042 0.0042 0.0042 0.0042
440.0	0.0000 0.5371 0.7457 1.0233	0.0000 0.5377 0.7451 1.0240	0.0000 0.0006 -0.0008 0.0016	0.0042 0.0042 0.0042 0.0042
485.0	CNR CNR CNR CNR	CNR CNR CNR CNR	CNR CNR CNR CNR	CNR CNR CNR CNR
546.1	0.0000 0.5006 0.6961 0.9563	0.0000 0.5006 0.6944 0.9550	0.0000 0.0000 -0.0017 -0.0013	0.0042 0.0042 0.0042 0.0042
590.0	CNR CNR CNR CNR	CNR CNR CNR CNR	CNR CNR CNR CNR	CNR CNR CNR CNR
635.0	0.0000 0.5137 0.6907 0.9533	0.0000 0.5137 0.6891 0.9519	0.0000 0.0000 -0.0016 -0.0014	0.0042 0.0042 0.0042 0.0042

\*CNR = Customer not request

### 4. Stray Light\*

Standard	Wavelength (nm)	Unit Under Calibration(UUC)	Absorbance (A)
cut-off wavelength (nm)	201.10	Transmission (%T)	2.0204

The Stray light transmission reference is less than 1.0%T and Stray light absorbance reference is greater than 2.00A  
\*Stray Light not NSC-QNSC Accredited.

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

\*\*\*End of Certificate\*\*\*

COPY

The above results are valid exclusively for the calibrated item(s) as mentioned in this report / certificate. Adversing the report / certificate and publicity of the results are prohibited and also shall not be reproduced except in full, without written approval of the Bara Scientific Co., Ltd.

FW-JV-708-02 Rev.01 (23/01/63)



รายละเอียดสาขาและขอบข่ายให้บริการ  
(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 22-LB0140  
(Certification No. 22-LB0140)

ห้องปฏิบัติการทดสอบ บริษัท อีสเทิร์น ไทย คอนซัลติง 1992 จำกัด  
(Eastern Thai Consulting 1992 Co., Ltd.)

ชื่อห้องปฏิบัติการ  
(Laboratory Name)  
หมายเลขการรับรองที่  
(Accreditation No.)

ฉบับที่ 02  
(Issue No.)

สถานะภาพห้องปฏิบัติการ  
(Laboratory status)

ทดสอบ 0031  
(Testing 0031)

ออกให้ตั้งแต่วันที่ 21 มีนาคม พ.ศ. 2565  
(Valid from 21 March B.E.2565 (2022))

☒ถาวร  
(Permanent)

☐ชั่วคราว  
(Temporary)

เคลื่อนที่ ☐  
(Mobile)

หลายสถานที่ ☐  
(Multisite)

ถึงวันที่ 17 พฤษภาคม พ.ศ. 2566  
(Until 17 May B.E.2566 (2023))



ใบรับรองระบบงาน  
(Certificate of Accreditation)

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

เลขที่การสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม  
(Secretary-General, Thai Industrial Standards Institute)

ออกใบรับรองฉบับนี้ให้  
(Issues this certificate to)

บริษัท อีสเทิร์น ไทย คอนซัลติง 1992 จำกัด  
(Eastern Thai Consulting 1992 Co., Ltd.)

ตั้งอยู่เลขที่  
(Address)

๖๘๓ หมู่ที่ ๑๑ ถนนสุขุมวิท ๘ ตำบลหนองแขม อำเภอศรีราชา จังหวัดชลบุรี  
(683 Moo 11, Sukhaphan 8 Road, Nongkham, Sriracha, Chonburi)

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 ๐๐๓๑  
(Accreditation No. Testing 0031)

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

ออกให้ ณ วันที่ ๓๐ มีนาคม พ.ศ. ๒๕๖๕  
(Issue date : 30 March B.E. 2565 (2022))

(นายเอกนิติ รมยานนท์)  
รองเลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม

ปฏิบัติราชการแทน  
เลขาธิการสำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม



กระทรวงอุตสาหกรรม สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม  
(Ministry of Industry, Thai Industrial Standards Institute)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสังแวดล้อม (Environmental field)</p> <p>1. น้ำและน้ำเสีย (Water and Wastewater)</p>	<p>- โลหะหนัก (Heavy metal)</p> <ul style="list-style-type: none"> <li>โครเมียม (Cr) 0.10 mg/l to 2.00 mg/l</li> <li>ทองแดง (Cu) 0.10 mg/l to 2.00 mg/l</li> <li>เหล็ก (Fe) 0.10 mg/l to 2.00 mg/l</li> <li>ตะกั่ว (Pb) 0.10 mg/l to 2.00 mg/l</li> <li>นิกเกิล (Ni) 0.10 mg/l to 2.00 mg/l</li> </ul> <p>- ไขมันและน้ำมัน (Oil &amp; Grease) 3.0 mg/l to 20.0 mg/l</p>	<p>- Standard Method for the Examination of Water and Wastewater, APHA, AWWA, WEF 23<sup>rd</sup> edition 2017. Part 3030 F and 3111 B</p> <p>- Standard Method for the Examination of Water and Wastewater, APHA, AWWA, WEF 23<sup>rd</sup> edition 2017. Part 5520B.</p>



รายละเอียดสาขาและขอข่ายใยรับรองห้องปฏิบัติการ

(Scope of Accreditation for Testing)

ใบรับรองเลขที่ 22-LB0140  
(Certification No. 22-LB0140)

ฉบับที่ 02  
(Issue No.)

สถานภาพห้องปฏิบัติการ  
(Laboratory status)

21 มีนาคม พ.ศ. 2565  
(21 March B.E.2565 (2022))

□นอกสถานที่ (Site) □ชั่วคราว (Temporary)

ถึงวันที่ 17 พฤษภาคม พ.ศ. 2566  
(Until (17 May B.E.2566 (2023)))

☐ เคลื่อนที่ (Mobile) ☐ หลายสถานที่ (Multisite)

ฉบับที่ 02  
(Issue No.)

สถานภาพห้อง  
(Laboratory status)

ฉบับที่ 02  
(Issue No.)

สถานภาพห้องปฏิบัติการ  
(Laboratory status)

ออกให้ตั้ง  
(Valid from)

☒ถาวร (Permanent)

21 มีนาคม พ.ศ. 2565  
(21 March B.E.2565 (2022))

นอกสถานที่ (Site) □

ထိခိုက်မှု (Until)

การควบคุม (Control)

ถึงวันที่ 17 พฤษภาคม พ.ศ. 2566  
(Until (17 May B.E.2566 (2023)))

☐ เคลื่อนที่ (Mobile)

<p>สาขาการทดสอบ (Field of Testing)</p> <p>สาขาสีสิ่งแวดล้อม (Environmental field)</p> <p>1. น้ำดื่มเสีย (Water and Wastewater )</p>	<p>รายการทดสอบ (Parameter)</p> <p>- โลหะหนัก (Heavy metal)</p> <ul style="list-style-type: none"> <li>• แมงกานีส (Mn) 0.03 mg/l to 2.00 mg/l</li> <li>• ซิลเวอร์ (Ag) 0.05 mg/l to 2.00 mg/l</li> <li>• जिंक (Zn) 0.03 mg/l to 2.00 mg/l</li> </ul>	<p>วิธีทดสอบ (Test Method)</p> <p>- Standard Method for the Examination of Water and Wastewater, APHA, AWWA, WEF 23<sup>rd</sup> edition 2017. Part 3030 F and 3120 B</p>
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สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสังแวดล้อม (Environmental field)</p> <p>1. น้ำและน้ำเสีย (Water and Wastewater )</p>	<p>- โลหะหนัก (Heavy metal)</p> <ul style="list-style-type: none"> <li>โครเมียม (Cr) 0.03 mg/l to 2.00 mg/l</li> <li>ทองแดง (Cu) 0.03 mg/l to 2.00 mg/l</li> <li>เหล็ก (Fe) 0.03 mg/l to 2.00 mg/l</li> <li>ตะกั่ว (Pb) 0.01 mg/l to 1.00 mg/l</li> <li>นิกเกิล (Ni) 0.03 mg/l to 2.00 mg/l</li> <li>อลูมิเนียม (Al) 0.10 mg/l to 1.00 mg/l</li> <li>แบเรียม (Ba) 0.03 mg/l to 2.00 mg/l</li> <li>แคดเมียม (Cd) 0.003 mg/l to 1.00 mg/l</li> <li>0.03 mg/l to 2.00 mg/l</li> </ul>	<p>- Standard Method for the Examination of Water and Wastewater, APHA, AWWA, WEF 23<sup>rd</sup> edition 2017. Part 3030 F and 3120 B</p>

ขอขยการรับรองความสามารถห้องปฏิบัติการทดสอบ

ชื่อห้องปฏิบัติการ  
สถานที่ตั้ง

: บริษัท อีสเทิร์นไทยคอนกรีตติ้ง 1992 จำกัด

: เลขที่ 683 หมู่ที่ 11 ถนนสุขาภิบาล 8 ตำบลหนองขาม

อำเภอศรีราชา จังหวัดชลบุรี 20230

: ทดสอบ - 0159

: ☒ ถาวร ☐ นอกสถานที่ ☐ชั่วคราว ☐เคลื่อนที่

หมายเลขการรับรองระบบงานที่

สถานะของห้องปฏิบัติการ

ลำดับ ที่	วัสดุ / ผลิตภัณฑ์ที่ทดสอบ	รายการที่ทดสอบ / ช่วงของการทดสอบ	วิธีทดสอบ / เทคนิคที่ใช้
1	น้ำ	-ซีเมนต์ 40 mg/L ถึง 5 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 5220 C
		-ปรอท 0.001 mg/L ถึง 0.02 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 3112 B
		-บีโอดี 2 mg/L ถึง 5 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 5210 B

ออกครั้งแรก ณ วันที่ 21 พฤศจิกายน 2560

ฉบับที่ 3

กองบริหารและรับรองห้องปฏิบัติการ กรมวิทยาศาสตร์บริการ กระทรวงการอุดมศึกษา วิทยาศาสตร์ วิจัย และนวัตกรรม



ที่ อว 0303/3163

ใบรับรองความสามารถห้องปฏิบัติการทดสอบ

ใบรับรองฉบับนี้ให้เพื่อแสดงว่า

บริษัท อีสเทิร์นไทยคอนกรีตติ้ง 1992 จำกัด  
เลขที่ 683 หมู่ที่ 11 ถนนสุขาภิบาล 8 ตำบลหนองขาม  
อำเภอศรีราชา จังหวัดชลบุรี 20230

ได้ผ่านการประเมินความสามารถห้องปฏิบัติการทดสอบตามมาตรฐาน ISO/IEC 17025 : 2017  
และข้อกำหนด กฎระเบียบ และเงื่อนไขการรับรองความสามารถห้องปฏิบัติการทดสอบ  
ของกองบริหารและรับรองห้องปฏิบัติการ กรมวิทยาศาสตร์บริการ



หมายเลขการรับรองระบบงานที่ ทดสอบ - 0159

รายละเอียดการรับรองห้องปฏิบัติการรับรองแบบท้าย

ออกให้ ณ วันที่ : 28 กุมภาพันธ์ 2565

หมดอายุ วันที่ : 14 กรกฎาคม 2566

ลงชื่อ :

(นางพจมาน ทาจิณ)

ผู้อำนวยการกองบริหารและรับรองห้องปฏิบัติการ

กองบริหารและรับรองห้องปฏิบัติการ กรมวิทยาศาสตร์บริการ  
กระทรวงการอุดมศึกษา วิทยาศาสตร์ วิจัย และนวัตกรรม

ขอข่ายการรับรองความสามารถห้องปฏิบัติการทดสอบ

ชื่อห้องปฏิบัติการ : บริษัท อีสเทิร์นไทยคอนกรีตติ้ง 1992 จำกัด  
สถานที่ตั้ง : เลขที่ 683 หมู่ที่ 11 ถนนสุขุมวิท 8 ตำบลหนองขาม อำเภอสรีราชา จังหวัดชลบุรี 20230  
หมายเลขการรับรองระบบงานที่ : ทดสอบ - 0159  
สถานะของห้องปฏิบัติการ : ☒ ถาวร ☐ นอกสถานที่ ☐ชั่วคราว ☐เคลื่อนที่

ลำดับที่	วัสดุ / ผลิตภัณฑ์ที่ทดสอบ	รายการที่ทดสอบ / ช่วงของการทดสอบ	วิธีทดสอบ / เทคนิคที่ใช้
2	น้ำเสีย (ต่อ)	- ปรีท 0.001 mg/L ถึง 0.02 mg/L  - บีไอดี 2 mg/L ถึง 5 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 3112 B  Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 5210 B
		- สารที่ละลายได้ทั้งหมด 25 mg/L ถึง 10 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 2540 C

ออกครั้งแรก ณ วันที่ 21 พฤศจิกายน 2560

ฉบับที่ 3

กองบริหารและรับรองห้องปฏิบัติการ กรมวิทยาศาสตร์บริการ กระทรวงการอุดมศึกษา วิทยาศาสตร์ วิจัย และนวัตกรรม

ขอข่ายการรับรองความสามารถห้องปฏิบัติการทดสอบ

ชื่อห้องปฏิบัติการ : บริษัท อีสเทิร์นไทยคอนกรีตติ้ง 1992 จำกัด  
สถานที่ตั้ง : เลขที่ 683 หมู่ที่ 11 ถนนสุขุมวิท 8 ตำบลหนองขาม อำเภอสรีราชา จังหวัดชลบุรี 20230  
หมายเลขการรับรองระบบงานที่ : ทดสอบ - 0159  
สถานะของห้องปฏิบัติการ : ☒ ถาวร ☐ นอกสถานที่ ☐ชั่วคราว ☐เคลื่อนที่

ลำดับที่	วัสดุ / ผลิตภัณฑ์ที่ทดสอบ	รายการที่ทดสอบ / ช่วงของการทดสอบ	วิธีทดสอบ / เทคนิคที่ใช้
1	น้ำ (ต่อ)	- สารที่ละลายได้ทั้งหมด 25 mg/L ถึง 10 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 2540 C
		- สารแขวนลอยทั้งหมด ที่อุณหภูมิ 103 °C ถึง 105 °C 5 mg/L ถึง 2 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 2540 D
2	น้ำเสีย	- ซีไอดี 40 mg/L ถึง 5 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 5220 C

ออกครั้งแรก ณ วันที่ 21 พฤศจิกายน 2560

ฉบับที่ 3

กองบริหารและรับรองห้องปฏิบัติการ กรมวิทยาศาสตร์บริการ กระทรวงการอุดมศึกษา วิทยาศาสตร์ วิจัย และนวัตกรรม



Ref No. : 0303/3163

## CERTIFICATE OF TESTING LABORATORY ACCREDITATION

This is to certify that

*Eastern Thai Consulting 1992 Co., Ltd.  
683 Moo 11, Sukhapibarn 8 Road, Tambon Nongkham,  
Amphoe Siriracha, Changwat Chonburi 20230*

has successfully undergone assessment according to ISO/IEC 17025 : 2017  
and under the Bureau of Laboratory Accreditation, Department of Science Service  
for the requirements, regulations and criteria for the competence of testing laboratories

**LABORATORY ACCREDITATION**  
Accreditation Number TESTING - 0159  
BLA-DSS

The scope of accreditation is as annexed hereto

Issue date : 28<sup>th</sup> February 2022

Expired date : 14<sup>th</sup> July 2023

Signature : 

(Mrs. Pochaman Tagheen)

Director of Bureau of Laboratory Accreditation

Bureau of Laboratory Accreditation, Department of Science Service,  
Ministry of Higher Education, Science, Research and Innovation

### ขอบข่ายการรับรองความสามารถห้องปฏิบัติการทดสอบ

ชื่อห้องปฏิบัติการ  
สถานที่ตั้ง

: บริษัท อีสเทิร์นไทยคอนซัลติ้ง 1992 จำกัด  
: เลขที่ 683 หมู่ที่ 11 ถนนสุขาภิบาล 8 ตำบลหนองขาม  
อำเภอศรีราชา จังหวัดชลบุรี 20230

หมายเลขการรับรองระบบงานที่

: ทดสอบ - 0159  
: ☒ ถาวร ☐ นอกสถานที่ ☐ชั่วคราว ☐เคลื่อนที่

ลำดับ ที่	วัสดุ / ผลิตภัณฑ์ที่ทดสอบ	รายการที่ทดสอบ / ช่วงของการทดสอบ	วิธีทดสอบ / เทคนิคที่ใช้
2 (ต่อ)	น้ำเสีย ผลิตภัณฑ์ที่ทดสอบ	- สารแขวนลอยทั้งหมด ที่อุณหภูมิ 103 °C ถึง 105 °C 5 mg/L ถึง 2 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 2540 D

ออกให้ ณ วันที่ : 28 กุมภาพันธ์ 2565

ลงชื่อ :   
(นางพจมาน ทาจิณ)

ผู้อำนวยการกองบริหารและรับรองห้องปฏิบัติการ

ออกครั้งแรก ณ วันที่ 21 พฤศจิกายน 2560

ฉบับที่ 3

กองบริหารและรับรองห้องปฏิบัติการ กรมวิทยาศาสตร์บริการ กระทรวงการอุดมศึกษา วิทยาศาสตร์ วิจัย และนวัตกรรม

## Scope of Testing Laboratory Accreditation

Laboratory Name : Eastern Thai Consulting 1992 Co., Ltd.  
 Address : 683 Moo 11, Sukhapibarn 8 Road, Tambon Nongkham,  
 Amphoe Siriracha, Changwat Chonburi 20230  
 Accreditation Number : Testing - 0159  
 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	- Total dissolved solids at 180 °C 25 mg/L to 10 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 2540 C
		- Total suspended solids at 103 °C to 105 °C 5 mg/L to 2 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 2540 D
2	Wastewater	- COD 40 mg/L to 5 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 5220 C

Initial Issue Date 21<sup>st</sup> November 2017

Issue Number 3

Bureau of Laboratory Accreditation, Department of Science Service, Ministry of Higher Education, Science, Research and Innovation

## Scope of Testing Laboratory Accreditation

Laboratory Name : Eastern Thai Consulting 1992 Co., Ltd.  
 Address : 683 Moo 11, Sukhapibarn 8 Road, Tambon Nongkham,  
 Amphoe Siriracha, Changwat Chonburi 20230  
 Accreditation Number : Testing - 0159  
 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
1	Water	- COD 40 mg/L to 5 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 5220 C
		- Mercury 0.001 mg/L to 0.02 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 3112 B
		- BOD 2 mg/L to 5 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 5210 B

Initial Issue Date 21<sup>st</sup> November 2017

Issue Number 3

Bureau of Laboratory Accreditation, Department of Science Service, Ministry of Higher Education, Science, Research and Innovation

## Scope of Testing Laboratory Accreditation

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Accreditation Number : Testing - 0159

Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Total suspended solids at 103 °C to 105 °C 5 mg/L to 2 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 2540 D

Issue Date : 28<sup>th</sup> February 2022

Signature :   
 (Mrs. Pochaman Tagheen)

Director of Bureau of Laboratory Accreditation

Initial Issue Date 21<sup>st</sup> November 2017

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Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Mercury 0.001 mg/L to 0.02 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 3112 B
		- BOD 2 mg/L to 5 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 5210 B
		- Total dissolved solids at 180 °C 25 mg/L to 10 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 <sup>rd</sup> ed., 2017, part 2540 C

Initial Issue Date 21<sup>st</sup> November 2017

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## K.S.P OCTATECH CO.,LTD.

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Page 1 of 3

# Calibration Certification

Certificate No.65T150

Equipment : pH meter  
Manufacturer : Mettler Toledo  
Serial No. : 151000017107  
Type : HQ411D  
ID No. : PK5901001  
Company : SOUTHERN THAI CONSULTING CO.,LTD.  
Address : 59/45 Moo 5 T. Srisoontorn, A.Talang, Phuket 83110  
Calibrated by : Miss Fatimah Maetimoh  
Calibration Date : 30 November 2022

( Signature)

Calibration Approve : Mr. Sudkhet Anuchit

Approve Date: 7 December 2022

( Signature)

Date of Issue : 8 December 2022

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K.S.P Octatech Company Limited calibration laboratory



The uncertainties are base on estimated confidence probability of approximately 95%



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Page 2 of 3

Equipment : pH electrode  
Manufacturer : PHC101  
Serial No. : 220212562675  
Type : HACH  
ID No. : PK5901001  
Calibration method

Calibration were conducted using in-house calibration procedure CP-T01 according to comparison method with certified Reference Material Conductivity solution and Digital thermometer

### Reference Standard Instrument

Instrument	Serial No.	Change/Lot	Expire date	Traceability
1. Buffer pH 4.01	S/N: 51350004	IH164E	13.06.2024	MT
2. Buffer pH 7.00	S/N: 51350006	IH140D	20.05.2024	MT
3. Buffer pH 10.00	S/N: 51350010	IH031A	31.01.2024	MT
4. pH Simulator	S/N :2013379	-	01.07.2023	*Scal

\*Scal = Southern Calibraion Service Co.,Ltd

Condition of this result of calibration

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

2. Calibration were performance under the following ambient condition

Temperature (25±5) C°

Humidity (55±15) %RH







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Input From	
External Source	Display
(pH)	(pH)
1.00	NA
1.68	NA
4.01	NA
7.00	NA
10.01	NA
12.45	NA

Input From	
External Source	Display
(mv)	(mv)
1800	NA
900	NA
390	NA
-390	NA
-900	NA
-1800	NA

Measurement values			
Test value 25°C	pH Reading	Correction	Uncertainty
Buffer	(pH)	(pH)	(pH)
4.01	3.95	0.06	0.015
7.00	7.03	-0.03	0.015
10.00	10.05	-0.05	0.036

Electrode calibration			
3 point	Temp °c	Slope value(%)	Zero point(mv)
Buffer pH 4.01	25.6	96	-13
Buffer pH 7.00			
Buffer pH 10.00			

...End...



## Bara Scientific Co., Ltd.

988 U Chu Liang Building Floor7 Ramat Road  
Silom Bangkok Bangkok Thailand 10500  
Tel : 02-6324300 Fax : 02-6375496-7  
www.barascientific.com

Bara Scientific  
CALIBRATION LABORATORY



# Certificate of Calibration

Number of Page(s) 1 of 3

Certificate No. BSCC-UV-378/22  
Equipment UUV/Vis Spectrophotometer

Model UUV-1800

Manufacturer SHIMADZU

Serial No. A11635305233CD

ID No. UUV-03

Date of receipt 4 November 2022

Date of calibration 4 November 2022

Date of issue 10 November 2022

Customer name Southern Thai Consulting Co., Ltd.

Address 59/45 Moo 5, Srisoontorn, Talang, Phuket 83110

Temperature (23.6-26.9) °C (On site)  
Humidity (50.5-57.1) %RH (On site)

Equipment condition Good Operation

Calibration Location Laboratory

Calibration Procedure In-house method WI-UV-702-01 based on ASTM E275-01

Traceability  
Wavelength Accuracy is traceable to certificate No. 99394 and 99395  
Photometric Accuracy is traceable to certificate No. 99380 and 99387  
Stray Light is traceable to certificate No. 99385  
The above certificate are traceable to SI unit through Starna Scientific Ltd.  
(UKAS accredited calibration laboratory NO. 0659)

Calibrated by Mr.Sarunkorn Pukachong



Approved by

Mr.Kanchit Choothep  
Technical Manager

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.  
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced  
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Tel : 02-6324300 Fax : 02-6375496-7  
www.barascientific.com



# Certificate of Calibration

Certificate No.

BSCC-UV-378/22

Number of Page(s)

2 of 3

Calibration Results:

## 1.Wavelength Accuracy

Certified Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (±nm)
360.89	360.85	-0.04	0.18
418.53	418.51	-0.02	0.18
513.39	513.43	0.03	0.18
572.99	573.02	0.03	0.18
879.41	879.39	-0.02	0.18

## 2.Photometric Accuracy (UV)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
235	CNR	CNR	CNR	CNR
257	0.0000	0.0000	0.0000	0.0075
313	0.8579	0.8574	-0.0005	0.0075
350	0.0000	0.0000	0.0000	0.0075

\*CNR = Customer not request



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# Certificate of Calibration

Certificate No.

BSCC-UV-378/22

Number of Page(s)

3 of 3

Calibration Results:

## 3.Photometric Accuracy (Visible)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
420.0	CNR	CNR	CNR	CNR
440.0	CNR	CNR	CNR	CNR
465.0	0.4894	0.4889	-0.0005	0.0042
546.1	0.5042	0.5032	-0.0010	0.0042
590.0	0.6899	0.6889	-0.0011	0.0042
635.0	0.6878	0.6867	-0.0011	0.0042

\*CNR = Customer not request

## 4.Stray Light\*

Standard cut-off wavelength (nm)	Wavelength (nm)	Transmission (%)	Absorbance (A)
200.98±0.11nm	200.80	2.0246	0.9450

The Stray light transmission reference is less than 1.0%T and Stray light absorbance reference is greater than 2.00A  
\*Stray Light not NSC-ONSC Accredited.

The measurement uncertainty is base on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%.

\*\*\*End of Certificate\*\*\*

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Page 1 of 3

# Calibration Certificate

Certificate No. 65T155

Equipment : Incubator  
Manufacturer : Accuplus  
Serial No. : THL0408-0415-0034  
Type : 1250-DS  
Company : SOUTHERN THAI CONSULTING CO.,LTD.  
Address : 59/45 Moo 5 T. Srisoontorn, A.Talang, Phuket 83110  
ID NO. : NA  
Calibrated by : Mr.Sudkhet Anuchit Calibration Date: 30 November 2022

.....  
(Signature)

Calibration Approve : Mr.Issara Ongkabin Approve Date: 8 December 2022

.....  
(Signature)

Date of Issue : 9 December 2022

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K.S.P Octatech Company Limited calibration laboratory

*The uncertainties are base on estimated confidence probability of approximate*

FM-SER-03-06/Rev.01



## K.S.P OCTATECH CO.,LTD.

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Page 2 of 3

## Calibration method

This instrument was calibrated by comparison of indication with the temperature measured by the standards data acquisition with RTD sensor at specified locations inside the working space of chamber according to calibration procedure no. CP-S01-01

1. Reference instrument user: Temperature Data Logger with Sensor type RTD

RTD ID NO. TP-01 to TP-09

\*S/N : 21260163

2. This result of test was found accurate as show on date and place

\*Room Temperature : 25 $\pm$ 10 $^{\circ}$ c

\*Room Humidity : 55 $\pm$ 15% RH

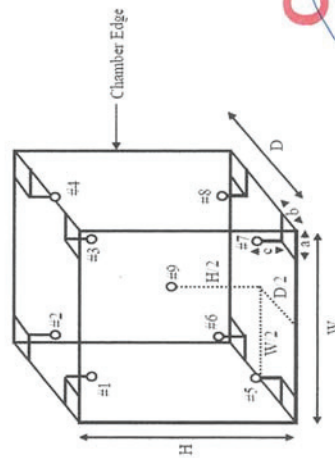
3. This calibration is traceable to:

\*Cer.No. SPR21070116-2 to SPR21070116-10

## Result of calibration

☒With out Adjustment

☐After Adjustment



Interior Chamber Size	W x H x D	50.0 cm x 110.0 cm x 48.0 cm	Fresh Air Setting	-
Installation Sensor Position	a x b x c	5 cm x 5 cm x 5 cm	Fan Speed Setting	-

FM-SER-03-06/Rev.01





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Page 3 of 3

## Result of Calibration (Without Adjustment)

Function : Temperature Generation

### Reporting of Temperature Distribution

Indicating Temperature ( °C )	Measured Temperature ( °C ) @ Probe No. ( Probe No.#9 is REF )									Uncertainty of Meas. ( ± °C )
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
	20.61	20.63	20.51	20.99	20.75	20.70	20.62	20.67	20.90	
20.0										0.38

### Reporting of Temperature Enclosure Performance

Setting Temperature (°C)	Indicating Temperature (°C)	Measured* Uniformity (°C)	Measured** Stability (± °C)	Overall*** Variation (°C)
20.0	20	0.47	0.11	0.55

### Measured Uniformity\*

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

### Measured Stability\*\*

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

### Overall Variation\*\*\*

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



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Page 1 of 3

## Calibration Certificate

Certificate No. 65T154

Equipment : Freezer  
Manufacturer : NA  
Serial No. : NA  
Type : NA  
Company : SOUTHERN THAI CONSULTING CO.,LTD.  
Address : 59/45 Moo 5 T. Srisoontorn, A.Talang, Phuket 83110  
Reference : -  
Calibrated by : Mr.Sudkhet Anuchi  
Calibration Date: 30 November 2022

(Signature)

Calibration Approve : Mr.Issara Ongkabin  
Approve Date: 8 December 2022

(Signature)

Date of Issue : 9 December 2022

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*The uncertainties are base on estimated confidence probability of approximate*





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Page 2 of 3

## Calibration method

This Instrument was calibrated by comparison with digital thermometer temperature indicator selector switch Manufacture : Tutron

### Condition of result of calibration

1. Reference instrument user: Digital Thermometer with probe type K

No.1 Type: TC-K

\*S/N : I.303962

2. This result of test was found accurate as show on date and place

\*Room Temperature : 25+/-10°c

\*Room Humidity : 55+/-15% RH

3. This calibration is traceable to: Southern Calibration Service Co.,Ltd.

\*Cer.No. 21DTH911

### Result of calibration

☒ With out Adjustment ☐ After Adjustment

COPY



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Page 3 of 3

Calibrate Point	Equipment Reading	Temperature Standard	Correction
°C	°C	°C	°C
4	4	3.23	-0.77

The estimate uncertainty of measurement was  $\pm 0.1^{\circ}\text{C}$   
the reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k=2$  providing at level of confidence of approximately 95%

Note: True value = Equipment Reading + Correction

COPY



## K.S.P OCTATECH CO.,LTD.

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Page 1 of 3

# Calibration Certificate

Certificate No. 65T153

Equipment : Water Bath  
Manufacturer : Memmert  
Serial No. : L408.0264  
Type : WNB14  
Company : SOUTHERN THAI CONSULTING CO.,LTD.  
Address : 59/45 Moo 5 T. Srisoontorn, A.Talang, Phuket 83110  
Reference : -  
Calibrated by : Mr.Sudkhet Anuchi  
(Signature)  
Calibration Approve : Mr.Issara Ongkabin  
Approve Date: 8 December 2022  
Date of Issue : 9 December 2022  
(Signature)

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COPY



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Page 2 of 3

## Calibration method

This Instrument was calibrated by comparison with digital

thermometer temperature indicator selector switch Manufacture : Tutron

## Condition of result of calibration

1. Reference instrument user: Digital Thermometer with probe type K

No.1 Type: TC-K

\*S/N : L303962

2. This result of test was found accurate as show on date and place

\*Room Temperature : 25+/-10°c

\*Room Humidity : 55+/-15% RH

3. This calibration is traceable to: Southern Calibration Service Co.,Ltd.

\*Cer.No. 21DTH911

## Result of calibration

☒ With out Adjustment

☐ After Adjustment

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Tel : (074) 346011-13 Fax : (074) 346014-15

Email : iss.kan@gmail.com , www.ksp108.com, Email : kspoctatech.hatyai2@gmail.com

Calibrate Point °C	Equipment Reading °C	Temperature Standard °C	Correction °C
85	85	85.38	0.38

The estimate uncertainty of measurement was  $\pm 0.1^{\circ}\text{C}$   
the reported uncertainty of measurement was based on a standard  
uncertainty multiplied by a coverage factor  $k=2$  providing at level  
of confidence of approximately 95%

Note: True value = Equipment Reading + Correction

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## Calibration Certificate

Certificate No. 65T152

Equipment : Hot Air Oven  
Manufacturer : Memmert  
Serial No. : C405.0786  
Type : UNE400  
Company : SOUTHERN THAI CONSULTING CO.,LTD.  
Address : 59/45 Moo 5 T. Srisoonthorn, A.Talang, Phuket 83110  
Reference : -  
Calibrated by : Mr.Sudkhet Anuchi  
(Signature)

Calibration Approve : Mr.Issara Ongkabin  
(Signature)  
Approve Date: 8 December 2022  
Date of Issue : 9 December 2022

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K.S.P Octatech Company Limited calibration laboratory

The uncertainties are base on estimated confidence probability of approximate

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### Calibration method

This Instrument was calibrated by comparison with digital thermometer temperature indicator selector switch Manufacture : Tutron

#### Condition of resurt of calibration

1. Reference instrument user: Digital Thermometer with probe type K

No.1 Type: TC-K

\*S/N : I.303962

2. This result of test was found accurate as show on date and place

\*Room Temperature : 25+/-10°C

\*Room Humidity : 55+/-15% RH

3. This calibration is traceable to: Southern Calibration Service Co.,Ltd.

\*Cer.No. 21DTH911

#### Result of calibration

☒ With out Adjustment

☐ After Adjustment

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Calibrate Point °C	Equipment Reading °C	Temperature Standard °C	Correction °C
104	104	106.09	2.09
150	150.0	150.11	0.11
180	180.0	180.78	0.78

The estimate uncertainty of measurement was  $\pm 0.1^{\circ}\text{C}$   
the reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k=2$  providing at level of confidence of approximately 95%

Note: True value = Equipment Reading + Correction

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### Certificate of Calibration

Certificate No.65T149

#### Customer

Company	SOUTHERN THAI CONSULTING CO.,LTD.
Address	59/45 Moo 5 T. Srisoontorn, A-Talang, Phuket 83110
ID No.	NA

#### Balance Scale

Manufacturer	sartorius	S/N	0035106544
Model	PRACTUM224-1S	Readability (d)	0.0001 g
Max. capacity	220 g		

#### Reference weight

Weight set No.	30402717	Class OIML	F1
Certificate No.	22M141		
Date of issue	30 January 2022		
	7 December 2022		

Technology Promotion  
Association (Thailand-Japan)

The above mentioned balance/scale is meteorologically tested and the test results reported in this calibration certificate correspond with the manufacturer's specification. ☒ Yes ☐ No

Adjustment of balance scale has been necessary ☒ Yes ☐ No

(In case of "NO" "Before Adjustment" results are equal to "After Adjustment"

#### Remarks

Calibration date	30 November 2022	Approve date	8 December 2022
Calibrated by	Miss Fatimah Maetimoh	Calibration Approve	Mr. Sudkhet Amehit
Signature		Signature	

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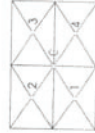
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Email : iss.kan@gmail.com , www.ksp108.com, Email : kspoctatech.hatyaiz@gmail.com

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### Measuring Result

#### 1. Eccentricity test

<input checked="" type="checkbox"/>	Reference weight	50g	Position	Center	Increasing value(g)	50.0000
				Left front		49.9999
				Left rear		49.9995
				Right rear		50.0002
				Right front		50.0000
<input type="checkbox"/>				Maximum error		0.0000
				Within manufacturer's		After Adjustment
				Specification :	Yes <input checked="" type="checkbox"/> NO <input type="checkbox"/>	



#### 2. Linearity Test

Nominal Value	Displayed value(g)	Weight Value(g)	Deviation(g)	Uncertainty k=2(g)
1 0.1 g	0.0999	0.100015	0.00012	0.00014
2 1 g	1.0000	1.000031	0.00003	0.00014
3 2g	2.0001	2.000039	-0.00006	0.00014
4 5 g	4.9998	5.000051	0.00025	0.00015
5 10 g	10.0002	10.000068	-0.00013	0.00015
6 20 g	20.0001	20.000075	-0.00003	0.00015
7 50 g	49.9999	50.000060	0.00016	0.00016
8 100g	100.0003	100.00014	-0.00016	0.00016
9 150g	149.9999	150.00020	0.00030	0.00019
10 200 g	200.0000	200.00028	0.00028	0.00021

Within manufacturer's

Specification :

After Adjustment  
Yes ☒ NO ☐

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### 3. Repeatability Test

Ref. Weight				
200 g				
(After Adjustment only)				
No.	Empty	Loaded(g)	Difference(g)	
1	0	200.0001	0.0001	
2	0	200.0001	0.0001	
3	0	200.0001	0.0001	
4	0	200.0001	0.0001	
5	0	200.0004	0.0004	
6	0	200.0001	0.0001	
7	0	199.9999	-0.0001	
8	0	200.0003	0.0003	
9	0	200.0003	0.0003	
10	0	200.0001	0.0001	
SD		=	0.00014	
Within manufacturer's			After Adjustment	
Specification :			Yes <input checked="" type="checkbox"/> NO <input type="checkbox"/>	

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## Certificate of Calibration

Certificate No. 65T158

### Customer

Company	SOUTHERN THAI CONSULTING CO.,LTD.
Address	59/45 Moo 5 T. Srisoonthorn, A.Talang, Phuket 83110
ID No.	-

### Balance Scale

Manufacturer	OHAUS
Model	Scout Pro SPs402F
Max. capacity	400 g

S/N	7124302108
Readability (d)	0.01

### Reference weight

Weight set No.	30402717
Certificate No.	21M162
Date of issue	30 January 2021
	7 December 2022

Class OIML	F1
------------	----

Technology Promotion	Association (Thailand-Japan)
----------------------	------------------------------

The above mentioned balance/scale is meteorologically tested and the test results reported in this calibration certificate correspond with the manufacturer's specification. ☒ Yes ☐ No

Adjustment of balance scale has been necessary ☒ Yes ☐ No

In case of "NO" "Before Adjustment" results are equal to "After Adjustment"

### Remark

Calibration date	30 November 2022	Approve date	8 December 2022
Calibrated by	Mr. Sudket Anuchit	Calibration Approve	Mr. Issara Ongkabin
Signature		Signature	

**copy**



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Email : iss.kan@gmail.com , www.ksp108.com, Email : kspoctatech.hatyai2@gmail.com

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### Measuring Result

#### 1. Eccentricity test



Reference weight	Position	Increasing value(g)
100 g	Center	99.99
	Left front	99.98
	Left rear	99.98
	Right rear	99.99
	Right front	99.99
	Maximum error	0.02
	Within manufacturer's	After Adjustment
	Specification :	Yes <input checked="" type="checkbox"/> NO <input type="checkbox"/>

#### 2. Linearity Test

Nominal Value	Displayed value(g)	Weight Value(g)	Deviation(g)	Uncertainty(g) k=2
1 1 g	1.00	1.000027	0.0000	0.0048
2 5 g	5.00	5.000051	0.0001	0.0048
3 10 g	10.00	10.000063	0.0001	0.0048
4 20 g	20.00	20.000075	0.0001	0.0048
5 50 g	49.99	50.000006	0.010	0.0048
6 100 g	70.00	100.00017	30.000	0.0048
7 150 g	99.99	150.00023	50.010	0.0048
8 200 g	150.00	200.00034	50.000	0.0048
9 300 g	199.99	300.00051	100.0105	0.0048
10 400 g	398.54	400.0006	1.4606	0.0048

Within manufacturer's

Specification :

After Adjustment

Yes ☒ NO ☐

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### 3. Repeatability Test

No.	Empty	Loaded(g)	Difference(g)
1	0	199.99	-0.01
2	0	199.98	-0.02
3	0	199.99	-0.01
4	0	199.99	-0.01
5	0	199.99	-0.01
6	0	199.98	-0.02
7	0	199.99	-0.01
8	0	199.99	-0.01
9	0	199.98	-0.02
10	0	199.99	-0.01
SID = 0.0048			
Within manufacturer's			After Adjustment
Specification :			Yes <input checked="" type="checkbox"/> NO <input type="checkbox"/>

Ref. Weight  
(After Adjustment only)  
200 g

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# Calibration Certification

Certificate No. 65T151

Equipment : Conductivity meter  
Manufacturer : HACH  
Serial No. : 180700001018  
Type : HQ14  
ID No. : SCD-001

Company : SOUTHERN THAI CONSULTING CO.,LTD.

Address : 59/45 Moo 5 T. Srisoontorn, A.Talang, Phuket 83110

Calibrated by : Miss Fatimah Maetimoh  
Calibration Date : 30 November 2022

(Signature)

Calibration Approve : Mr. Sudkhet Anuchit  
Approve Date: 7 December 2022

(Signature)

Date of Issue : 8 December 2022

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Equipment : Conductivity electrode  
Manufacturer : HACH  
Serial No. : 180892587022  
Type : CDC401  
ID No. : NA  
Calibration method

Calibration were conducted using in-house calibration procedure CP-T01 according to comparison method with certified Reference Material Conductivity solution and Digital thermometer

### Reference Standard Instrument

Instrument	Serial No.	Change/Lot	Expire date	Traceability
1 84 $\mu$ S/cm	51302153	CS8421F1	28.06.2023	MT
2 1413 $\mu$ S/cm	51350092	1G041A	10.02.2023	MT
3 12.88 ms/cm	51350094	1G131M	11.05.2023	MT

### Condition of this result of calibration

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

2. Calibration were performance under the following ambient condition

Temperature (25 $\pm$ 5) C°

Humidity (55 $\pm$ 15) %RH

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## Calibration Certificate

Certificate No. 65T156

Equipment : Incubator  
Manufacturer : Labtech  
Serial No. : B100622019  
Type : LBI-500E  
Company : SOUTHERN THAI CONSULTING CO.,LTD.  
Address : 59/45 Moo 5 T. Srisoontorn, A.Talang, Phuket 83110  
ID NO. : NA  
Calibrated by : Mr. Sudkhet Anuehrit Calibration Date: 30 November 2022

.....  
(Signature)

Calibration Approve : Mr.Issara Ongkabin Approve Date: 8 December 2022

.....  
(Signature)

Date of Issue : 9 December 2022

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Calibration Data			
Test value 25°C	UCC Reading	Corection	Uncertainty
Conductivity sol.			
84 µs/cm	84.09 µs/cm	-0.1 µs/cm	1.5 µs/cm
1413 µs/cm	1413 ms/cm	0 µs/cm	9.1 ms/cm
12.88 ms/cm	12.85 ms/cm	0.03 ms/cm	0.12 ms/cm

Temperature calibration		
Test Measured values	Equipment Reading	Temperature Standard Error
1413 µs/cm	25.1 °C	25.1 °C 0 °C

...End...

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### Calibration method

This instrument was calibrated by comparison of indication with the temperature measured by the standards data acquisition with RTD sensor at specified locations inside the working space of chamber according to calibration procedure no. CP-S01-01

1. Reference instrument user: Temperature Data Logger with Sensor type RTD

RTD ID NO. TP-01 to TP-09

\*SN : 21260163

2. This result of test was found accurate as show on date and place

\*Room Temperature : 25 $\pm$ 10 $^{\circ}$ C

\*Room Humidity : 55 $\pm$ 15% RH

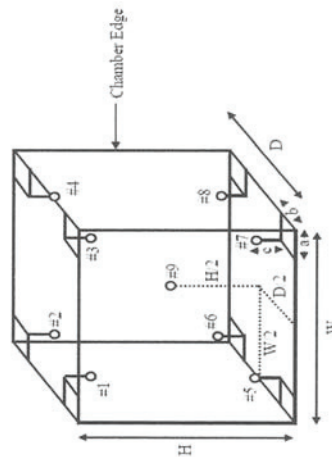
3. This calibration is traceable to:

\*Cer.No. SPR21070116-2 to SPR21070116-10

### Result of calibration

☒ Without Adjustment

☐ After Adjustment



Interior Chamber Size	W x H x D	50.0 cm x 60.0 cm x 50.0 cm	Fresh Air Setting	-
Installation Sensor Position	a x b x c	5 cm x 5 cm x 5 cm	Fan Speed Setting	-

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### Result of Calibration (Without Adjustment)

Function : Temperature Generation

### Reporting of Temperature Distribution

Indicating Temperature ( $^{\circ}$ C)	Measured Temperature ( $^{\circ}$ C) @ Probe No. (Probe No.#9 is REF)									Uncertainty of Meas. ( $\pm$ $^{\circ}$ C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
35.0	31.75	32.03	31.66	31.92	32.03	31.83	31.75	32.12	32.01	0.49

### Reporting of Temperature Enclosure Performance

Setting Temperature ( $^{\circ}$ C)	Indicating Temperature ( $^{\circ}$ C)	Measured* Uniformity ( $^{\circ}$ C)	Measured** Stability ( $\pm$ $^{\circ}$ C)	Overall*** Variation ( $^{\circ}$ C)
35.0	35	0.47	0.55	0.81

### Measured Uniformity\*

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

The reference sensor should preferably be located at the geometric center of the chamber.

### Measured Stability\*\*

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

### Overall Variation\*\*\*

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

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%.

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