

ANALYTICAL BALANCE (DU)

Model. : XS205DU

Serial No. : 1126323724



Certificate No. : 23-006683

Sample Code : 23-02820-006

Page 1 of 4

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

683 Moo 11, Sukhapiban 8 Rd., Nongkham,

Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Analytical Balance Room)

Equipment : ELECTRONIC BALANCE

Manufacturer : METTLER TOLEDO

Model : XS205DU

Serial No. : 1126323724

ID No. : LABE 05/1

Date of Receipt : 20 January 2023

Date of Calibration : 20 January 2023

Calibrated by : Mr. Thanadol Pholthep
ScientistApproved by : (Mr. Somchai Neampunt)
Signed for Director

Issue date : 25 January 2023

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

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

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



REPORT OF CALIBRATION

Equipment : ELECTRONIC BALANCE

Manufacturer : METTLER TOLEDO

Model : XS205DU

Capacity : Max 81 g / 220 g

Resolution : 0.01 mg / 0.1 mg

Serial No. : 1126323724

ID No. : LABE 05/1

Result of Calibration

1. Test weight and repeatability of reading

Repeatability is a measure of the ability of a balance to supply the same result in repetitive weighings with one and the same load under the same measurement condition. The measurement of the repeatability must include both the balance specifications and the ambient (vibration, fluctuating air current/temperature/humidity, etc.) Operator handling of the balance is also included in the standard deviation.

Unit : g Range : 80 ☐ Before adjustment ☐ After adjustment

Nominal value 40 90

Standard weight 40.000042 50.000045

Average reading of indicator 40.00015 50.00019

Standard deviation 0.000004 0.000007

Unit : g Range : 200 ☐ Before adjustment ☐ After adjustment

Nominal value 100 200

Standard weight 100.000022 200.000199

Average reading of indicator 100.0001 200.0004

Standard deviation 0.00004 0.00008

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Certificate No. : 23-006683

Sample Code : 23-02820-006

REPORT OF CALIBRATION

Result of Calibration

2. Sensitivity or value of a scale division

Change in the output variable of a measuring instrument divided by the associated change in the input variable.

Unit: g

Range	Test Point	Sensitivity, S	Test Point	Sensitivity, S
Range : 80	0	0.99800	0	0.9980
	40	0.99800	100	0.9980
	80	0.99800	200	0.9980

3. Departure of indication from nominal value, Linearity

Unit: g

Nominal Value	Standard Value	Average Reading of Indicator	Correction Value	Expanded Uncertainty	Coverage Factor (k)
Unload	0.000000	0.00000	0.00000	0.0000090	2.01
0.01	0.0100036	0.01000	0.00000	0.0000093	2.01
0.1	0.1000062	0.10000	0.00001	0.000012	2.00
1	1.0000036	1.00001	-0.00001	0.000014	2.00
5	5.0000044	5.00003	-0.00003	0.000020	2.00
10	10.000000	10.00007	-0.00007	0.000032	2.00
20	20.000016	20.00011	-0.00009	0.000036	2.00
50	50.000029	50.00013	-0.00010	0.000067	2.00
100	100.000022	100.0001	-0.0001	0.00016	2.00
150	150.000051	150.0001	0.0000	0.00023	2.00
200	200.000199	200.0003	-0.0001	0.00028	2.00

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

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Certificate No. : 23-006683

Sample Code : 23-02820-006

REPORT OF CALIBRATION

Result of Calibration :

4. Eccentric or off-centre loading

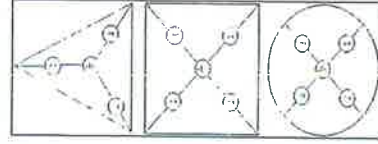
Deviation of the measurement value through off - center (eccentric) loading. The corner load increases with the weight of the load and its removal from the center of the pan support.

Weighting pan : ☐ Circle
☐ Triangular
☒ Rectangular

Test weight : 50 and 100

Unit : g

Range	Position	Reading of indicator	Reading of indicator
80	1	50.00014	100.00001
	2	50.00014	99.99998
	3	50.00006	100.00000
	4	50.00010	100.00001
	5	50.00017	100.00001
	6	50.00014	100.00001
Maximum difference		0.00008	0.00003



Condition of Calibration

1. Calibrator Method : WI-CL-004 base on UKAS LAB 14: 2019

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

3. Condition of Calibration item: Normal

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

* Through the reference standard laboratory of Asia Medical and Agricultural Laboratory and Research Center Public Company Lim ted (Instrument number 1).

5. Reference standard instrument :

Instrument : 1) STANDARD WEIGHT 1 mg to 1 kg

Class : E2

ID No. : LB-WE-57

Certificate No. : 22-060539

Dua Date : 27 June 2023

Ambient conditions	Min	Max
Temperature (°C)	21.3	22.4
Relative Humidity (%Rh)	38.2	40.4
Air pressure (hPa)	1006.4	1010.1

ANALYTICAL BALANCE

Model. : SECURA224-1S

Serial No. : 0036707137



Certificate No. : 23-006682

Sample Code : 23-02820-005

Page 1 of 4

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

683 Moo 11, Sukhapiban 8 Rd., Nongkham,

Sriracha, Chonburi 20230

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Analytical Balance Room)

Equipment : ELECTRONIC BALANCE

Manufacturer : SARTORIUS

Model : SECURA224-1S

Serial No. : 0036707137

ID No. : LABE 05/2

Date of Receipt : 20 January 2023

Date of Calibration : 20 January 2023

Calibrated by : Mr. Thanadol Pholthep
Scientist

Issue date : 25 January 2023

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

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

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361 Soi Ladprao 122, Ladprao Road,

Phlabphla, Wang Thonglang, Bangkok 10310

FW-CL-017

TEL 02-516-2422

FAX 02-516-6949

Rev.05

CONTACT@AMARC.CO.TH

WWW.AMARC.CO.TH

Effective Date 15/10/21



Page 2 of 4

Certificate No. : 23-006682

Sample Code : 23-02820-005

REPORT OF CALIBRATION

Equipment : ELECTRONIC BALANCE

Manufacturer : SARTORIUS

Model : SECURA224-1S

Capacity : Max 220 g

Resolution : 0.0001 g

Serial No. : 0036707137

ID No. : LABE 05/2

Result of Calibration

1. Test weight and repeatability of reading

Repeatability is a measure of the ability of a balance to supply the same result in repetitive weighings with one and the same load under the same measurement condition. The measurement of the repeatability must include both the balance specifications and the ambient (vibration, fluctuating air current/temperature/humidity, etc.) Operator handling of the balance is also included in the standard deviation.

Unit : g	Range : 220	<input type="checkbox"/> Before adjustment	<input type="checkbox"/> After adjustment
<input checked="" type="checkbox"/> No adjustment	Nominal value	100	200
<input type="checkbox"/> Adjustment	Standard weight	100.000022	200.0000199
	Average reading of indicator	99.9998	199.9999
	Standard deviation	0.00007	0.00007

Unit : -	Range : -	<input type="checkbox"/> Before adjustment	<input type="checkbox"/> After adjustment
<input type="checkbox"/> No adjustment	Nominal value	*	*
<input type="checkbox"/> Adjustment	Standard weight	*	*
	Average reading of indicator	*	*
	Standard deviation	*	*

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361 Soi Ladprao 122, Ladprao Road,

Phlabphla, Wang Thonglang, Bangkok 10310

FW-CL-024

TEL 02-516-2422

FAX 02-516-6949

Rev.03

CONTACT@AMARC.CO.TH

WWW.AMARC.CO.TH

Effective Date 15/10/21

Certificate No. : 23-006682
Sample Code : 23-02820-005

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REPORT OF CALIBRATION

Result of Calibration

2. Sensitivity or value of a scale division

Change in the output variable of a measuring instrument divided by the associated change in the input variable.

Unit : g

Test Point	Sensitivity, S	Range :	Test Point	Sensitivity, S
0	0.9980			
100	0.9980			
200	0.9980			

3. Departure of indication from nominal value, Linearity

Unit : g

Nominal Value	Standard Value	Average Reading of Indicator	Correction Value	Expanded Uncertainty	Coverage Factor (k)
Unload	0.0000000	0.0000	0.0000	0.00011	2.04
0.01	0.0100036	0.0100	0.0000	0.00011	2.04
0.1	0.1000062	0.1000	0.0000	0.00011	2.04
1	1.0000036	1.0000	0.0000	0.00011	2.04
2	2.0000128	2.0000	0.0000	0.00011	2.04
5	5.0000044	5.0000	0.0000	0.00011	2.04
10	10.0000000	10.0000	0.0000	0.00011	2.03
20	20.0000016	20.0000	0.0000	0.00012	2.03
50	50.0000029	50.0000	0.0000	0.00013	2.02
100	100.0000022	99.9998	0.0002	0.00017	2.01
200	200.0000199	200.0000	0.0002	0.00028	2.00

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

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Certificate No. : 23-006682
Sample Code : 23-02820-005

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REPORT OF CALIBRATION

Result of Calibration :

4. Eccentric or off-centre loading

Deviation of the measurement value through off - center (eccentric) loading. The corner load increases with the weight of the load and its removal from the center of the pan support.

☒ CircleWeighing pan ☐ Triangular

Test weight : 100

☐ Rectangular

Unit : g

Range	Position	Reading of indicator	Reading of Indicator
220			
1		99.9998	
2		100.0001	
3		99.9997	
4		99.9998	
5		99.9998	
6		99.9998	
Maximum difference		0.0003	

Condition of Calibration

1. Calibration Method : WI-CL-004 base on UKAS LAB 14: 2019

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

3. Condition of Calibration item: Normal

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

- Through the reference standard laboratory of Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (Instrument number 1).

5. Reference standard instrument :

Instrument

1) STANDARD WEIGHT 1 mg to 1 kg

Class

E2 LB-WE-57

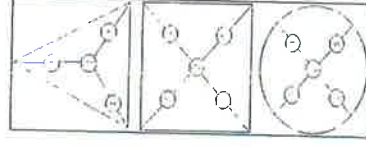
Certificate No.

22-060639

Due Date

27 June 2023

Ambient conditions	Min	Max
Temperature (°C)	21.2	22.5
Relative Humidity (%Rh)	37.1	44.3
Air pressure (hPa)	1021.1	1013.0



- End of Report -

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BOD INCUBATOR

ID No. : LABE 19/2



CERTIFICATE OF CALIBRATION

Certificate No. : 22-136844
Sample Code : 22-51164-006

Page 1 of 3

NSC-TSI-TSI17025
CALIBRATION 0152

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

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Laboratory)

Equipment : Temperature controlled enclosures (Incubator)
Manufacturer : N/A Model : N/A
Serial No. : S540040277 ID No. : LABE 19/2
Date of Receipt : 21 December 2022 Date of Calibration : 21 December 2022

Condition of Calibration

1. Environment
1.1 Ambient temperature : Maximum 25.1 °C : Minimum 24.3 °C
1.2 Relative humidity : Maximum 52.3 % : Minimum 48.5 %
1.3 Line voltage supplied : Maximum 223.6 VAC : Minimum 221.9 VAC

2. Calibration method

TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data Acquisition With Sensor (RTD-Prt00)	LB-DA-11 (RTD-148 to RTD-227)	22-040308	24 April 2023

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

The measurement is traceable to 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

Mr. Natthan Phosri
Scientist

Approved by

(Mr. Somchai Neampunt)
Signed for Director

Issue date

26 December 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).

361 Soi Ladprao 122, Ladprao Road,
Phlabphla, Wang Thonglang, Bangkok 10310
Rev.01
TEL 02-516-2422
FAX 02-516-6949
WWW.AMARC.CO.TH
CONTACT@AMARC.CO.TH
Effective Date 15/10/21

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REPORT OF CALIBRATION

Certificate No. : 22-136844
Sample Code : 22-51164-006

Page 2 of 3

NSC-TSI-TSI17025
CALIBRATION 0152

Results of Calibration

Resolution : 0.1 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)								Uncertainty ± (°C)	Coverage factor k	
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8			# g ^{Ref}
20	20.0	20.0	19.65	19.56	19.47	19.29	20.96	20.47	20.23	20.58	20.29	0.35	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
20	0.13	1.09	1.90

Notes

UUC* = Unit Under Calibration

[Signature]

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361 Soi Ladprao 122, Ladprao Road,
Phlabphla, Wang Thonglang, Bangkok 10310
Rev.09
TEL 02-516-2422
FAX 02-516-6949
WWW.AMARC.CO.TH
CONTACT@AMARC.CO.TH
Effective Date 15/10/21



REPORT OF CALIBRATION

Page 3 of 3

Certificate No. : 22-136844

Sample Code : 22-51164-006

Results of Calibration

Notes

1. Sensor installation locations
 - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
 - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :
W = 60 cm ; D = 70 cm ; H = 124 cm
3. Air valve or fresh air level : Off
4. Fan level : open
5. The quoted uncertainty includes "Stability of chamber and loading effect in chamber at 20% of uniformity".
6. 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.
7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC* reading - the average reading of indicating device that forms the integral part of the enclosure.
10. Calibration results without adjustment.

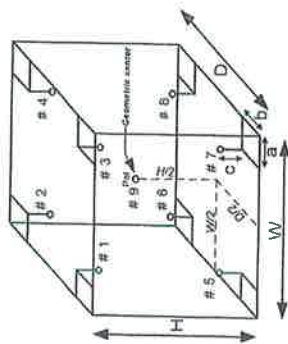


Figure. Example of sensor installation Positions

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 N3003.

- End of Report -

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BOD INCUBATOR
ID No. : LABE 19/5

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- $UUC^* = \text{Unit Under Calibration}$

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Phlabphla, Wang Thonglang, Bangkok 10310
FM-CL-018

Agricultural Laboratory
TEL 02-516-2422
FAX 02-516-6949

ment realized at the
Agricultural Laboratory
TEL 02-516-242

J (AMARC)
TACT@AMARC.CO.TH
WWW.AMARC.CO.TH

361 Soi Ladprao 122, Ladprao Road,
Phlabphla, Wang Thonglang, Bangkok 10310
FM-CL-018



REPORT OF CALIBRATION

Certificate No. : 23-040768
Sample Code : 23-16178-002

Results of Calibration

Notes

1. Sensor installation locations
 - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
 - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :
W = 60 cm ; D = 56 cm ; H = 146 cm
3. Air valve or fresh air level : Off
4. Fan level : Open
5. The quoted uncertainty includes " Stability of chamber and loading effect in chamber at 20% of uniformity ".
6. 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.
7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC* reading - the average reading of indicating device that forms the integral part of the enclosure.
10. Calibration results without adjustment.

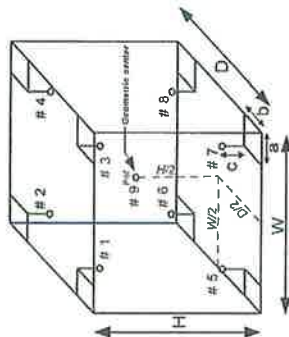


Figure: Example of sensor
Installation Positions

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

- End of Report -

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BAROMETER

Equipment : Analog Barometer

ID No. / Tag No. : BM001/41



MIRACLE INTERNATIONAL TECHNOLOGY CO., LTD.
214 Bangwaek Rd. Bangpai Bangkok 10160
Tel: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Certificate No. : L202305085-002
Date Issued : 16-May-23

Customer : Eastern Thai Consulting 1992 Co., Ltd.
683 Moo 11 Sukhapiarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

Equipment : Analog Barometer

Manufacturer : Barigo

Model : -

Serial No. : -

ID No./Tag No. : BM001/41

Date Received : 11-May-23

Date Calibrated : 15-May-23

Calibrated by : Mr. Janne Khaohong

Calibration Method or Calibration Procedure Used

In-house method : CP-21 base on DKD-R 6-1: Edition 3 2014.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

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Approved by:
(Mr. Sarayuth Tochuva)



Page 1 of 2

Certificate No : L202305085-002

Environment : Ambient Temperature : (25 ± 2)°C
Relative Humidity : (50 ± 15)%RH

STD Reading mbar	UUC Reading (mbar) Before Adjusted	UUC Reading (mbar) After Adjusted	UUC Error mbar	Uncertainty ± mbar
990.00	990.0	*	0.00	0.61
1000.00	1000.0	*	0.00	0.61
1010.00	1010.0	*	0.00	0.61
1020.00	1020.0	*	0.00	0.61
1030.00	1030.0	*	0.00	0.61

STD = Standard

UUC = Unit Under Calibration

Calibrated condition :

Pressure Medium : Air : Density = 1.19 kg/m³ @ 20°C, 1 bar
Mounting Position : Vertical
Reference Level : at center of its dial
Conversion Factor : Multiply by 1.0 E+02 - Pa unit

Description of UUC :

Range : 990 - 1030 mbar Absolute
Calibration Range : 990 - 1030 mbar Absolute
Scale Interval : 1 mbar
Resolution : 0.5 mbar Absolute

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

iRPC Certificate No. CL1-P220104 for Reference Pressure Monitor Serial No. 1598, Due 11-Nov-23

End of Certificate

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GAS CHROMATOGRAPH

Model. : GC-2010 PLUS AF

Serial No. : C12095200986

Operational Qualification

Operational Qualification Record

3. Operational Qualification Record

If the unit is included in the system to be inspected, place a checkmark in the "Applicable" box. If the unit is not included in the system, place a checkmark in the "Not Applicable" box. Enter a diagonal line in the Pass/Fail checkbox for "Not applicable" items.
Here, Inspection results are recorded along the procedure of Chapter 4 in Operational Qualification Protocol.

Component ID		Model Name		GC-2010Plus		Applicable <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/>	
Serial Number (SN)		C 1 2 0 9 5 2 0 0 9 3 6		L H F 0 4 3			
No.	Item	Criteria	Results	Pass	Fail		
1	Display, LED test	Verify the display and LED operation. Screen contrast adjustment is possible.	LED Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
2	Standard self-diagnostic test	"Good" displayed as the result of the self-diagnostic test.	Good	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
3	Firmware version check	Version number and build number are displayed. The version No. and build No. matches the controlled version number.	Version: 2.1040 Build No.: 2.63 Version: 2.1040 Build No.: 2.63	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
4	Temperature test	Verify that temperature control is normal. TEMP LED lights green.	Displayed actual values agree to the set values within $\pm 1.0^{\circ}\text{C}$. Temperature controller (Name) COL IN1 50.0°C IN2 50.0°C DET1 50.0°C DET2 50.0°C AUX3 50.0°C AUX4 50.0°C AUX5 50.0°C	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
5	Column inlet pressure test	Verify the accuracy of the column inlet pressure. Inspection pressure gauge reading $10.0 \pm 3.0\text{kPa}$ Inspection pressure gauge reading $200.0 \pm 20.0\text{kPa}$ Inspection pressure gauge reading $500.0 \pm 35.0\text{kPa}$	Pressure gauge correction value Pressure gauge reading 9.3 kPa Post-correction reading 0.5 kPa Pressure gauge correction value Pressure gauge reading 200.5 kPa Post-correction reading 200.5 kPa Pressure gauge correction value Pressure gauge reading 493.3 kPa Post-correction reading 492.5 kPa	<input checked="" type="checkbox"/>	<input type="checkbox"/>		

Performer (signature): DM Date: 25 / 07 / 2022
Reviewer (signature): DM Date: 25 / 8 / 22

Operational Qualification

Operational Qualification Record

No.	Item	Criteria	Results	Pass	Fail
6	Pressure program test	Verify that the pressure program operates normally. Monitored pressure 6 minutes after start $250.0 \pm 5.0\text{kPa}$ Inspection pressure gauge reading 8 minutes after start $250.0 \pm 20.0\text{kPa}$	250.0 kPa 250.0 kPa	<input checked="" type="checkbox"/>	<input type="checkbox"/>
7	Flowrate test	Verify the accuracy of the full-flow and septum purging. Septum purge vent measured flow rate $3.0 \pm 1.0\text{mL/min}$ Total of septum purge and split vent flow rate values $100 \pm 3\text{mL/min}$ Total of septum purge and split vent flow rate values $200 \pm 20\text{mL/min}$	Septum purge 2.1 mL/min Split vent 1.0 mL/min Total 3.1 mL/min Septum purge 200 mL/min Split vent 20 mL/min Total 220 mL/min	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	Column oven test	Verify the accuracy of the column oven temperature. Inspection temperature sensor displayed value $50.0 \pm 2^{\circ}\text{C}$ Inspection temperature sensor displayed value $150.0 \pm 4.2^{\circ}\text{C}$ Inspection temperature sensor displayed value $280.0 \pm 5.5^{\circ}\text{C}$ Inspection temperature sensor displayed value $280 \pm 4^{\circ}\text{C}$	Temp. correction value -0.1°C Temp. sensor reading 49.9°C Corrected temp. value 49.9°C Temp. sensor reading 152.1°C Corrected temp. value 152.0°C Temp. sensor reading 282.5°C Corrected temp. value 282.3°C Temp. sensor reading 280.4°C Corrected temp. value 280.4°C	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	Temperature program test	Verify that the column temperature program operates normally. Monitored temperature 6 minutes after start $200 \pm 1^{\circ}\text{C}$ Inspection temperature reading 8 minutes after start $200.0 \pm 4.7^{\circ}\text{C}$ Using a temperature sensor with 1°C minimum display increment $200 \pm 3^{\circ}\text{C}$	200.0°C 200.0°C 200.0°C	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10	Sensitivity test	Verify the detector sensitivity. FID () Not Applicable Calculated S value Inj. unit () Make-up gas: N ₂ 10.0 x 10 ³ C/g min. Make-up gas: He 7.00 x 10 ³ C/g min. TCD () Not Applicable Calculated S value Inj. unit () 4.00 x 10 ³ nV·mL/mg min.	CiAREA value 61462 Calculated S value 15.60 x 10 ⁻³ C/g CiAREA value Flowrate at vent Calculated S value	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Performer (signature): DM Date: 25 / 08 / 2022
Reviewer (signature): DM Date: 25 / 8 / 22

1-2 Scope

This Operational Qualification shall apply to the equipment installed at the following site.

(Address): 631 Moo 11 Sukhag, Boro 3 Rd, Nongphaw, Siachon, Chonburi 20110
(Company): Eastern Thai Consulting 1992 Co., Ltd.
(Department):
(Installation Site): Instrument Room GC/1C
(Equipment ID No.): Gas Chromatograph LABE 0419
(Product Model Name): GC-2010Plus | AOC-201 | AOC-205

SHIMADZU GAS CHROMATOGRAPH SYSTEM
GC-2010Plus Series

Operational Qualification

Operational Qualification Report

System Name _____
System ID No. Gas Chromatograph LABE 0419
Installation Site Instrument Room GC/1C

The undersigned performer reports that the Operational Qualification Protocol has been successfully completed for the system stated above.

• Performer

Signature Ch Date 25/02/2022
Print Thannant Pumpaka
Title Service Engineer
Company Boruscintific Co., Ltd.

The undersigned reviewer and manager report that the performer has completed the Operational Qualification Protocol successfully.

• Reviewer

Signature Manly Date 25/02/2022
Print Nunnapat Chaisiri
Title Scientist
Company Eastern Thai Consulting 1992 Co., Ltd.

• Manager

Signature Manly Date 25/02/2022
Print Nunnapat Chaisiri
Title HS
Company Eastern Thai Consulting 1992 Co., Ltd.

COPY

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Performer (signature): Ch Date: 25 / 02 / 2022
Reviewer (signature): Manly Date: 25 / 02 / 2022

Hot Air Oven

Model. : UM 400

Serial No. : 900982



CERTIFICATE OF CALIBRATION

Certificate No. : 23-018635
Sample Code : 23-07651-001

Page 1 of 3

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

Location of Calibration : EASTERN THAI CONSULTING 1992 CO., LTD.
(Hot Lab)

Equipment : Temperature controlled enclosures (Hot air oven)
Manufacturer : Mammet
Serial No. : 900982
Date of Receipt : 21 February 2023
Model : UM 400
ID No. : LABE 17/1
Date of Calibration : 21 February 2023

Condition of Calibration

1. Environment
1.1 Ambient temperature : Maximum 31.2 °C : Minimum 28.7 °C
1.2 Relative humidity : Maximum 50.2 % : Minimum 40.1 %
1.3 Line voltage supplied : Maximum 223.9 VAC : Minimum 221.5 VAC

2. Calibration method

TLAS-G-20: Guidelines for calibration and checks of temperature controlled enclosures.

3. Reference standard instrument

Instrument	ID No.	Certificate No.	Due Date
Data acquisition with sensor (RTD-P100)	LB-DA-12 (RTD-158 to RTD-166)	22-040312	02 May 2023

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

The measurement is traceable to 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

Mr. Sarawoot Thammo

Approved by

Scientist

Issue date

24 February 2023

(Mr. Somchai Neampunt)

Signed for Director

The uncertainties are for a confidence probability of approximately 95%.
The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

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

361 Soi Ladprao 122, Ladprao Road,

Phlabphla, Wang Thonglang, Bangkok 10310

FM-CL-114

TEL 02-516-2422

FAX 02-516-6949

Rev 01

CONTACT@AMARC.CO.TH

WWW.AMARC.CO.TH

Effective Date: 15/10/21



REPORT OF CALIBRATION

Certificate No. : 23-018635

Sample Code : 23-07651-001

Results of Calibration

Resolution : 0.1 °C

1. Reporting of Temperature

Calibration point (°C)	UUC* setting (°C)	UUC* reading (°C)	Measured temperature at each positions (°C)								Uncertainty ± (°C)	Coverage factor k	
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8			# 9 th
85	85.0	85.0	85.18	85.04	84.62	84.82	85.03	85.04	85.00	84.96	85.08	0.25	2.00

2. Characterization results

Calibration point (°C)	Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
85	0.07	0.49	0.68

Notes

- UUC* = Unit Under Calibration

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TEL 02-516-2422

FAX 02-516-6949

Rev 09

361 Soi Ladprao 122, Ladprao Road,

Phlabphla, Wang Thonglang, Bangkok 10310

FM-CL-008

CONTACT@AMARC.CO.TH

WWW.AMARC.CO.TH

Effective Date: 15/10/21

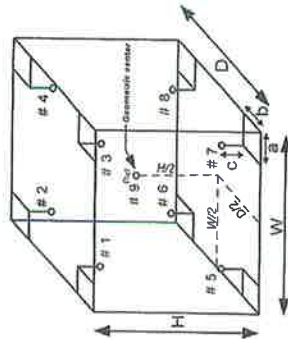


REPORT OF CALIBRATION

Results of Calibration

Notes

1. Sensor installation locations
 - 1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
 - 1.2 The reference sensor is preferably located of the geometric center of the chamber.
2. Interior dimensions approx of chamber :
W = 40 cm ; D = 28 cm ; H = 39 cm
3. Air valve or fresh air level : Off
4. Fan level : Open
5. The quoted uncertainty includes " Stability of chamber and loading effect in chamber at 20% of uniformity " .
6. 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.
7. Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
8. Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
9. UUC* reading - the average reading of indicating device that forms the integral part of the enclosure.
10. Calibration results without adjustment.

Figure: Example of sensor
Installation Positions

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

- End of Report -

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INDUCTIBELY COUPLED PLASMA SPECTROMETER

Model : Prodigy 7

Serial No. : P70177



บริษัท แอปพลิเคชัน ดีฟายน์ จำกัด
Application Define Company Limited
133/318 ถนนพหลโยธิน แขวงดินแดง เขตดินแดง กรุงเทพมหานคร 10510
133/318 Hatayath Road, Minburi Sub-district Minburi District, Bangkok 10510
Tel: (66)64458-5191 E-mail: support@apdefine.co.th Website: http://www.apdefine.co.th
เลขประจำตัวเสียภาษี 4105556032491

CERTIFICATE OF INSTRUMENT PERFORMANCE

INSTRUMENT:	INDUCTIVELY COUPLED PLASMA SPECTROMETER																																								
BRAND:	Telendyne Leeman Labs																																								
MODEL:	Prodigy 7																																								
SERIAL NO.	P70177																																								
CUSTOMER:	บริษัท อีทีพีเอ็น โปศ จำกัด 1992 จำกัด																																								
CHECKING:	<table><tr><td>SPECTROMETER</td><td>STATUS</td></tr><tr><td>Wavelength Accuracy check by use emission line of Hg Lamp</td><td>OK</td></tr><tr><td>Mercury line 253.652 nm.</td><td>OK</td></tr><tr><td>Plasma View (Dual View)</td><td>OK</td></tr><tr><td>CMOS Detector check</td><td>OK</td></tr><tr><td>Align View by Mn line 257.610 nm.</td><td>OK</td></tr><tr><td>RF GENERATOR</td><td></td></tr><tr><td>Incident Power 1,200 ±10 Watt</td><td>Reading = 1,200 Watt</td></tr><tr><td>SAMPLE INTRODUCTION</td><td></td></tr><tr><td>Plasma Torch, Injector, Spray chamber, Nebulizer</td><td>OK</td></tr><tr><td>Particulate pump & Tubing</td><td>OK</td></tr><tr><td>EXHAUSTING & COOLING SYSTEM</td><td></td></tr><tr><td>Safety Interlock Switch (Door, Argon pressure, Water pressure)</td><td>OK</td></tr><tr><td>Cooling System, water flowrate & low pressure switch</td><td>OK</td></tr><tr><td>Flowrate of Air blower</td><td>OK</td></tr><tr><td>COMPUTER & SOFTWARE</td><td></td></tr><tr><td>Plasma Ignition software & Analytical Software</td><td>OK</td></tr><tr><td>ANALYTICAL TEST</td><td></td></tr><tr><td>Full Frame Capture & Echellogram check</td><td>OK</td></tr><tr><td>Calibration Curve & QC Test</td><td>OK</td></tr></table>	SPECTROMETER	STATUS	Wavelength Accuracy check by use emission line of Hg Lamp	OK	Mercury line 253.652 nm.	OK	Plasma View (Dual View)	OK	CMOS Detector check	OK	Align View by Mn line 257.610 nm.	OK	RF GENERATOR		Incident Power 1,200 ±10 Watt	Reading = 1,200 Watt	SAMPLE INTRODUCTION		Plasma Torch, Injector, Spray chamber, Nebulizer	OK	Particulate pump & Tubing	OK	EXHAUSTING & COOLING SYSTEM		Safety Interlock Switch (Door, Argon pressure, Water pressure)	OK	Cooling System, water flowrate & low pressure switch	OK	Flowrate of Air blower	OK	COMPUTER & SOFTWARE		Plasma Ignition software & Analytical Software	OK	ANALYTICAL TEST		Full Frame Capture & Echellogram check	OK	Calibration Curve & QC Test	OK
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DATE : Dec 12, 2022

Mr. Somchai Chumyung
Engineer Sign

COPY

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีทีพีเอ็น โปศ จำกัด	Date: Dec 12, 2022
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

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

Gas system: ตรวจสอบแรงดันแก๊สและการรั่วซึม Argon Pressure: 5-5 psi Leak inspected (✓) No leak Nitrogen Pressure: 5-5 psi Leak inspected (✓) No leak Oxygen Pressure: 5-5 psi Leak inspected (✓) No leak	
() Change camera purge gas Dehydrator (1 times /years) Next time replacement 24/12/22 เปลี่ยนตัวดูดความชื้นแก๊สออกซิเจน ทุก 1 ปี	
Water Chiller: RF generator flow rate 4.44 LPM Temperature 2.5 °C ตรวจสมบูรณ์ Leak inspected (✓) No leak ตรวจสมบูรณ์	
Water Chiller: Camera (✓) check water level and refill ตรวจสมบูรณ์และเติมน้ำ (✓) change water เปลี่ยนน้ำ Temperature -31 °C ตรวจสมบูรณ์	
Exhaust Hood Flow rate 270 CFM (system request > 150)	

TELEDYNE LEMMAN LABS
P.L. V.P. V.P. V.P. V.P. V.P.

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PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีสเทิร์นไทย คอนสตรัคชั่น จำกัด	Date: Dec 12, 2022
Instrument: ICP-OES	Model: Prodigy 7
	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

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีสเทิร์นไทย คอนสตรัคชั่น จำกัด	Date: Dec 12, 2022
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

3. Instrument Control

Description	Status
<u>Optical view position:</u> ตรวจสอบตำแหน่งที่ติดตั้งหลอดไฟในแต่ละมุมมอง	
<u>Hg Lamp Deltas</u>	
X 2 Y -9	OK
XUV 0	OK
Axial peak positions X 3325 Y 1235	OK
Radial peak positions X 1151 Y 1225	OK
Hg lamp peak positions X 2220 Y 2630	OK
<u>Plasma Control</u> ตรวจสอบการทำงานมาตรฐานระดับพลังงาน	
() Auto Start	OK
() Extinguish	OK
() RF power setting	OK
() Igniter	OK
() Air Knife	OK
<u>Torch Gas</u> ตรวจสอบการทำงานที่ระบบแก๊สที่ใช้ในคอมพิวเตอร์	
() 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 อีทีพี จำกัด	Date: Dec 12, 2022
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

4. Cleaning & Replacement

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

5. Safety Interlock

Description	Status
(1) Door switch	OK
(2) RF Water Re-circulator	OK
(3) Camera Water Re-circulator	OK
(4) Camera purge gas	OK
(5) Argon pressure	OK
(6) Nitrogen pressure	OK

PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีทีพี จำกัด	Date: Dec 12, 2022
Instrument: ICP-OES	Model: Prodigy 7
	S/N: P70177

6. Hardware Check with SALS.EXE Diagnostics

Power Supply	Value	Status
-12 VDC (11 - 14.5 VDC)	-13.15%	OK
+12 VDC (11 - 14.5 VDC)	+12.01%	OK
+3.3VDC	3.28%	OK
+5.0 VDC	4.94%	OK
+13.5 VDC	13.46%	OK

Plasma Generator	Value	Status
ICP Current 0.500A = 1kW	0.54%	OK
ICP Ref 5.0Vdc = 1kW	5.46%	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	23	OK
Air Knife Pres. (0.00V) OFF	0	OK
Air Knife Pres. (3.0 - 7.0 V) ON	4.03%	OK
Neb 25 @ setting of 25 PSI	23	OK
Cool 18 @ setting of 18 LPM	12	OK
Aux 0.6 @ setting of .6 LPM	0.2	OK
Camera Water pump	0	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	1.0%	OK
Pump Voltage (8 to 13 V) ON	12.52	OK

Set Points	Value	Status
Air In Set Point 32°C	31	OK
Cam Tec Temperature -32°C	-32	OK
Op Purge Low 0.77 LPM	0.7	OK
Op Purge High 15.50 LPM	15.5	OK
Cam Wtr T 28°C	28	OK



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PREVENTIVE MAINTENANCE / CALIBRATION REPORT FOR PRODIGY7

Customer: บริษัท อีสเทิร์นไทย คอนกรีต จำกัด	Date: Dec 12, 2022
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 LPM	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	Seaspray	ok
Intensity first performance	1 ppm ≥ 4,000,000 5 ppm ≥ 15,000,000 10 ppm ≥ 50,000,000	265,000,000	ok

Engineer Sign	12 Dec 2022
 Somchai Chumyaung	 TELEDYNE LEEMAN LABS Everywhere you look

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LIQUID IN GLASS THERMOMETER

Model : Total immersion

Serial No. : 43560

Calibration Certificate

Certificate No.: 2300368-001-01
Client name: EASTERN THAI CONSULTING 1992 CO., LTD.
Address: 683 Moo 11, Sukhapibarn 8 Rd.,
 Nongkham, Sriracha, Chonburi 20230

Page 1 of 3

Equipment: Liquid-in-Glass Thermometer

Manufacturer: Precision

Model / Type: Total Immersion

Serial No.: 43560

ID No.: LABE 16/1

Order No.: 2300368

Operation No.: 2300368-001

Date of Receipt: 7 November 2022

Date of Calibration: 15 November 2022

Calibrated by Mr. Nattapong Niyomchat
 Specialist

Date of Issue: 18 November 2022

Approved by
 (Mr. Pheraphat Tuanjit)
 Manager, Division of Calibration Laboratory
 Responsible for the Technical Management Team

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

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 units 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 National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65



Calibration Report

Certificate No.: 2300368-001-01
Equipment: Liquid-in-Glass Thermometer
Range: -1.9 to 101.1 °C
ID No.: LABE 16/1
Manufacturer: Precision
Date of Calibration: 15 November 2022

Location: Temperature Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature 23 °C ± 3 °C
 Relative Humidity 55 % ± 15 %

Condition of this results of Calibration:

1. Calibration Method : - In-house method : W-TE-015 based on ASTM E77-07
 - The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.
 - The temperature Scale in use at this laboratory is the International Temperature Scale of 1990 (ITS-90).

2. Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
BLACK STACK THERMOMETER	1560/2560	A39258/A39719	PSL-T 0674/65	7-Jun-23	TISTR
Platinum Resistance Thermometer (PRT)	5615	808926			

Support Equipment : - Ice point Unit, ID No.: ann. 614/21

- Low Temperature Bath (Deep Well Compact Bath), Model: 7381, S/N: B53496.
- Low Temperature Bath (Deep Well Compact Bath), Model: 7341, S/N: A5A084.
- High Temperature Bath (Deep Well Compact Bath), Model: 6331, S/N: A5A087.

3. This certificate is traceable to International System of Units (SI Units).
4. This certificate was certified only for the instrument we calibrated.
5. This result of calibration was found accurate as shown on date and place of calibration only
6. Condition of Calibrated item : Good ☒ Without adjustment ☐ After adjustment
7. Result of Calibration :


 After adjustment

F-CS-012 Revision: 01 Date: 20-04-65





MERCURY ANALYZER

Model : RA-4500

Serial No. : 21780504



บริษัท โคแอกซ์ กรุ๊ป คอร์ปอเรชั่น จำกัด
COAX GROUP CORPORATION LTD.

COAX GROUP CORPORATION LTD.

DATE : March 24, 2023

Certificate of Calibration

MERCURY ANALYZER FOR WORKING ENVIRONMENT
THERMOMETER / RA-4500

Customer name : Eastern Thai Consulting 1992 Co.,Ltd.

Certificate No : SRP001-23
Customer P/O : PO.no.PL6602053
Sale Order No : -

Model # RA-4500
Serial No. # 21780504

Results : Quality Reborn Reference Standard Laboratory, NSC-TISI-TIS 17025 Calibration No.0292


Cal. Points	TIME	PRESET TEMP	Avr.	FACTOR ± 0.5
Calibration at 3 Point	60 Minutes	95 (°C)	90.73	0.950 - 1.050


This instrument is calibrated at factor 0.955

TEST APPARATUS		
Instrument Type	Serial Number	Certificate No.
PONPE 429TP	5845166	TM23-0008
PONPE 429TP	5845167	TM23-0009
PONPE 429TP	5845168	TM23-0010



Date of Calibrate : March 24, 2023
Next due date : March 24, 2024

Calibrate by :  (Siriraj Punsiri) Service Engineer
Environments & Petroleum Division

Approve by :  (Pathom Srivises) Service Manager
Environments & Petroleum Division

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Eastern Thai Consulting 1992 Co., Ltd.

Automatic Mercury Analyzer

Model RA-4500

Preventive Maintenance Report

Serial No. : 21780504

Soft version : Ver 2.0.7

ROM version : Ver 2.0.1

Date : February 09, 2023

Next due date : August 09, 2023

PM by :  (P. Siriraj)

Approved by :  (Pathom S.)



Coax Group Corporation Ltd.

1131/62,64,325-331 Nakornchaisri road,
Kwang ThanonNakornchaisri, Dusit, Bangkok 10300 Thailand
Tel. 02-2435263, 02-6682436 Fax. 02-2437386



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Inspection result

ITEM	STANDARD	RESULT	JUDGE
1. Self Check			
1.1 Leak check	0.14 - 2.0L/min	0.17L/min	PASS
1.2 Sig/Ref check	Signal 3.00 - 4.00V	Sig:3.97V, Ref:3.89V	PASS
1.3 Drift check	0.0000236 - 0.0000061	0.0000175	PASS
2. Analytical curve inspection(AREA)			
2.1 Calibration curve 0-100ng (Hight)	Correlation coefficient	1.0000	PASS
	(r) ≥ 0.9999		
3. Repeatability(AREA)			
3.1 Repeat STD 50ng, n=3			
	1.	50.60	ng
	2.	50.94	ng
	3.	50.71	ng
	C.V. ≤ 5%	0.34%	PASS
4. Blank	Below 1.0(AREA)	0.0158	PASS

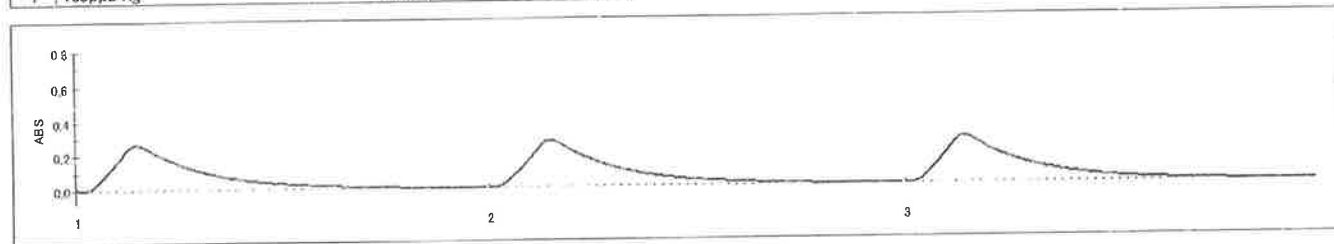
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SMP

No.	NAME	SVOL [mL]	CVOL [mL]	DVOL [mL]	AREA [ON]	MEAS [ng]	CONC [ug/L]	Color		Note
								[1]	[2]	
1	100ppb Hg	0.500	5.000	5.000	73.5373	50.6006	101.2012	-	-	
2	100ppb Hg	0.500	5.000	5.000	74.0347	50.9422	101.8844	-	-	
3	100ppb Hg	0.500	5.000	5.000	73.6938	50.7081	101.4162	-	-	

Statistics

No.	NAME	TRY	AV [ug/L]	SD [ug/L]	Cv [%]
1	100ppb Hg	3	101.50060	0.3493323	0.34



Self Check

Heat check:PASS!! (27.1degC[05:00] -> 31.2degC[03:03])
 Sensor check:PASS!! (3488- 133=3355)
 Leak check:PASS!! (0.17L/min)
 Sig/Ref check:PASS!! (Sig:3.97V, Ref:3.89V)
 Drift check:PASS!! (0.0000236 - 0.0000061 = 0.0000175)

COPY

-2-

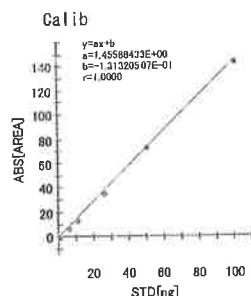
NIC NIPPON INSTRUMENTS CORPORATION

9/2/2566 16:11

Title : RA-4500 Preventive Maintenance no.2of2 in Warranty
 Date : 9/2/2566
 Name : Coax Group Corporation Ltd.
 Memo : Calibration curve, range 0-100ng

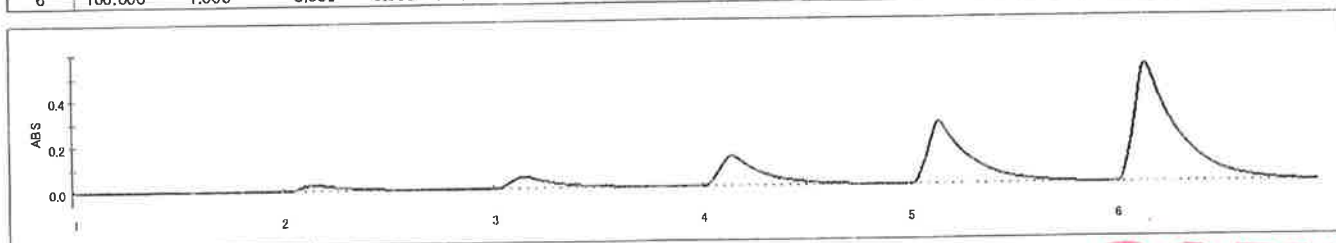
Method

Method1 (Pretreatment:without)
 (1+1)H2SO4 : 0.9mL
 10w/v% SnCl2 : 0.5mL
 Measurement Time(sec) : 120sec



STD

No.	STD [ppb]	SVOL [mL]	CVOL [mL]	DVOL [mL]	STD [ng]	AREA [ON]	MEAS [ng]	Dev [%]	Color		Note
									[1]	[2]	
1	100.000	0.000	5.000	5.000	0.000	0.0158	0.1011	-	-	-	
2	100.000	0.050	5.000	5.000	5.000	7.4089	5.1791	3.6	-	-	
3	100.000	0.100	5.000	5.000	10.000	14.1152	9.7855	2.1	-	-	
4	100.000	0.250	5.000	5.000	25.000	35.6872	24.6026	1.6	-	-	
5	100.000	0.500	5.000	5.000	50.000	73.3032	50.4398	0.9	-	-	
6	100.000	1.000	5.000	5.000	100.000	145.2998	99.8919	0.1	-	-	



COPY

pH Meter

Model. : SevenCompact S220

Serial No. : B448305208



CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

683 Moo 11, Sukhapiban 8 Rd., Nongkham,

Siracha, Chonburi 20230

Location of Calibration : Asia Medical and Agricultural Laboratory and Research Center Public Company Limited
(Calibration Laboratory)Equipment : pH Meter
Manufacturer : METTLER TOLEDO
Serial No. : B448305208
Date of Receipt : 01 February 2023
Condition of Calibration :
1. Environment
1.1 Ambient temperature : 25.0 ± 2.5 °C 1.2 Relative humidity : 55.0 % ± 15.0 %
2. Calibration method
In house method WI-CL-019; based on direct measurement by using standard voltage calibrator and using certified reference material (CRM).

3. Reference standard / Certified reference material

Instrument	ID No.	Certificate No.	Due Date
3.1 Voltage Calibrator	LB-AMC-01	22E3240	03 October 2023
3.2 Digital Thermometer	LB-TH-33	22-107027	02 October 2023
Certified Reference Material	Lot No.	Ref No.	Expire Date
3.3 Buffer Solution pH 4.008	838357	PH216.L5	15 September 2024
3.4 Buffer Solution pH 6.985	838358	PH107.L5	15 September 2023
3.5 Buffer Solution pH 10.008	838359	PH220.L5	15 September 2023

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

- 4.1 Instrument No. 3.1 through Technology Promotion Association (Thailand-Japan).
4.2 Instrument No. 3.2 through Asia Medical and Agricultural Laboratory and Research Center Public Company Limited.
4.3 Buffer Solution No. 3.3 and No. 3.5 traceable to CPA chem (through primary measurement method-Harned cell using calibrated thermometer, barometer, and nanovoltmeter Accredited laboratory ISO/IEC 17025 and ISO/IEC 17034).
4.4 Buffer Solution No. 3.4 traceable to CPA chem (BIM RefN HI-27 LotN 04.06.2021 ; BIM RefN HI-28 LotN 28.05.2021 ; BIM RefN HI-27 LotN 04.06.2021 ; BIM RefN HI-28 LotN 28.05.2021 Accredited laboratory ISO/IEC 17025 and ISO/IEC 17034).

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

6. Condition of calibration item : Normal

Calibrated by : Mr. Anupong Lakawin
Scientist
Approved by : (Ms. Pawana Pen-on)
Signed for Director

Issue date : 03 February 2023

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

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

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



REPORT OF CALIBRATION

Certificate No. : 23-011524
Sample Code : 23-04833-001Equipment : pH Meter
Manufacturer : METTLER TOLEDO
Serial No. : B448305208
Range : -2.000 pH to 20.000 pH ; ± 2000.0 mV ; -5.0°C to 130.0°C
Resolution : 0.01 pH ; 0.1 mV ; 0.1°C
Model : SevenCompact S220
ID No. : LABE 11/4

Results of Calibration

Part 1. DC Voltage measurement

pH Meter Serial No. : B448305208

Nominal Value	Applied DC Voltage mV	Average indicator reading		Uncertainty mV	Coverage factor k
		mV	pH		
pH					
0	414.113	414.0	0.00	± 0.083	2.00
4	177.477	177.5	4.00	± 0.083	2.00
7	0.000	0.1	7.00	± 0.083	2.00
10	-177.477	-178.3	10.00	± 0.083	2.00
14	-414.113	-413.8	14.00	± 0.083	2.00

Part 2. Performance of Electrode system

Electrode Manufacturer : METTLER TOLEDO Model : InLab Expert Pro-ISM

Electrode Serial No. : 2365921

Three-Point Calibration at pH4 and pH7 Percent Slope : 99.6 ; at pH7 and pH10 Percent Slope : 98.4

Standard Buffer Solution pH (@ 25 °C)	Average indicator reading		Error Value pH	Uncertainty pH	Coverage factor k
	pH	mV			
4.008	4.01	184.2	0.002	± 0.011	2.00
6.985	6.99	8.9	0.005	± 0.010	2.00
10.008	10.01	-166.8	0.002	± 0.010	2.00

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

COPY



NSC-TISI-TIS17025
CALIBRATION 0152
Page 3 of 3

REPORT OF CALIBRATION

Certificate No. : 23-011524
Sample Code : 23-04833-001

Equipment : PH Meter (Digital Thermometer with sensor)

Thermometer readout

Manufacturer : METTLER TOLEDO

Serial No. : B448305208

Resolution : 0.1 °C

Thermometer sensor

Manufacturer : METTLER TOLEDO

Serial No. : 2365921

Model : InLab Expert Pro-ISM

ID No. : N/A

Model : SevenCompact S220

ID No. : LABE 11/4

Range : -5.0 °C to 130.0 °C

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 The calibration use in house method WI-CL-021 : by comparison with standard thermometer
- 2.2 The calibration by comparison unit under calibration (UUC) to the standard thermometer in a calibration bath at the controlled temperature.
- 2.3 The temperature scale in use of this laboratory is the international temperature scale of 1990 (ITS-90).

3. Reference standard instrument

Instrument	Model	ID. No.	Certificate No.	Due date
3.1 Platinum Resistance Thermometer	PT-100	RTD-90	22-107027	02 October 2023
3.2 Thermometer Readout	GT-11	LB-TH-33	22-107027	02 October 2023

4. This certificate is traceable to the international system of unit (SI Unit).
Asia Medical and Agricultural Laboratory and Research Center Public Company Limited (Accreditation Under TLAS Laboratory Calibration No.0152)

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

Results of Calibration

Calibration point °C	Average of standard reading °C	Unit under calibration		Expanded uncertainty °C	Coverage factor k
		Immersion depth mm	Average reading °C	Correction value °C	
25	25.002	120	25.0	+ 0.002 ± 0.13	2.00

Notes

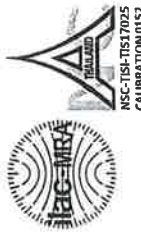
- Calibration results without adjustment

The result expanded uncertainty of measurement U is stated as the standard uncertainty u 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 M2003.

- End of report -

COPY

STANDARD WEIGHT 50 g



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

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.
883 Moo 11, Sukhepiban 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 : 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
Issue date : 31 May 2022

(Mr. Somchai Neampunt)
Signed for Director

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

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

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



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 (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_0) of 1.2 kg.m⁻³

Description	Deviation	Conventional	Expanded	Maximum	ID No.
		Mass	Uncertainty	Permissible Error	
	(mg)		(mg)	\pm (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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Certificate No. : 22-052238

Sample Code : 22-19150-003

REPORT OF CALIBRATION

Condition of Calibration:

1. Ambient Conditions : Temperature 20 °C ± 1.5°C, Relative humidity 50% ± 10% and air density 1.20 kg/m³
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 -

June

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STANDARD WEIGHT 100 g



Certificate No. : 22-052239

Sample Code : 22-19150-004

CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO., LTD.

683 Moo 11, Sukhapiban 8 Rd., Nongkham,

Si Racha, 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
Scientist

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).



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 (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_a) of 1.2 kg.m⁻³

Description	Deviation	Conventional	Expanded	Maximum	ID No.
		Mass	Uncertainty	Permissible Error	
	(mg)		(mg)	± (mg)	
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

COPY

Certificate No. : 22-052239

Sample Code : 22-19150-004

Page 3 of 3

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/m³
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 -



COPY

STANDARD WEIGHT 50 g



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,
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 : 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

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).



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 (ρ_{ref}) of 8000 kg.m⁻³ which it balances in air of a reference density (ρ_a) of 1.2 kg.m⁻³

Description	Deviation	Conventional	Expanded	Maximum	ID No.
		Mass	Uncertainty	Permissible Error	
	(mg)		(mg)	± (mg)	
50 g	-0.111	49.99889 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

COPY



Certificate No. : 22-052237

Sample Code : 22-19150-002

Page 3 of 3

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/m³
 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 50 g
Shape :	Cylindrical weight with knob
Material :	Stainless steel
Case :	Wooden Box
Comments :	Recalibration

- End of Report -

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SPECTROPHOTOMETER

Model : PROVE 100

Serial No. : 1613110857



CERTIFICATE OF CALIBRATION

Instrument : SPECTROPHOTOMETER
Model : PROVE 100
Date of Calibration : February 13, 2023
Customer Name : Eastern Thai Consulting 1992 Co., Ltd.
Procedure used

The wavelength accuracy and the linearity of the absorbance measurement of photometers are checked using Check solutions according to Merck calibration laboratory work instruction.

Measurements results

Function : Absorbance measurement.
All data shown below as received values of blank solution before adjustment.

Check Solution (Abs.)	Wavelength (nm)	Desired Absorbance (Abs.)	Measured Absorbance (Abs.)	Error (Abs)
0.000	445	0.000 ± 0.005	0.000	0.000
0.000	525	0.000 ± 0.005	0.000	0.000
0.000	690	0.000 ± 0.005	0.000	0.000

CERTIFICATE No. WO-02514383



Merck Ltd. Thailand
19th Floor, Emporium Tower, 622 Sukhumvit Road
Klongton, Klongtoey, Bangkok 10110
Tel : +66 (0) 2667 8000
Fax : +66 (0) 2667 8399
Customer Care Center : +66 (0) 2667 8333

1 of 4



CERTIFICATE OF CALIBRATION

Function : Absorbance measurement.
All data shown below were final value of standard solution after adjustment.

Check Solution* (Abs.)	Desired Absorbance (Abs.)	Allowed tolerance (Abs.)	Actual Absorbce (Abs.)	Assessment Yes/No
445-1	0.198	± 0.020	0.196	Yes
445-2	0.496	± 0.030	0.493	Yes
445-3	0.994	± 0.040	0.985	Yes
445-4	1.492	± 0.050	1.475	Yes
525-1	0.197	± 0.020	0.195	Yes
525-2	0.494	± 0.030	0.491	Yes
525-3	0.986	± 0.040	0.984	Yes
525-4	1.482	± 0.050	1.480	Yes
690-1	0.197	± 0.020	0.197	Yes
690-2	0.498	± 0.030	0.497	Yes
690-3	0.985	± 0.040	0.978	Yes
690-4	1.485	± 0.050	1.482	Yes

* Spectroquant Photocheck (Check Solution) Lot : HC35941

- Check solution for this certification is traceable to : Reference Photometer Agilent Cary 4000 checked and calibrated using NIST-grey glass filter SRM 1930 and Holmiumoxide Solution NIST SRM 2034.
- Desired absorbance round cell has been calculated from the absorbance of the 1 cm cell using the path length of the round cell and is entered as the desired



Merck Ltd. Thailand
19th Floor, Emporium Tower, 622 Sukhumvit Road
Klongton, Klongtoey, Bangkok 10110
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CERTIFICATE OF CALIBRATION

Software version: 1.5.1

Wavelength Accuracy [†]					
Equipment	Nominal value	Tolerance limit [‡]	Actual value	Result	
Holmium Oxide Liquid Filter Hellma 667-UV5	361.25 nm	360.1 - 362.5 nm	360.8 nm	P	
	536.55 nm	535.4 - 539.3 nm	536.9 nm	P	
	640.55 nm	639.4 - 642.8 nm	640.9 nm	P	
Photometric Accuracy [†]					
Equipment	Wavelength	Nominal value	Tolerance limit [‡]	Actual value	Result
Neutral Density 1.00 Abs. Hellma 666-F4	440 nm	1.079 A	1.067 - 1.091 A	1.083 A	P
	546 nm	1.012 A	1.004 - 1.020 A	1.015 A	P
	635 nm	1.050 A	1.042 - 1.058 A	1.051 A	P
Stray Light [†]					
Equipment	Wavelength		Nominal value	Actual value	Result
UV-VIS Standard 2 Sodium Nitrite Solution	340 nm		≤0.10 %T	0.05 %T	P
Self-test Hardware					
No visual flaws, no burrs, no loose parts and fastenings					P



Merck Ltd. Thailand
19th Floor, Emporium Tower, 622 Sukhumvit Road
Klongtoey, Bangkok 10110
Tel : +66 (0) 2667 8000
Fax : +66 (0) 2667 8399
Customer Care Center : +66 (0) 2667 8333



Merck Ltd. Thailand
19th Floor, Emporium Tower, 622 Sukhumvit Road
Klongtoey, Bangkok 10110
Tel : +66 (0) 2667 8000
Fax : +66 (0) 2667 8399
Customer Care Center : +66 (0) 2667 8333



CERTIFICATE OF CALIBRATION

INSTRUMENT : SPECTROPHOTOMETER

MANUFACTURER : Merck KGaA, Darmstadt, Germany

MODEL : PROVE 100

SERIAL No. : 1613110857

CLIENT : Eastern Thai Consulting 1992 Co., Ltd.

DATE OF ISSUE : February 13, 2023

APPROVED SIGNATORY

NAME : Mr. Rawat Rattanachethakul
(SERVICE ENGINEER)

SIGNATURE :

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

CERTIFICATE No. WO-02514383

THERMO-HYGROMETER

Model : 608-H1

Serial No. : 45106737



CERTIFICATE OF CALIBRATION

Page 1 of 2
Certificate No. : 22-068062
Sample Code : 22-24591-002

Customer

: EASTERN THAI CONSULTING 1992 CO., LTD.
683 Moo 11, Sukhaphiban 8 Rd., Nongkham,
Siriracha, Chonburi 20230

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

Equipment : Digital thermo-hygrometer

Manufacturer : testo Model : 608-H1

Serial No. : 45106737 ID No. : LABE 09/7

Date of Receipt : 22 June 2022 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-045 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.)	22-029549	14 March 2023
3.3 Digital Thermometer	34972A	LB-DA-07 with RTD-89	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 Pornsuda Lohabal

Approved by

(Mr. Somchai Neampunt)

Scientist

27 June 2022

Issue date

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

This 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).

361 Soi Ladprao 122, Ladprao Road,

Phlabphla, Wang Thonglang, Bangkok 10310

Rev 01

TEL 02-516-2422

FAX 02-516-6949

CONTACT@AMARC.CO.TH

WWW.AMARC.CO.TH

Effective Date 15/10/21



REPORT OF CALIBRATION

Page 2 of 2
Certificate 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 multiplied by the coverage factor k , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

- End of Report -

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TEL 02-516-2422

FAX 02-516-6949

Rev 09

361 Soi Ladprao 122, Ladprao Road,

Phlabphla, Wang Thonglang, Bangkok 10310

FM-CL-018

CONTACT@AMARC.CO.TH

WWW.AMARC.CO.TH

Effective Date 15/10/21

UV/VIS SPECTROPHOTOMETER

Model : UV - 1800

Serial No. : A11635101643 CD



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

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Certificate of Calibration

Number of Page(s) 2 of 3

Certificate No. BSCC-UV-152/23

Calibration Results:
1. Wavelength Accuracy

Certified Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (±nm)
287.71	287.65	-0.06	0.18
445.82	445.80	-0.02	0.18
536.52	536.35	-0.17	0.18
741.02	740.99	-0.03	0.18
879.41	879.27	-0.14	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
257	0.7311	0.7313	0.0002	0.0075
313	CNR	CNR	CNR	CNR
350	CNR	CNR	CNR	CNR

*CNR = Customer not request

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988 U Chu Liang Building Floor 7 Rama4 Road
Silom Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com

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Certificate of Calibration

Number of Page(s) 1 of 3

Certificate No. BSCC-UV-152/23

Equipment UV/Vis Spectrophotometer

Model UVI-1800

Manufacturer Shimadzu

Serial No. A11635101643 CD

ID No. N/A

Date of receipt 25 April 2023

Date of calibration 25 April 2023

Date of issue 27 April 2023

Customer name Eastern Thai Consulting 1992 Co., Ltd

Address 683 Moo 11, Sukkhaphibarn 8 Rd., Nongkham, Sriracha, Chonburi 20230

Temperature (22.4-23.1) °C (On site)

Humidity (44.5-45.2) %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. 94780 and 94775

Photometric Accuracy is traceable to certificate No. 94808 and 100147

Stray Light is traceable to certificate No. 94791

The above certificate are traceable to SI unit through Starna Scientific Ltd.

(UKAS accredited calibration laboratory NO. 0659)

Calibrated by Mr. Pannaphong Phannmekaku

Approved by

Signature

Mr. Kanchit Choothep
Technical Manager

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



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Certificate of Calibration

Certificate No. **BSCC-UV-152/23** 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	0.0000	0.0000	0.0042
	0.5468	0.5508	0.0020	0.0042
	0.7527	0.7535	0.0008	0.0042
	1.0756	1.0758	0.0002	0.0042
440.0	0.0000	0.0000	0.0000	0.0042
	0.5391	0.5406	0.0015	0.0042
	0.7355	0.7360	0.0005	0.0042
	1.0509	1.0501	-0.0008	0.0042
465.0	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
546.1	0.0000	0.0000	0.0000	0.0042
	0.5045	0.5044	-0.0001	0.0042
	0.6884	0.6885	0.0001	0.0042
	0.9816	0.9808	-0.0008	0.0042
590.0	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
	CNR	CNR	CNR	CNR
635.0	0.0000	0.0000	0.0000	0.0042
	0.5183	0.5178	-0.0005	0.0042
	0.6864	0.6868	0.0004	0.0042
	0.9747	0.9739	-0.0008	0.0042

*CNR = Customer not request

4. Stray Light*

Standard cut-off wavelength (nm)	Unit Under Calibration(UUC)	
	Wavelength (nm)	Absorbance (A)
200.75±0.11nm	200.72	2.0164

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%
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