

ภาคผนวกที่ 7

เอกสารสอบเทียบเครื่องมือที่ใช้ในการวิเคราะห์

Certificate No.: C0-0410001/23

Page 2 of total 4 pages

Reference Method:

- The calibration method used was CP-178 based on an in-house method.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard:

Type	pH Value	Lot No.	Due Date	Traceability
pH Standard Solution	1.67	080822	Jan. 4, 2024	NIMT
	4.01	030822	Mar. 12, 2024	
	7.01	300522	Mar. 12, 2024	
	10.01	230822	Mar. 12, 2024	

ภาพผนวกที่ 7 หน้า 1

Type	Model	Serial No.	Certificate No.	Due Date	Traceability
Documenting Process Calibrator	754	2630521	10-2412001/22	Dec. 23, 2023	THC
Digital Thermometer with Sensor	1523 / 5622	1709138 / 4605984-005	10-0806001/23	Jun. 8, 2024	

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

- NIMT, National Institute of Metrology (Thailand).
- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

1. Function Simulated pH Meter

Standard Applied (mV)	Nominal Value (pH)	UUC Reading (pH)	UUC Reading (mV)	Uncertainty (± mV)
177.48	4.00	4.01	177.6	0.060
0.00	7.00	7.00	0.1	0.060
-177.48	10.00	10.01	-177.4	0.060

UUC : Unit Under Calibration

Note : Adjust Curve to simulate pH (4.7, 10)

Calibrated by Kitiipong
REV 02 02/24/21

FE-169

CERTIFICATE OF CALIBRATION

Certificate No.: C0-0410001/23

Page 1 of total 4 pages

Customer

WE ENVIRONMENT CO., LTD.
280/19 Moo 9, Bangcoey, Sam Khok, Pathum Thani 12160 Thailand

Equipment pH Meter
Manufacturer EUTECH
Serial No. 3150127
Description Range : 0 - 14 pH, Resolution : 0.01 pH

Model pH 700
ID No. -

Environmental Conditions

Ambient Temperature: (20 ± 2) °C
Relative Humidity: (50 ± 10) %
Atmospheric Pressure: -

Calibration Location

Jayhawks Laboratory (CL&GL)

Received Date

4 October 2023

Calibration Date

4 October 2023

Date of Issue

4 October 2023

Condition of Artifacts

Used conditions but can be calibrated

Checked by

Approved by

Act as Technical Manager

Representative of Managing Director

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

(Dr. Ekachai Puttitwong)

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FE-169

REV 02 02/24/21

Certificate No.: CO-0410001/23

Page 4 of total 4 pages

Reference Method:

- The calibration method used was CP-096 based on an in-house method.
- The temperature scale used was an ITS-90.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Model	Serial No.	Cert. No.	Due Date	Traceability
Thermometer Readout	1529-R	B7C853	10-0911001/22	Nov. 9, 2023	THC
Platinum Resistance Thermometer	5626	4854	C0A30047	Oct. 22, 2023	FLUKE
Liquid Bath	XORTS-40A	XO111019	10-2405001/23	May 25, 2025	THC

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

- THC, Thai Heart Calibration Co., Ltd.
- FLUKE, Fluke Corporation, U.S.A.

Measurement Results:

(X) Without Adjustment

Dimension of probe : Diameter 3 mm. Sensor Type : RTD (PT100)

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
110	25.00	25.0	0.00	0.065

UUC : Unit Under Calibration

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

- End of Certificate -

Certificate No.: CO-0410001/23

Page 3 of total 4 pages

Measurement Results (Cont.):

2. Calibration of pH Electrode (Serial No.: 183)

pH Standard Solution (pH)	Measured Value		Uncertainty (± pH)
	(pH)	(mV)	
1.67	1.69	314.0	0.013
4.01	4.02	178.4	0.013
7.01	7.01	2.9	0.013
10.01	10.02	-171.2	0.013

Note : Adjust Curve to Buffer Solution pH (4.7,10)

Temperature stability of micro bath : $25 \pm 0.2^\circ\text{C}$

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

CALIBRATION CERTIFICATE

Certificate No. : L202310129-0001
 Date Issued : 12-Oct-23

Customer : WE ENVIRONMENT CO., LTD.
 280/19 Moo 9, T. Bang Toei, A. Sam Khok, Pathum Thani 12160

Equipment : Digital Forced Convection Drying Oven

Manufacturer : FRANCE ETUVES
Model : XUE112
Serial No. : Y0137
ID No./Tag No. : -
Date Received : 10-Oct-23
Date Calibrated : 12-Oct-23

Callibrated by : Mr. Surat Aumarb

Calibration Method or Calibration Procedure Used

Standard method : CP-05 TLAS G-20.

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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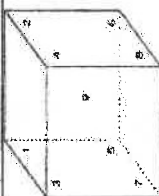
Approved by: *Sorayuth*
 (Mr. Sarayuth Tochua)

Certificate No. : L202310129-0001		(25 ± 2)°C	
Environment : Ambient Temperature :		(50 ± 15)%RH	
Relative Humidity :			
Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)
85.0	85.0	85.0	0.20
104.0	104.0	104.0	0.24
180.0	180.0	180.0	0.30
Without adjustment		Measured Uniformity ² (°C)	Overall Variation ³ (°C)
		0.34	0.51
		0.38	0.62
		0.33	0.64

Calibration Temperature (°C)	STD No. 1 (°C)	STD No. 2 (°C)	STD No. 3 (°C)	STD No. 4 (°C)	STD No. 5 (°C)	STD No. 6 (°C)	STD No. 7 (°C)	STD No. 8 (°C)	STD No. 9 (°C)	Uncertainty ⁴ (°C)
85	84.92	85.05	84.97	85.07	84.91	85.13	85.14	84.94	85.06	0.75
104	103.89	103.99	103.86	104.01	103.93	104.03	104.05	103.90	104.01	0.95
180	179.83	179.90	179.78	179.94	179.87	179.94	180.02	179.84	179.89	1.1

Decision Rule with Guard Band

Calibration Temperature (°C)	Pass / Fail	MPE
85	Pass	Pass
104	Pass	Pass
180	Pass	Pass



Pass = $|\text{error}| + |\text{uncertainty}| \leq |\text{MPE}|$
 Fail = $|\text{error}| + |\text{uncertainty}| > |\text{MPE}|$

Note : Probe No. 9 is Reference Probe

Setting Air Fresh No. -

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
 MIT Certificate No. L202309114-005 for Digital Thermometer with Probe (Agilent) Module 2 (245) Serial No. US37005130,
 Due 11-Mar-24

- Notes :
- The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
 - The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.
 - Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
 - The uncertainty of measurement is included temperature stability.
 - The temperature uniformity, stability, overall variation and indicating temperature is applicable to all air or gas filled temperature controlled enclosures at atmospheric pressure.

End of Certificate

Certificate No.: T0-0410012/23

Page 2 of total 2 pages

Reference Method:

- The calibration method used was CP-089 based on an in-house method.
- The temperature scale used was an ITS-90.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Model	Serial No.	Cert. No.	Due Date	Traceability
Chilled Mirror Hygrometer			TH-0027-23	Mar. 23, 2024	NIMT
Chilled Mirror Hygrometer with Temperature Sensor	Dewmaster	53787/2A5508X	TT-0040-23		
4.5 Cubic Foot Reach-In Chamber	7041-8110-4A	2101151	10-0202001/22	Feb. 4, 2024	THC

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

- NIMT, National Institute of Metrology (Thailand).
- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

1) Temperature Measurement	(X) Without Adjustment	
Standard Temperature Reading (°C)	UUC Temperature Reading (°C)	Correction (°C)
25.00	24.9	0.10
		Uncertainty (± °C)
		0.27

2) Humidity Measurement	(X) Without Adjustment	
Ambient Temperature Reading (°C)	Standard Humidity Reading (%RH)	UUC Humidity Reading (%RH)
25.0	50.0	49
		Uncertainty (± %RH)
		1.2

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

- End of Certificate -

Calibrated by Pongsak
REV.02 02/24/21

FE-169

CERTIFICATE OF CALIBRATION

Certificate No.: T0-0410012/23

Page 1 of total 2 pages

Customer

WE ENVIRONMENT CO., LTD.
280/19 Moo 9, Bangtoey, Sam Khok, Pathum Thani 12160 Thailand

Equipment	Digital Thermo-Hygrometer
Manufacturer	-
Serial No.	-
Description	Model HTC-2 ID No. TH-01 Temperature range : 25 °C, Resolution of UUC : 0.1 °C Humidity range : 50 %RH, Resolution of UUC : 1 %RH

Environmental Conditions	Ambient Temperature: (23 ± 3) °C Relative Humidity: (50 ± 15) % Atmospheric Pressure: -
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Calibration Location	Blue Devils Laboratory (TL)
Received Date	4 October 2023
Calibration Date	4 October 2023
Date of Issue	5 October 2023
Condition of Artifacts	Used conditions but can be calibrated

Checked by

Approved by

Act as Technical Manager

Representative of Managing Director

() (Krisyol K.)	() (Sakda Y.)
() (Pariphan K.)	() (Omnapa P.)
() (Pongsak H.)	() (Nithiphong K.)
() (Kanung C.)	() (Nonthachai K.)
() (Pramong P.)	() (Noppol P.)

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FE-169

REV.02 02/24/21

53/154 Moo 2, Semafahkarm Road, Tambon Khukhot, Amphur Lamukha, Pathumthani 12130
53/154 หมู่ 2 ถนนเสมาฟ้ากรม ตำบลคูคต อำเภอลำลูกกา จังหวัดปทุมธานี 12130
Tel. 02-9877200 Fax. 02-9877205

Certificate No. : M23 - 4632A
Page : 1 of 4

Certificate of Calibration

Customer : WE ENVIRONMENT CO., LTD.
Address : 280/19 Moo.9 Bangtoei, Sam khlok, Padum Thani 12160

Description of Equipment : Electronic Balance
Manufacturer : Sartorius
Model : BSA224S-CW
Serial Number : 3143517467
ID. / Control Number : N/A
Made In : N/A
Location : MCL Laboratory

Environmental Conditions : Temperature (20 +/- 2) °C
Humidity (55 +/- 15) % RH
Atmospheric Pressure (1010 +/- 10) mbar

Calibration Date : Oct 05, 2023
Issue Date : Oct 05, 2023

Uncertainty of Measurement

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of $k = 2$. It has been evaluated according to the "Expression of the Uncertainty of Measurement in Calibration (M3003)" which provides a level of confidence approximately 95%.

Calibrated by : Sarawut Khruapan
Approved by :  (Precha Pavachot)
Laboratory Manager

Certificate No. : M23 - 4632A
Page : 2 of 4

MCL
Microtech Calibration Laboratory Co., Ltd.

Certificate of Calibration

Description : Electronic Balance
Manufacturer : Sartorius
Model : BSA224S-CW
Unit : g

Serial Number : 3143517467
ID. /Control Number : N/A
Made In : N/A
Capacity : 220 g

Resolution : 0.0001 g
Order No. : 4368 - 23
Received Date : Oct 04, 2023
Calibration Date : Oct 05, 2023

Calibration Method

The Electronic balance was measured using standard weight following to in house calibration method MCL-CP14 and based on UKAS LAB 14: Edition 5 July 2015

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

Reference Standard

Description	Model	Serial No.	Certificate No.	Due Date
Standard Weight Set	50 mg - 2 kg	N/A	B0-1305012/23	May 15, 2024

Traceability of Measurement

The measurements are traceable to international system of units (SI)
The certificate is traceable to through Thai Heart Calibration Co., Ltd.

Range : 200 g
Resolution : 0.0001 g

1. Repeatability of Balance

Nominal Value	Standard Deviation of Reading
g	g
0	0.0000
200	0.0000

Certificate of Calibration

Description	: Electronic Balance	Serial Number	: 3143517467	Resolution	: 0.0001 g
	: Sartorius	ID. /Control Number	: N/A	Order No.	: 4368 - 23
	: BSA224S-CW	Made In	: N/A	Received Date	: Oct 04, 2023
	: g	Capacity	: 220 g	Calibration Date	: Oct 05, 2023

Result of Calibration :		Without Adjustment
Range :	200 g	

2. Departure From Nominal Value



Nominal Load	UUC's Reading					Maximum Difference
	A	B	C	D	E	
50	50.0000	50.0000	50.0001	50.0000	50.0001	-0.0001

A Mass of 50 g Was Placed in Various Position on The Pan. The Weighing Machine Reading Error Obtained Is Given In Table

Weight g	g		g	g
	Tare			
100	at 20 %	20.0000	0.0000	0.0000
	at 100 %	100.0000	20.0000	0.0000
			100.0000	0.0000

UUC* = Unit Under Calibration



บริษัท ไมโครเทค แล็บอราทอรี จำกัด
Microtech Calibration Laboratory Co., Ltd.

.....END.....



บริษัท ไมโครเทค แล็บอราทอรี จำกัด
Microtech Calibration Laboratory Co., Ltd.



Calibration Certificate

ENTECH
When Signed Begin

The Reference Standard Instrument :-

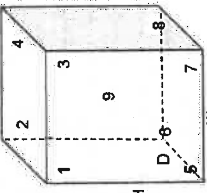
1) Data logger with RTD Probe

Model : Agilent 34972A
Serial No. : MY60008352
Cert. No. : PSL-T 0651-3/66
Due date : 21-Apr-2024

Measured room conditions

Temperature : Minimum: 23.6 °C Maximum: 24.2 °C
Humidity : Minimum: 48.7 %RH Maximum: 60.4 %RH
Voltage : Minimum: 220.1 VAC Maximum: 223.4 VAC
Fresh Air Settings: off

Sensor Position :



Working Space of chamber :

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

Sensor Installation Details :

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

Results : The measurement results of the calibration were reported in the table below.
(*) Without adjustment () After adjustment

UUC*		Temperature Reading of Standard Sensor								
Setting (°C)	Reading (°C)	1	2	3	4	5	6	7	8	9
20.0	20.0	20.28	20.26	20.19	20.22	20.07	20.15	20.11	20.09	20.01

UUC*	UUC*	Temperature Uniformity (°C)	Temperature Stability (± °C)	Overall Variation (°C)	Uncertainty of Measurement (± °C)	Coverage Factor
20.0	20.0	0.75	0.42	1.03	0.62	K
						2

UUC* = Unit Under Calibration

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

End of Report

FM-CL-33-C Rev.4

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Issued Date 01/02/59

Entech Industrial Solution Co., Ltd.

17/121 Soi Niamwongwan 47 Yaek 48, Toonsonghong, Laksi, Bangkok 10210 THAILAND Tel. 0-2779-8888 Calibration@entech.co.th
Tax ID : 0105536035591 www.entech.co.th



Calibration Certificate

ENTECH
When Signed Begin

Certificate No. T/O 660197
Date of Issue : 29-Sep-2023

Equipment Description : Incubator
Equipment Model : SMART I250-DS
Equipment Serial No. : 0410-0423-0017
I.D. No. or Control No. :
Manufacturer : Entech Industrial Solution Co., Ltd.
Customer Name : WE ENVIRONMENT CO., LTD.
Customer Address : 280/19 Moo.9 Bang Toei, Sam Khok, Pathum Thani 12160 Thailand
Total pages of certificate : 2 pages
Instrument Receiving Date : 28-Sep-2023
Receiving No. : O-230228
Environmental Conditions : All of the measurement were carried out in the working area

Temperature : (25 ± 15) °C
Humidity : (55 ± 30) % RH
Voltage : (220 ± 22) VAC

Calibration Place : (Production Room) 17/121 Soi Niamwongwan 47 Yaek 48 Toonsonghong, Laksi, Bangkok 10210 Thailand

Calibration Procedure No. : This instrument was calibrated by comparison of reference radiation source standard according to calibration work instruction no WI-CL-19-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k , which for a normal distribution corresponds to a coverage probability of approximately 95%
The standard uncertainty of measurement has been determined in accordance with M 3003
The expression uncertainty and confidence in measurement.

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

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

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

Date of Calibration : 28-Sep-2023

Mr. Kittipong Keerwasi
Calibration Engineer

Ms. Nongluck Wongsetee
Technical Manager

Page 1 of 2

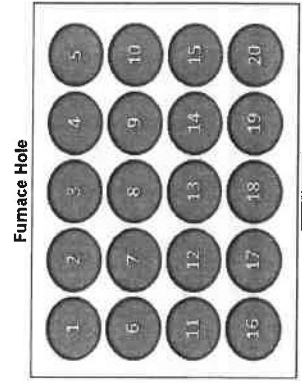
FM-CL-33-C Rev.4

Issued Date 01/02/59

Entech Industrial Solution Co., Ltd.

17/121 Soi Niamwongwan 47 Yaek 48, Toonsonghong, Laksi, Bangkok 10210 THAILAND Tel. 0-2779-8888 Calibration@entech.co.th
Tax ID : 0105536035591 www.entech.co.th

Manufacturer: Elite Lab Instrument
Description: Curve Heating Digestion System
Model #: JRX-20SX
Asset No. 20SX-231007-0071
Serial No. 20SX-231007-0071
Report No. TTH-87498



Controller

Temperature Accuracy

Furnace Hole	UUT Displayed	STD Reading	Error	Result	Uncertainty	Tolerance	
						Min	Max
1	380 °C	378.3 °C	1.7 °C	Pass	0.1 °C	375 °C	385 °C
2	380 °C	378.6 °C	1.4 °C	Pass	0.1 °C	375 °C	385 °C
3	380 °C	379.6 °C	0.4 °C	Pass	0.1 °C	375 °C	385 °C
4	380 °C	378.6 °C	1.4 °C	Pass	0.1 °C	375 °C	385 °C
5	380 °C	378.8 °C	1.2 °C	Pass	0.1 °C	375 °C	385 °C
6	380 °C	378.2 °C	1.8 °C	Pass	0.1 °C	375 °C	385 °C
7	380 °C	378.9 °C	1.1 °C	Pass	0.1 °C	375 °C	385 °C
8	380 °C	378.8 °C	1.2 °C	Pass	0.1 °C	375 °C	385 °C
9	380 °C	379.1 °C	0.9 °C	Pass	0.1 °C	375 °C	385 °C
10	380 °C	378.6 °C	1.4 °C	Pass	0.1 °C	375 °C	385 °C
11	380 °C	378.5 °C	1.5 °C	Pass	0.1 °C	375 °C	385 °C
12	380 °C	378.2 °C	1.8 °C	Pass	0.1 °C	375 °C	385 °C
13	380 °C	379.1 °C	0.9 °C	Pass	0.1 °C	375 °C	385 °C
14	380 °C	378.5 °C	1.5 °C	Pass	0.1 °C	375 °C	385 °C
15	380 °C	378.3 °C	1.7 °C	Pass	0.1 °C	375 °C	385 °C
16	380 °C	378.2 °C	1.8 °C	Pass	0.1 °C	375 °C	385 °C
17	380 °C	378.1 °C	1.9 °C	Pass	0.1 °C	375 °C	385 °C
18	380 °C	378.3 °C	1.7 °C	Pass	0.1 °C	375 °C	385 °C
19	380 °C	378.2 °C	1.8 °C	Pass	0.1 °C	375 °C	385 °C
20	380 °C	377.9 °C	2.1 °C	Pass	0.1 °C	375 °C	385 °C

Notes : 1) The calibration results are verified its tolerance with the customer's specification.
2) The instrument was calibrated for the parameter and at the points specified by the customer.
3) This result of calibration was found accurate as show on date and place of calibration only.

Issued on:15-12-2023:38 PM

End of Certificate



540.6 1503

99/26-29 New Course Near Damdang, Pathayadin Road, Samutth, Donmuang Bangkok 10120
Tel: 4662531-5141



AC-1736,08

CERTIFICATE OF CALIBRATION

Customer: WE ENVIRONMENT CO. LTD
280/19 Moo 9 Bangsoel,
Sam Khok,, Pathum Thani 12160

Manufacturer: Elite Lab Instrument
Model Number: JRX-20SX

Description: Curve Heating Digestion System
Asset Number: 20SX-231007-0071

Serial #: 20SX-231007-0071
P.O. #: N/A

Procedure: CPTD-05 (Sep. 2020)
Certificate Number: TTH-87498

Temperature: 31 °C
Relative Humidity: 48 %RH
Calibration Location: On-Site
Calibrated By: CHAIYAPONG KONGKAMUT
Calibration Date: 12/Dsc/2023
Next Due Date: 12/Dsc/2024
Condition Received: IN TOLERANCE
Condition Returned: IN TOLERANCE

This certifies that the above instrument was calibrated in compliance with the Calibration System Requirements of ISO/IEC 17025:2017, ANSI/NCCL Z540-1-1994 (R2002) in accordance with referenced procedures. Standards used to perform this calibration are traceable to SI units; their source of traceability derives from a National Metrology Institute such as NIST, CEVAM, NPL, DIN, from natural physical constants, consensus standards or derived by the ratio type of calibrations. Collective uncertainties are determined as required with a distribution that corresponds to a probability of approximately 95% (k=2). Unless otherwise noted calibrations are performed to manufacturer's specifications. Compliance statements are in conformance with ILAC-G8:2019 simple acceptance decision rule. This form shall not be reproduced, except in full, without the expressed written consent of Techmaster. Contact our customer service representative for clarification of this document.

Standard #		Description	Manufacturer	Model #	Standards Utilized	Due Date	Test Report #
5680		Digital Multimeter	Hewlett Packard	3458A		10/Mar/2024	TTH-0-62070-R1
5755		Standard PRTs	FLUKE	5626		07/Aug/2024	TTH-0-85528

Remarks:

W. Chaotian

Wanipa Chootian
Quality Assurance

P. Moonmuangsan

Pornthep Moonmuangsan
Technical Manager

N. Hemta

Noppapat Homta
Approved By

Issued on: 2023-12-18 21:53:52.3670000 -08:00

540.1 2105

TTH-87498



Certificate No. : HIT-2345-1576
Page : 2 of 2

Condition of this calibration result

Reference Standard Instruments:

Instruments	Model	Serial No.	Certificate No.	Traceable
Data Acquisition Switch Unit	34970A	MY44065265	WK2307-164-1	WK Electric Co., Ltd.

Calibration Result:

Measurement Temperature Source Accuracy for COD Reactor

Capacity (Vial)	Nominal Value (°C)	Average Value (°C)	Uncertainty (±°C)	Tolerance of UUC (±°C)	Acceptance Criteria
25 Vial	150.0	149.7	0.50	2	Pass

Figure: Shows the location of the temperature source.

(1A)	(2A)	(3A)	(4A)	(5A)
149.07°C	149.39°C	150.09°C	149.30°C	148.37°C
(1B)	(2B)	(3B)	(4B)	(5B)
149.39°C	150.59°C	150.52°C	150.30°C	148.97°C
(1C)	(2C)	(3C)	(4C)	(5C)
149.70°C	149.75°C	150.29°C	150.02°C	149.44°C
(1D)	(2D)	(3D)	(4D)	(5D)
149.36°C	149.98°C	150.21°C	150.08°C	149.94°C
(1E)	(2E)	(3E)	(4E)	(5E)
149.50°C	149.64°C	149.34°C	149.55°C	149.67°C

Remark: The Acceptance criteria is the error value plus or minus the Measurement Uncertainty, and then Not More than the Tolerance value of UUC, therefore concluded that pass.

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

** End of certificate **



Hanna Instruments (Thailand) Ltd.
410/67-68 Soi Ratchadapisek 24, Ratchadapisek Rd., Samsen-nok,
Huaikwang, Bangkok 10310 Tel: 0-2541-4199 Fax: 0-2541-4198



Certificate No. : HIT-2345-1576

Page : 1 of 2

CERTIFICATE OF CALIBRATION

Equipment : COD Test Tube Heater
Meter Model : HI839800-02
Tube Heater : 25 Vial Capacity
Temperature Range : (-10 to 170) °C
Ambient Temperature : (25 ± 2) °C
Manufacturer : Hanna Instruments
Condition As-Received : New Product
Customer name : WE ENVIRONMENT CO., LTD

Serial No. : 101170095211
Accuracy : ± 2 °C
Temperature of Reaction : 150 °C
Relative Humidity : (50 ± 15) % RH
Made in : Romania
Reference : RE231896

280/19 Moo. 9, Bangtoey, Sam Khok,

Pathum Thani 12160, Thailand

Received date : 26 October 2023

Calibrate date : 1 November 2023

Issue date : 6 November 2023

Calibrated Location : Hanna Instruments (Thailand) Ltd.

Calibration Procedure : This calibrator was conducted by using in-house: calibration procedure
CP-04 by using certified reference material.

Calibrated by :

☒ Mr. Pichit Peithong

Approved by :

☐ Mr. Channarong Soinak

Mr. Anan Suwanchaisakul

Authorized Signatory



This certificate was certified only for the instrument we calibrated.

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

** This certificate may not be reproduced other than in full, except with the prior written **
approval of the head of Hanna Instrument (Thailand).

Certificate No. : MT23-6898

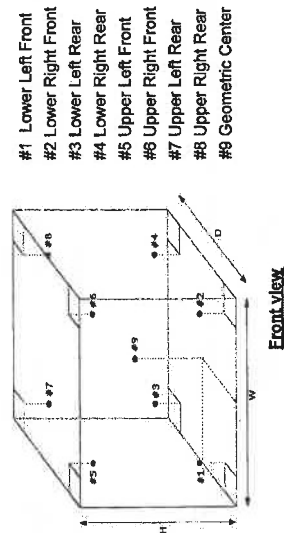
Page : 2 of 2

Result : Without adjustment
 Resolution : 0.1 °C

Function : Temperature measurement
 Calibration point : 3 °C

Calibration point (°C)	Temperature of UUC* at each position (°C)									Uncertainty of measurement (±, °C)
	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Ch.8	Ch.9	
3	4.374	2.957	4.238	2.900	4.044	3.500	4.301	3.411	2.799	0.50

Setting temperature (°C)	Indicating Temperature (°C)	Measured stability (±, °C)	Measured uniformity (°C)	Overall variation (°C)
3.0	3.0	0.20	1.9	1.9



UUC* = Unit under calibration
 Uniformity = Maximum and Minimum difference of measured temperature at any probes and the measured temperature at the reference and same time.
 Overall Variation = Difference of temperature value between the maximum and minimum any time.
 Stability = One half of the maximum difference of measured temperatures at any one probe.

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Rev 02 / Mar 2020

FM-MT-013

Certificate of Calibration

Certificate No. : MT23-6898
 Page : 1 of 2

Customer Address : We Environment Co.,Ltd.
 : 280/19 Moo 9, Bang Toei, Sam Khok, Pathum Thani 12160

Description : Refrigerator
Manufacturer : SB-COOL
Model : SB-1000 L
Serial No. : N/A
Identification No. : LAB-0037
Calibration Place : Customer Laboratory

Order No. : 358223
Received date : Nov 04, 2023
Calibration date : Nov 04, 2023
Environment Condition :
Temperature : (25±10) °C
Humidity : (50±30) %RH

Calibration Method : Calibration were conducted using In-house calibration procedure CP-MT-006 According to comparison with LXI Data Acquisition Switch Unit with sensor. The calibration methods based on Euramet Calibration Guide No.20 - guidelines on the Calibration of Temperature and/or Humidity Controlled Enclosures.

Reference Standard Instruments :

Instrument : LXI Data Acquisition Switch Unit with Sensor
Model : 34872A
Serial No. : MV57003222
Certificate No. : MT23-5838
Due Date : Oct 05, 2024

This result of calibration was found accurate as shown on date and place of calibration only.
Traceability : This measurement are traceable to the International System of Unit (SI), through National Institute of Metrology Thailand (NIMT)

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k = 2, providing a level of confidence of not less than 95%



Calibrated by : Mr. Yuttakorn Jamnansri
Issue date : Nov 09, 2023
Approved by : (Mr. Panuwat Phukian)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of Intech Metrological Center Co.,Ltd

Rev 02 / Mar 2020

FM-MT-013

Certificate of Calibration

Customer : WE ENVIRONMENT CO., LTD.

Address : 280/19 Moo.9 Banggoei, Sam khok, Pathum Thani 12160

Description of Equipment : Water Bath

Manufacturer : N/A

Model Number : HWS-28

Serial Number : 161245615

ID./Control No. : N/A

Made In : N/A

Location : MCL Laboratory

Environment Conditions : Temperature (23 +/- 3) °C

Humidity (50 +/- 20) %RH

Cal Date : Oct 05, 2023


Issue Date : Oct 06, 2023

Uncertainty of Measurement

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of k = 2. It has been evaluated according to the "Expression of the Uncertainty of Measurement in Calibration (EA-4/02)" which provides a level of confidence approximately 95%.

Calibrated by : Hathaya Rittmongkon

Approved by :  (Precha Pavachot)
Laboratory Manager



CERTIFICATE OF CALIBRATION

Certificate No. : T23 - 4086A

Page : 2 of 2

Description : Water Bath

Manufacturer : N/A

Model : HWS-28

Serial No. : 161245615

ID./Control No. : N/A

Made In : N/A

Order No. : 4368 - 23

Received Date : Oct 04, 2023

Calibration Date : Oct 06, 2023

Calibration method :

- This instrument was calibrated by comparison with data acquisition followed to in house calibration method based on MCL-CP32
- The temperature scale used was based on ITS - 90
- This result was found accurate as shown on date and place of calibration only.

Reference Standard

Description	Model	Serial No.	Certificate No.	Due Date
Data Acquisition	34970A	MY44047870	T22 - 475	Nov 04, 2023

Traceability :


The measurement is traceable to the international system of unit maintained at NIMT, through

-The reference standard of Unihai Group Co., Ltd.

Result of Calibration : Without Adjustment

Calibration Range: 85 °C Resolution : 0.1 °C

Function : Temperature Source



Microtech Calibration Laboratory Co., Ltd

บริษัท ไมโครเทค แคลิเบรชัน แล็บอราทอรีส์ จำกัด

Setting	UUC*	Measured Temperature		Measured Variation			Uncertainty of Measurement	
		°C	°C	Min	Max	Stability	Uniformity	Overall
85.0	85.0	85.120	84.480	85.588	0.291	0.610	1.198	0.15

Note: The actual temperature, which average from the above 5 position of Mid - Range Values.

The uncertainty determination in this type (Type 2 : Uncertainty of the Bath) was included with Uniformity (Spatial) , Stability (Temporal) , Repeatability and indicator's resolution of UUC.

Temperature of UUC at each position °C						
Calibration Point	85 °C	*1	*2	*3	*4	*5
Maximum	84.894	85.588	85.367	85.142	85.379	85.379
Minimum	84.480	85.006	85.193	84.946	85.209	85.209
Mid - Range	84.687	85.297	85.280	85.044	85.294	85.294
Difference	0.414	0.582	0.174	0.196	0.170	0.170

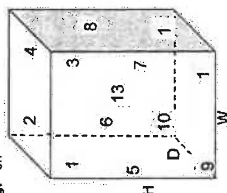
Mid - Range values : Half the sum of the maximum and minimum values of a set of temperatures (average temperature of each position)

UUC * = Unit Under Calibration

The Reference Standard Instrument :-				Certificate No. : Y/O 670085
Instrument	Model	Serial No.	Cert. No.	Due date
1) Data logger with RTD Probe	Agilent 34972A	MY41187730	PSL-T 0484-1/67	19-Feb-2025
		MY60008352	PSL-T 0484-3/67	19-Feb-2025

Measured room conditions

Temperature :	Minimum: 24.2 °C	Maximum: 25.6 °C
Humidity :	Minimum: 49.8 %RH	Maximum: 60.7 %RH
Voltage :	Minimum: 219.8 VAC	Maximum: 223.3 VAC



Working Space of chamber :
(Inside Dimensions) W x D x H : 1020 mm x 500 mm x 1450 mm

Sensor Installation Details :

- Sensor Number 1 to 12 installed approximately 50 mm

- Sensor Number 13 installed approximately geometric center of the chamber.

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

	UUC ^a : Setting (°C)	UUC ^b : Reading	Temperature Reading of Standard Sensor												
			Sensor Position												
			1	2	3	4	5	6	7	8	9	10	11	12	13
1	3.0	3.0	4.1	4.2	3.9	3.8	3.7	3.8	3.1	3.1	3.6	3.8	3.1	2.9	3.1

UUC* Setting	UUC* Reading (°C)	Temperature Uniformity (°C)	Temperature Stability (± °C)	Overall Variation (°C)	Uncertainty of Measurement (± °C)	Coverage Factor K
3.0	3.0	1.43	0.50	2.11	0.79	2

Remark :-

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

End of Report

Certificate No.: T/O 670085
Date of Issue: 23-May-2024

Equipment Description	: Refrigerator
Equipment Model	: P7011
Equipment Serial No.	: P701-0723-0003
I.D. No. or Control No.	: -
Manufacturer	: Enleoh Industrial Solution Co., Ltd.
Customer Name	: WE ENVIRONMENT CO., LTD.
Customer Address	: 280/19 Moo.9 Bangsoey, Sam khok, Pathum Thani 12160, Thailand

Total pages of certificate : 2 pages

Instrument Receiving Date : 21-May-2024
Receiving No. : O-240109

Environmental Conditions : All of the measurement were carried out in the working area
Temperature : $(25 \pm 15)^\circ\text{C}$

Calibration Place
: (Production Floor 1) 17/121 Soi Ngarmwongwan 47 Yeak-48 Toongsonghong, Laksi,
Bangkok 10210 Thailand

Calibration Procedure No.	:	This instrument was calibrated by comparison of reference radiation source standard
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according to calibration work instruction no WI-CL-18-C

The calibration certificate expended uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k , which for a normal distribution corresponds to a coverage probability of approximately 95%

The standard uncertainty of measurement has been determined in accordance with M 3003

The expression uncertainty and confidence in measurement.

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

This calibration certificate may not be reproduced other than in full except with the permission of the issuing laboratory.

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

Date of Calibration : 21-May-2024

Signature
Mr. Kittipong Kaewsai
Calibration Engineer

D. Wuttar
Ms. Nongluck Wongsettee
Technical Manager