



APPENDIX-5

เอกสารสอบเทียบเครื่องมือการตรวจวิเคราะห์คุณภาพน้ำ

CAL

Calibratech Co., Ltd.

7/106-7 Moo 2, Sukhaphrasan 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail: calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

ILAC-MRA



Certificate of Calibration

Certificate No. : 64-410105-2

Page : 1 of 2

Submitted by : Ecotech Water Systems Co., Ltd.

20 Soi Kheharomklao 74 Yak 6, Ratphatthana, Saphaung, Bangkok 10240

Equipment : Digital Thermo-Hygrometer

Manufacturer : Digicon

Model : TH-03A

Range Temperature : -10 °C to 50 °C Resolution : 0.1 °C

Range Humidity : 20 %R.H. to 99 %R.H. Resolution : 1 %R.H.

Serial No. : 365051554

ID No. : N/A

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

Relative Humidity : (50 ± 15) %

Date of Received : 05 October 2021

Date of Calibration : 09 October to 11 October 2021

Date of Issue : 11 October 2021

Calibrated by : Chotup Samelusi

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4013 by compared with standard probe sensor humidity/temperature into humidity/temperature chamber.

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

Digital Indicator with Standard Probe Temp&Hum

ID No.	Cert. No.	Due Date	Traceability
400034 & 400035	SG-H-00564/64	07 Jan 2022	Success Gateway Co., Ltd., Accredited by TISI Calibration No.0268

Approved by :

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 64-410105-2

Page : 2 of 2

UUC Condition As-Received : Good

Result of Calibration : Without Adjustment

Function : Temperature measurement (Mode : In)

Reference Humidity @ 50 %R.H.

Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
20.01	20.4	-0.4	0.46
24.97	25.3	-0.3	0.46
29.99	29.8	0.2	0.46

Result of Calibration : Without Adjustment

Function : Humidity measurement

Reference Temperature @ 25 °C

Standard Humidity (%R.H.)	UUC Reading (%R.H.)	Correction (%R.H.)	Uncertainty (± %R.H.)
40.00	38	2	2.2
50.01	49	1	2.2
59.99	59	1	2.2

Remark

UUC : Unit Under Calibration

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

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

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ILAC-MRA

NSG-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-410105-1

Page : 1 of 2

Submitted by :

Ecotech Water Systems Co., Ltd.

20 Soi Khetaromkiao 74 Yak 6, Ratphatthana, Saphansung, Bangkok 10240

Equipment :

Digital Thermo-Hygrometer

Manufacturer : Digicon

Model : TH-03A

Range Temperature : -10 °C to 50 °C Resolution : 0.1 °C

Range Humidity : 20 %R.H. to 99 %R.H. Resolution : 1 %R.H.

Serial No. : 365052106

ID No. : N/A

Environment :

Ambient Temperature : (23 ± 2) °C

Relative Humidity : (50 ± 15) %

Date of Received : 05 October 2021

Date of Calibration : 09 October to 11 October 2021

Date of Issue : 11 October 2021

Calibrated by : Chortip Sanchusi

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4013 by compared with standard probe sensor humidity/temperature into humidity/temperature chamber.

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

Digital Indicator with Standard Probe Temp&Hum

ID No.	Cert. No.	Due Date	Traceability
400034 & 400035	SG-H-00664/64	07 Jan 2022	Success Gateway Co., Ltd., Accredited by TISI Calibration No.0268

Approved by :

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 64-410105-1

Page : 2 of 2

UUC Condition As-Received : Good

Result of Calibration : Without Adjustment

Function : Temperature measurement (Mode : In)

Reference Humidity @ 50 %R.H.

Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
20.02	20.5	-0.5	0.46
24.99	25.4	-0.4	0.46
30.00	29.9	0.1	0.46

Result of Calibration : Without Adjustment

Function : Humidity measurement

Reference Temperature @ 25 °C

Standard Humidity (%R.H.)	UUC Reading (%R.H.)	Correction (%R.H.)	Uncertainty (±%R.H.)
40.01	38	2	2.2
50.01	48	2	2.2
60.01	58	2	2.3

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 64-400518-4

Page : 1 of 2

Submitted by : Ecotech Water Systems Co., Ltd.

20 Soi Kheharomklao 74 Yak 6, Ratphatthana, Saphansung, Bangkok 10240

Equipment : Air Chamber (Refrigerator)

Manufacturer : S-Cool

Model : N/A

Range : N/A °C

Resolution : 1 °C

Serial No. : Eco-Ins14

ID No. : N/A

Environment :

On site calibration was carried out at the Laboratory, Ecotech Water Systems Co., Ltd.

Ambient Temperature : (24.5 to 26.5) °C

Relative Humidity : (45 to 55) %

Line Voltage : (225.0 to 226.5) V

Date of Received : 05 October 2021

Date of Calibration : 05 October 2021

Date of Issue : 07 October 2021

Calibrated by : Bunferd Masri

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments :

This certification is traceable to the International System of Units

Standard Digital Thermometer with Thermocouple probe

ID No. Cert No.

Due Date

Traceability

400046 & 400023 64-400443-1

29 Mar 2022

National Institute of Metrology Thailand (NIMT)

Approved by :

Supervisor

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Certificate of Calibration

Certificate No. : 64-400518-4

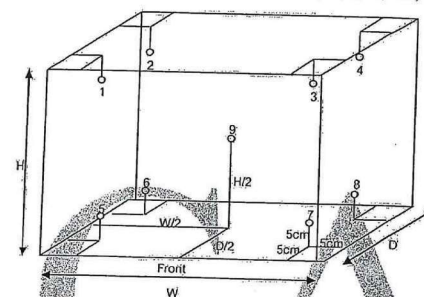
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 1.02 m

D = 0.44 m

H = 1.30 m

Capacity = 0.38 m³

Test Point	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty
(°C)	(°C)	(°C)	1	2	3	4	5	6	7	8	9	(± °C)
4	4	4	5.1	5.1	4.5	3.7	5.0	5.1	4.2	4.1	4.1	1.4

Test Point	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
4	4	4	1.3	1.0	2.2

Remark The uncertainty is not combine uniformity of the air chamber

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

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

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Certificate of Calibration

Certificate No. : 64-400518-1

Page : 1 of 2

Submitted by :

Ecotech Water Systems Co., Ltd.

20 Soi Khefiamklao 74 Yak 6, Ratphatthana, Saphansung, Bangkok 10240

Equipment :

Air Chamber (Refrigerator)

Manufacturer : Every Digital

Model : N/A

Range : N/A °C

Resolution : 0.1 °C

Serial No. : ASS1001

ID No. : INS005

Environment :

On site calibration was carried out at the Laboratory, Ecotech Water Systems Co., Ltd.

Ambient Temperature : (24.5 to 26.5) °C

Relative Humidity : (45 to 55) %

Line Voltage : (225.0 to 226.5) V

Date of Received :

05 October 2021

Date of Calibration :

05 October 2021

Date of Issue :

07 October 2021

Calibrated by :

Bunjerd Masri

Calibration Method :

CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments :

This certification is traceable to the International System of Units

Standard Digital Thermometer with RTD Probe

ID No.

Cert. No.

Due Date

Traceability

400046 & 400043 64-400382-2

23 Jan 2022

National Institute of Metrology Thailand (NIMT)

Approved by :

Supervisor

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CAL-P0031301

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Certificate of Calibration

Certificate No. : 64-400518-1

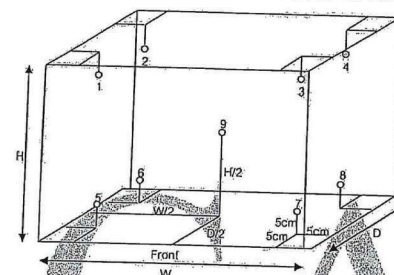
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber
 W = 1.00 m
 D = 0.50 m
 H = 1.35 m
 Capacity = 0.68 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.								Uncertainty (± °C)
			1	2	3	4	5	6	7	8	
4.0	3.0	3.0	4.11	4.17	4.23	4.37	4.11	4.26	4.47	4.63	±0.37

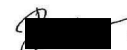
Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
4.0	3.0	3.0	0.60	0.03	0.6

Remark The uncertainty is not combine uniformity of the air chamber

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

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

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CAL-P0031301

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NSG-TISI-TIS 1 2025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 64-420115-1

Page : 1 of 2

Submitted by : Ecotech Water Systems Co., Ltd.

20 Soi Kheharouklao 74 Yak 6, Ratphatthana, Saphansung, Bangkok 10240

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : PC 700

Range : N/A pH

Resolution : 0.01 pH

Serial No. : 2728583

ID No. : N/A

Electrode

Model : N/A

Serial No. : ECFC725201B S40

Environment : On site calibration was carried out at the Laboratory of Ecotech Water Systems Co., Ltd.

Ambient Temperature : (24.5 to 26.5) °C

Relative Humidity : (45 to 55) %

Date of Received : 05 October 2021

Date of Calibration : 05 October 2021

Date of Issue : 07 October 2021

Calibrated by : Bunjerd Masri

Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)

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

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00473/64	27 Aug 2023	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.004	61218215	753167	02 Feb 2022	CPA chem
6.987	61211742	758970	02 Feb 2022	CPA chem
9.961	61223868	753169	02 Feb 2022	CPA chem

Approved by :

(Signature)

Supervisor

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Certificate of Calibration

Certificate No. : 64-420115-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

Performing standard curve by Multiproduct Calibrator at pH (4,7,10)

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (± mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	196.5	-19.0	0.12
	0.0000	7	7.00	21.4	-21.4	0.086
	-197.4800	10	10.00	-153.7	153.7	0.12

Function : pH meter with electrode

Performing a three - buffer standard curve using buffer nominal pH (4,7,10)

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.004	4.00	0.00	0.011
	6.987	7.00	-0.01	0.020
	9.961	10.00	-0.04	0.053

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 64-400519-1

Page : 1 of 2

Submitted by : Ecotech Water Systems Co., Ltd.

20 Soi Khetjaromklao 74 year 6, Ratphatthana, Saphansung, Bangkok 10240

Equipment : Digital Thermometer with Thermistor probe
Temperature Indicator

Manufacturer : Eutech

Model : PC 700

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 2728583

ID No. : N/A

Thermistor probe

Model : N/A

Sheath Material : Stainless

Diameter : 3.5 mm.

Length : 100 mm.

Serial No. : CONSEN9501D-028

ID No. : N/A

Environment : On site calibration was carried out at the Laboratory Ecotech Water Systems Co., Ltd.

Ambient Temperature : (24.5 to 26.5) °C

Relative Humidity : (45 to 55) %

Line Voltage : (220.0 to 225.9) VAC

Date of Received : 05 October 2021

Date of Calibration : 05 October 2021

Date of Issue : 07 October 2021

Calibrated by : Bunjerd Masri

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4003
by compared with PRT in the dry-well calibrator at the constant controlled temperature.
The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

400002 FI-0050-20 18 Jun 2022

National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No. Cert. No. Due Date

Traceability

400033 20E612 17 Feb 2022

National Institute of Metrology Thailand (NIMT)

Approved by :

Supervisor

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Certificate of Calibration

Certificate No. : 64-400519-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
100	20.002	20.3	-0.3	0.19
100	25.002	25.3	-0.3	0.19
100	30.002	30.3	-0.3	0.19

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 64-420115-2

Page : 1 of 2

Submitted by : Ecotech Water Systems Co., Ltd.

20 Soi Kheharomkiao 74 Yak 6, Ratphatthana, Saphansung, Bangkok 10240

Equipment : pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : PC 450

Range : N/A pH

Resolution : 0.01 pH

Serial No. : 2535550

ID No. : N/A

Electrode

Model : N/A

Serial No. : ECFC7252201B 278

Environment : On site calibration was carried out at the Laboratory Ecotech Water Systems Co., Ltd.

Ambient Temperature : (24.5 to 26.5) °C

Relative Humidity : (45 to 55) %

Date of Received : 05 October 2021

Date of Calibration : 05 October 2021

Date of Issue : 07 October 2021

Calibrated by : Bunjerd Masri

Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)

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

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00473/64	27 Aug 2023	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.004	61218215	753167	02 Feb 2022	CPA chem
6.987	61211742	758970	02 Feb 2022	CPA chem
9.961	61223868	753169	02 Feb 2022	CPA chem

Approved by :

Supervisor

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Certificate of Calibration

Certificate No. : 64-420115-2

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

Performing standard curve by Multiproduct Calibrator at pH (4,7,10)

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading		Correction (mV)	Uncertainty (± mV)
			(pH)	(mV)		
4, 7, 10	177.4800	4	4.00	177.5	0.0	0.12
	0.0000	7	7.00	0.0	0.0	0.086
	-177.4800	10	10.00	-177.6	0.0	0.12

Function : pH meter with electrode

Performing a three - buffer standard curve using buffer nominal pH (4,7,10)

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.004	4.00	0.00	0.011
	6.987	7.00	-0.01	0.020
	9.961	10.00	-0.04	0.053

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 64-400519-2

Page : 1 of 2

Submitted by : Ecotech Water Systems Co., Ltd.

20 Soi Kheharomklao 74 yeak 6, Ratphatthana, Saphansing, Bangkok 10240

Equipment : Digital Thermometer with Thermistor probe

Temperature Indicator

Manufacturer : Eutech

Model : PC 450

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 2535550

ID No. : N/A

Thermistor probe

Model : N/A

Sheath Material : Stainless

Diameter : 3.5 mm.

Length : 100 mm.

Serial No. : CONSEN9501D 141

ID No. : N/A

Environment : On site calibration was carried out at the Laboratory, Ecotech Water Systems Co., Ltd.

Ambient Temperature : (24.5 to 26.5) °C

Relative Humidity : (45 to 55) %

Line Voltage : (225.0 to 225.9) VAC

Date of Received : 05 October 2021

Date of Calibration : 05 October 2021

Date of Issue : 07 October 2021

Calibrated by : Bunjerd Masri

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4003 by compared with PRT in the dry-well calibrator at the constant controlled temperature.

The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

400002 TT-0050-20 18 Jun 2022

National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No. Cert. No. Due Date

400033 20E612 17 Feb 2022

Traceability

National Institute of Metrology Thailand (NIMT)

Approved by :

(B)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 64-400519-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
100	20.002	20.0	0.0	0.19
100	25.002	25.0	0.0	0.19
100	30.002	30.0	0.0	0.19

Remark

UUC : Unit Under Calibration

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

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

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Certificate of Calibration

Certificate No. : 64-400518-6

Page : 1 of 2

Submitted by : Ecotech Water Systems Co., Ltd.

20 Soi Kheharangkiao 74 Yak 6, Ratphatthana, Saphansung, Bangkok 10240

Equipment : Air Chamber (Incubator)

Manufacturer : Biobase

Model : BJPX-B400II

Range : N/A °C

Resolution : 0.1 °C

Serial No. : KYP400II2010002

ID No. : N/A

Environment :

On site calibration was carried out at the Laboratory, Ecotech Water Systems Co., Ltd.

Ambient Temperature : (24.5 to 26.5) °C

Relative Humidity : (45 to 55) %

Line Voltage : (225.0 to 226.5) V

Date of Received : 05 October 2021

Date of Calibration : 05 October 2021

Date of Issue : 07 October 2021

Calibrated by : Bunjerd Masri

Calibration Method : CAL-M4004, TLAS-G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments :

This certification is traceable to the International System of Units

Standard Digital Thermometer with Thermocouple probe

ID No. Cert. No.

Due Date

Traceability

400046 & 400028 64-400443-3

29 Mar 2022

National Institute of Metrology Thailand (NIMT)

Approved by :

(Signature)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 64-400518-6

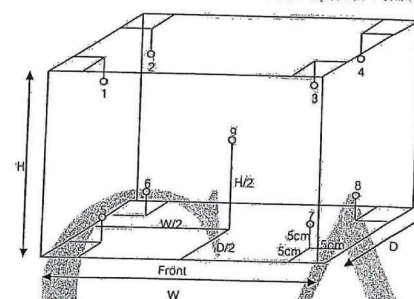
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.00 m

D = 0.00 m

H = 0.00 m

Capacity = 0.00 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.								Uncertainty (°C)	
			1	2	3	4	5	6	7	8		9
20.0	20.0	20.0	20.0	20.0	20.0	20.3	19.6	19.7	19.6	19.7	20.0	0.61

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.0	20.0	0.7	0.2	1.2

Remark The uncertainty is not combine uniformity of the air chamber

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

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

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(Signature)



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Certificate of Calibration

Certificate No. : 64-400518-5

Page : 1 of 2

Submitted by : Ecotech Water Systems Co., Ltd.

20 Soi Kheharomkiao 74 yak 6, Ratphatthana, Saphansung, Bangkok 10240

Equipment : Air Chamber (Incubator)

Manufacturer : Accuplus

Model : I250

Range : N/A °C

Resolution : 0.1 °C

Serial No. : I250402-0509-0261

ID No. : INS009

Environment : On site calibration was carried out at the Laboratory, Ecotech Water Systems Co., Ltd.

Ambient Temperature : (25.0 to 25.5) °C

Relative Humidity : (40 to 45) %

Line Voltage : (225.0 to 226.4) V

Date of Received : 05 October 2021

Date of Calibration : 05 October 2021

Date of Issue : 07 October 2021

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units
Standard Digital Thermometer with Thermocouple probe

ID No. Cert. No. Due Date Traceability

400029 & 400032 64-400434-1

25 Mar 2022

National Institute of Metrology Thailand (NIMT)

Approved by :

Supervisor

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Certificate of Calibration

Certificate No. : 64-400518-5

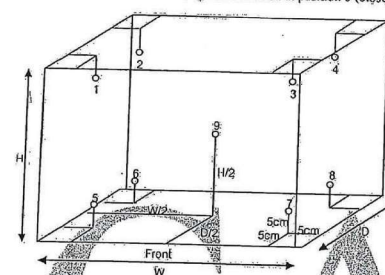
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good.

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber
 W = 0.50 m
 D = 0.50 m
 H = 1.04 m
 Capacity = 0.26 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.								Uncertainty (± °C)
			1	2	3	4	5	6	7	8	
20.0	20.0	20.0	20.4	20.3	20.1	20.2	20.2	20.1	20.0	20.1	0.67

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.0	20.0	0.3	0.4	0.9

Remark The uncertainty is not combine uniformity of the air chamber

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

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

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Certificate of Calibration

Certificate No. : 64-400518-2

Page : 1 of 2

Submitted by : Ecotech Water Systems Co., Ltd.

20 Soi Kheharomkiao 74 Yak 6, Ratphatthana, Saphansung, Bangkok 10240

Equipment : Air Chamber (Oven)

Manufacturer : LABTECH

Model : LDO-080F

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 081029024

ID No. : INS007

Environment : On site calibration was carried out at the Laboratory, Ecotech Water Systems Co., Ltd.

Ambient Temperature : (25.0 to 25.5) °C

Relative Humidity : (40 to 45) %

Line Voltage : (225.0 to 226.4) V

Date of Received : 05 October 2021

Date of Calibration : 05 October 2021

Date of Issue : 07 October 2021

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS-G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with Thermocouple probe

ID No. Cert. No. Due Date Traceability

400029 & 400030 64-400432-1 25 Mar 2022

National Institute of Metrology Thailand (NtMT)

Approved by :

Supervisor

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Certificate of Calibration

Certificate No. : 64-400518-2

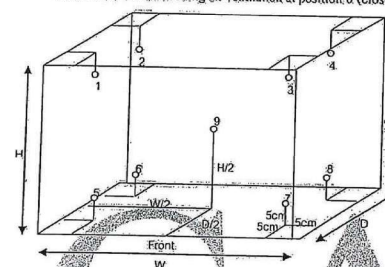
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber
 W = 0.50 m
 D = 0.40 m
 H = 0.40 m
 Capacity = 0.08 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
104.0	104.0	104.0	104.9	103.5	105.0	104.9	104.4	104.2	104.7	105.3	104.2	1.7
180.0	180.0	180.0	179.5	178.7	181.0	180.3	178.6	178.9	179.5	181.5	181.0	3.6

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	104.0	104.0	1.7	1.3	4.3
180.0	180.0	180.0	3.4	2.9	7.9

Remark The uncertainty is not combine uniformity of the air chamber

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

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

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Certificate of Calibration

Certificate No. : 64-400522-1

Page : 1 of 2

Submitted by : Ecotech Water Systems Co., Ltd.

20 Soi Kheharomklao 74 Yak 6, Ratphatthana, Saphansung, Bangkok 10240

Equipment : COD Reactor

Manufacturer : Hanna

Model : HI839800

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 05220009101

ID No. : N/A

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

Relative Humidity : (50 ± 15) %

Date of Received : 06 October 2021

Date of Calibration : 07 October 2021

Date of Issue : 07 October 2021

Calibrated by : Bunjerd Masti

Calibration Method : This instrument was calibrated by In-house method direct measurement with Standard Digital Thermometer with TC Type T probe

The temperature scale used was based on ITS-90

Reference Standard Instruments :

Standard Digital Thermometer with RTD probe

ID No.	Cert. No.	Due Date
400046 & 400023	64-400443-1	29 Mar 2022
400046 & 400028	64-400443-3	29 Mar 2022

Traceability

National Institute of Metrology Thailand (NIMT)

National Institute of Metrology Thailand (NIMT)

Approved by :

Supervisor

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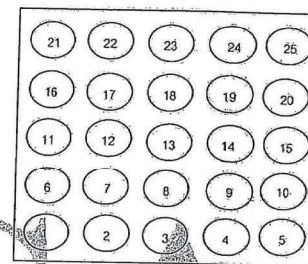
Certificate of Calibration

Certificate No. : 64-400522-1

Page : 2 of 2

Result of Calibration : Without Adjustment

Function : Temperature measurement



Test Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Standard Reading at Position (°C)									
			1	2	3	4	5	6	7	8	9	10
150.0	150.0	150.0	149.0	149.1	150.8	150.5	148.8	149.7	151.7	150.8	151.2	149.7

Test Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Standard Reading at Position (°C)									
			11	12	13	14	15	16	17	18	19	20
150.0	150.0	150.0	150.7	150.1	152.3	151.5	149.4	151.1	150.9	151.8	151.1	150.4

Test Point (°C)	UUC Setting (°C)	UUC Reading (°C)	Standard Reading at Position (°C)					Uncertainty (± °C)
			21	22	23	24	25	
150.0	150.0	150.0	148.3	150.0	150.5	150.0	148.6	0.74

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

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Certificate of Calibration

Certificate No. : 64-200292-1

Page : 1 of 2

Submitted by : Ecotech Water Systems Co., Ltd.

20 Soi Kheharomkiao 74 Yak 6, Ratphatthana, Saphrongsung, Bangkok 10240

Equipment : Electronic Balance

Manufacturer : OHAUS

Model : PA214

Serial No. : 8328380168

ID No. : INS013

Capacity : 210 g

Resolution : 0.0001 g

Environment : On site calibration was carried out at the Laboratory, Ecotech Water Systems Co., Ltd.

Ambient Temperature : (25.9 to 26.4) °C

Relative Humidity : (49.7 to 50.1) %

Air Pressure : 1008.0 mbar

Date of Received : 05 October 2021

Date of Calibration : 05 October 2021

Date of Issue : 07 October 2021

Calibrated by : Akaradath Thippichai

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref: LAB 14
Edition 5, July 2015

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

Standard Weights

ID No.	Cert. No.	Due Date	Traceability
B261-E2624	C02204101	17 Nov 2021	National Institute of Metrology (Thailand), (NIMT)

Approved by :

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL-P0031-03

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Tel: (02) 964-6211 Fax: (02) 964-5133, e-mail: calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 64-200292-1

Page : 2 of 2

Result of Calibration : After Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

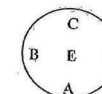
Nominal Value (g)	Correction (g)	Uncertainty ± (g)	Error before Adjustment (g)
0.01	0.0001	0.00011	0.0000
0.1	0.0001	0.00011	0.0000
1	0.0000	0.00011	0.0000
5	0.0000	0.00012	-0.0001
10	0.0001	0.00012	-0.0002
20	0.0000	0.00013	-0.0002
50	0.0000	0.00014	-0.0002
100	-0.0001	0.00020	-0.0012
150	-0.0002	0.00038	-0.0019
200	-0.0004	0.00038	-0.0025

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.11$, providing a level of confidence of approximately 95%

Eccentric error

Load test	50 g
A	0.0002
B	0.0003
C	0.0001
D	0.0001
E	0.0000



Repeatability

Load test	200 g
Stdev.	0.00005

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CAL-P0031-03

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Certificate of Calibration

Certificate No. : 64-400518-3

Page : 1 of 2

Submitted by : Ecotech Water Systems Co., Ltd.

20 Soi Kheharomklao 74 Yag 6, Ratphatthana, Saphansung, Bangkok 10240

Equipment : Autoclave

Manufacturer : LABTECH

Model : LAC-5060S

Range : N/A °C

Resolution 0.1 °C

Serial No. : 090414007

ID No. : INS008

Environment : On site calibration was carried out at the Laboratory, Ecotech Water Systems Co., Ltd.

Ambient Temperature : (23.0 to 24.0) °C

Relative Humidity : (40 to 45) %

Line Voltage : (225.0 to 226.4) V

Date of Received : 05 October 2021

Date of Calibration : 05 October 2021

Date of Issue : 07 October 2021

Calibrated by : Pempon Chanpu

Calibration Method : This instrument was calibrated by In-house method CAL-M4007 based on BS 2646 Part 5 : 1993

The temperature scale used was based on ITS-90

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

Standard Temperature Data Logger with RTD pt 100

ID No.	Cert. No.	Due Date	Traceability
400039	64-400398-1	07 Feb 2022	National Institute of Metrology Thailand (NIMT)
400040	64-400398-2	07 Feb 2022	National Institute of Metrology Thailand (NIMT)
400041	64-400398-3	07 Feb 2022	National Institute of Metrology Thailand (NIMT)

Approved by :

Supervisor

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Certificate of Calibration

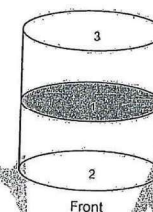
Certificate No. 64-400518-3

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Test Point	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.			Uncertainty (± °C)	Measured Uniformity (°C)	Measured Stability (°C)	Sterilizing Time (minute)	Pressure Gauge Reading (kg/cm²)
121.0	121.0	121.0	123.3	122.4	121.7	0.71	0.7	0.1	15	1.2

Remark

- UUC : Unit Under Calibration
- Pressure Gauge reading are out of accreditation's scope.

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

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

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