

เอกสารแนบ 6

เอกสารสอบเทียบ
เครื่องมือที่ใช้ในการวิเคราะห์



CALIBRATION LABORATORY Co., LTD.

210-11, 14, 55 Soi Prasert Manukit 29 Yeak 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2872 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : BALANCE
MANUFACTURER : SHIMADZU
MODEL / TYPE : AP255MD
SERIAL NO. : D376300692[LA-001]
CLID. NO. : 362100172
JOB CONTROL NO. : 210122006482

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
545 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 22 January 2021

DATE OF ISSUED : 28 January 2021

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

Calibrated By : Mangkornchai Lungkratok

Calibration Engineer



Approved By : Mongkol Yotsoontorn

Authorized Signatory

28 January 2021

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q21006482

F3-011-04/01-12

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calibration



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REPORT OF CALIBRATION

FOR

NOMENCLATURE : BALANCE
MANUFACTURER : SHIMADZU
MODEL / TYPE : AP255MD
SERIAL NO. : D376300692[LA-001]
LOCATION SITE : LABORATORY - BALANCE ROOM
DATE OF CALIBRATION : 23 January 2021

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C

Relative Humidity : 52 % to 55 %

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-46 based on EURAMET/cg-18/Version 4.0 (11/2015).

The calibration was performed by using Weight Set which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Weight Set Phoenix Class E2 SN. WBS-SET-E2-02.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).

Certificate No. MM-0032-20, Due Date 19 May 2022.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95%. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q21006482

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calibration



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NSC-TIS-17025
CALIBRATION 0659
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CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

CALIBRATION DATA

1. Error of indications

Nominal Test Value (g)	Conventional mass (g)	Display Value (g)	Error of Balance (g)	Uncertainty \pm (mg)	Coverage factor k
0.0000	0.0000	0.0000	0.0000	-	-
5.0000	5.0000	5.0000	0.0000	0.09	2.00
10.0000	10.0000	10.0000	0.0000	0.09	2.00
20.0000	20.0000	20.0000	0.0000	0.09	2.00
40.0000	40.0000	40.0000	0.0000	0.11	2.00
60.0000	60.0000	60.0000	0.0000	0.14	2.00
80.0000	80.0000	80.0000	0.0000	0.15	2.00
100.0000	100.0000	99.9999	-0.0001	0.15	2.00
120.0000	120.0000	119.9999	-0.0001	0.22	2.00
140.0000	140.0000	139.9999	-0.0001	0.22	2.00
160.0000	160.0000	159.9999	-0.0001	0.22	2.00
180.0000	180.0000	179.9999	-0.0001	0.25	2.00
200.0000	200.0001	199.9999	-0.0002	0.25	2.00

2. Repeatability of indications

Nominal Test Value (g)	Standard Deviation of Reading (g)
200.0000	0.00000

3. Effect of eccentric application of a load on the indication

<div><div><div><div><div></div><div>1</div><div>3</div></div><div><div>4</div><div>2</div><div>5</div></div></div></div><div><input type="checkbox"/></div></div>	<div><div><div><div><div></div><div>1</div><div>3</div></div><div><div>4</div><div>2</div><div>5</div></div></div></div><div><input checked="" type="checkbox"/></div></div>	<div><div><div><div><div></div><div>1</div><div>3</div></div><div><div>4</div><div>2</div><div>5</div></div></div></div><div><input type="checkbox"/></div></div>				
Display Value (g)			Maximum Difference of Center Value (g)			
Nominal Test Value (g)		Position 1	Position 2	Position 3	Position 4	Position 5
50.0000		50.0000	50.0000	50.0000	50.0000	50.0000
50.0000		0.0000				

Note. The Scope of Accredited TISI Certificate No. 19C0870655 Issue 1 Page 88 of 111

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

End of Certificate

Certificate No. Q21006482
F3-011-04/01-12



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NSC-TIS-17025
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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL / TYPE : UF30
SERIAL NO. : B119.1030[LA-005]
CLID. NO. : 332100152
JOB CONTROL NO. : 210122006483

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

545 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 22 January 2021 DATE OF ISSUED : 28 January 2021

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

Calibrated By :

Wenick Inchaisri

Calibration Engineer



Approved By :

Mongkol Yotsoontorn

Authorized Signatory

28 January 2021

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q21006483

F3-011-04/01-12

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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cali-laboratory.com E-mail: sale@cal-laboratory.com

REPORT OF CALIBRATION

FOR

NOMENCLATURE : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL / TYPE : UF30
SERIAL NO. : B119.1030[LA-005]
LOCATION SITE : LABORATORY-HOT ZONE
DATE OF CALIBRATION : 23 January 2021

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 26 °C

Relative Humidity : 50 % to 55 %

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-165 based on TLAS G-20 as calibration guidelines.

The calibration was performed by using Hydra Data Logger and Hydra Data Bucket which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Hydra Data Logger, Fluke Model 2620 S/N. 5592550.
2. Hydra Data Bucket, Fluke Model 2635A S/N. 6496317.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.

Certificate No. Q20067187, Due Date 13 August 2021.

2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.

Certificate No. Q20093272, Due Date 22 October 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q21006483

F3-011-04/01-12

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CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring hot air oven.

CALIBRATION DATA

1. HOT AIR OVEN PERFORMANCE

Setting (°C)	DUC		Measured Uniformity (°C)	Measured Stability (°C)	Measured Overall Variation (°C)
	104.0	180.0			
104.0		104.0	0.94	0.11	1.57
180.0		180.0	1.34	0.17	2.08

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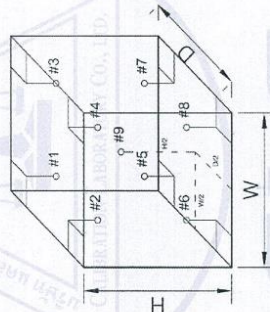
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

DUC		Measured Temperature (°C)@Probe No.9 is Ref.									Uncertainty (± °C)	Coverage factor k
Setting (°C)	Indicating (°C)	1	2	3	4	5	6	7	8	9		
104.0	104.0	105.60	105.45	104.78	104.41	104.78	105.20	105.82	104.41	104.95	0.59	2.00
180.0	180.0	181.54	181.58	180.51	180.21	180.62	181.09	181.99	180.72	180.74	1.50	2.00

Technical Note : W = 40 cm, D = 25 cm, H = 32 cm.

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

End of Certificate



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH
MANUFACTURER : MEMMERT
MODEL / TYPE : WNB14
SERIAL NO. : L418.0758[LA-004]
CLID. NO. : 332100157
JOB CONTROL NO. : 210122006486

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 22 January 2021 DATE OF ISSUED : 28 January 2021

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

Calibrated By :

Wenick Inchaisri

Calibration Engineer



Approved By :

Mongkol Yotsoontorn

Authorized Signatory

28 January 2021

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)





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REPORT OF CALIBRATION

FOR

NOMENCLATURE : WATER BATH
MANUFACTURER : MEMMERT
MODEL / TYPE : WNB14
SERIAL NO. : L418.0758[L A-004]
LOCATION SITE : LABORATORY-HOT ZONE
DATE OF CALIBRATION : 23 January 2021

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 26 °C

Relative Humidity : 50% to 55%

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-135 based on ASTM E 715-80 as calibration guidelines.
The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 SN: 5592550.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q20102430, Due Date 18 May 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q21006486

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CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring water bath.

CALIBRATION DATA

1. WATER BATH PERFORMANCE

Test Point (°C)	DUC Reading (°C)	Uniformity (°C)	Stability (°C)
95.0	95.0	0.49	0.17

Certificate No. Q21006486

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@calibration

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : pH METER
 MANUFACTURER : APERA
 MODEL / TYPE : PH700/201T-F
 SERIAL NO. : PH700X1019061009/N/A[PHM-01]
 CLID. NO. : 272100152
 JOB CONTROL NO. : 210121006418

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
 5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
 NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 21 January 2021 DATE OF ISSUED : 25 January 2021

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

Calibrated By : Sukgasem Seehanart

Tanawan Seenam-Ngoen

Calibration Engineer



Approved By :

Mongkol Yotsoontorn

Authorized Signatory

25 January 2021

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to

the International System of Units (SI)

Certificate No. Q21006418

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REPORT OF CALIBRATION

FOR

NOMENCLATURE : pH METER
 MANUFACTURER : APERA
 MODEL / TYPE : PH700/201T-F
 SERIAL NO. : PH700X1019061009/N/A[PHM-01]
 DATE OF CALIBRATION : 22 January 2021

ENVIRONMENT CONDITIONS :

Temperature : $(25 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 15) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-128, 238 by direct measurement with Certified Reference Material (CRM) and comparison with Calibration Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. pH Standard Solution, TRM CODE TRM-S-2003, TRM CODE TRM-S-2005, TRM CODE TRM-S-2007.
2. Calibration Bath, Kaibic Model OB-222 ULT S/N. 17115653.
3. Precision Thermometer, ASL Model F200-A-8 S/N. 014433/03 with IPRT, ASL Model T100-250-1D S/N. PO106346-1-13.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand). Lot Number. 280319, 280119, 080719, Due Date 16 June 2021.
2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20008277, Due Date 05 February 2021.
3. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand). Certificate No. ER-0032-20, TT-0011-20. Due Date 09 April 2021, 06 February 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q21006418

F3-011-04/01-12

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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DO METER

MANUFACTURER : YSI

MODEL / TYPE : 5000-230V/5010

SERIAL NO. : 16D101626/19D100367[DOM-01]

CLID. NO. : 272100329

JOB CONTROL NO. : 210204010947

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 04 February 2021

DATE OF ISSUED : 08 February 2021

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

Calibrated By : Sukkasem Seehanart

Calibration Engineer

Approved By : Mongkol Yotsontorn

Authorized Signatory

08 February 2021

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)


Certificate No. Q21010947

F3-011-04/01-12


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ACQM-3814

CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of pH meter.

CALIBRATION DATA

1. pH METER RESULT @ 25 °C

Standard pH Buffer Solution (pH)	pH Meter Reading (pH)	pH Meter Reading (mV)	Correction (pH)	Uncertainty of pH Measurement (± pH)	k Factor
4.003	4.00	161	+0.003	0.014	2,20
7.025	7.02	-17	+0.005	0.014	2,17
10.008	10.01	-190	-0.002	0.100	2,09

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*2. TEMPERATURE RESULT

Immersion depth (mm)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty ± (°C)
100	25.00	25.0	0.00	0.07

Note. * means Calibrations marked "Not TISI Accredited" in this Certificate have been included for completeness.

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of k = 2.00.


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

End of Certificate

Certificate No. Q21006418

F3-011-04/01-12

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REPORT OF CALIBRATION

FOR

NOMENCLATURE : DO METER
MANUFACTURER : YSI
MODEL / TYPE : 5000-230V/5010
SERIAL NO. : 16D101626/19D100367[DOM-01]
DATE OF CALIBRATION : 05 February 2021

ENVIRONMENT CONDITIONS :

Temperature : $(25 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 15) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CFCH-06 by direct measurement with Dissolved Oxygen which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Dissolved Oxygen, Sigma-Aldrich Product ID QC3077-500ML.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Sigma-Aldrich, Lot LRAC4478, Due Date January 2022.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2,00$ which for a normal distribution corresponds to a coverage probability of approximately 95%. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q21010947

F3-011-04/01-12

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CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of Do Meter.

CALIBRATION DATA

Nominal Value (mg/L)	DUC Reading (mg/L)	Correction (mg/L)	Uncertainty (mg/L)
8.49	8.49	0.00	± 0.31

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 006 Page 4 of 57

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

End of Certificate

Certificate No. Q21010947

F3-011-04/01-12

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NSC-TIS-TIS 17925
CALIBRATION 0699
CLC

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : INCUBATOR
MANUFACTURER : ACCUPLUS
MODEL / TYPE : SMART i250
SERIAL NO. : 2059-0718-0010[LA-002]
CLID. NO. : 332100155
JOB CONTROL NO. : 210122006484

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 22 January 2021 DATE OF ISSUED : 28 January 2021

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

Calibrated By :

Wenick Inchaisri

Calibration Engineer



Approved By :

Mongkol Yotsoontorn

Authorized Signatory

28 January 2021

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q21006484

F3-011-04/01-12

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NSC-TIS-TIS 17925
CALIBRATION 0699
CLC

REPORT OF CALIBRATION

FOR

NOMENCLATURE : INCUBATOR
MANUFACTURER : ACCUPLUS
MODEL / TYPE : SMART i250
SERIAL NO. : 2059-0718-0010[LA-002]
LOCATION SITE : LABORATORY
DATE OF CALIBRATION : 23 January 2021

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 26 °C

Relative Humidity : 50 % to 55 %

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-165 based on TLAS G-20 as calibration guidelines.

The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N. 5592550.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.

Certificate No. Q20067187, Due Date 13 August 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q21006484

F3-011-04/01-12

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@clcalibration



CALIBRATION LABORATORY CO., LTD.

210-11,14, 55 Soi Prasert Manukit 23 Yeak 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com Email: sale@cal-laboratory.com



NIST-TEST-TIN 17025
CALIBRATION 0059
CLC

CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring incubator.

CALIBRATION DATA

1. INCUBATOR PERFORMANCE

DUC		Measured Uniformity (°C)	Measured Stability (°C)	Measured Overall Variation (°C)
Setting (°C)	Indicating (°C)			
20.0	20.0	0.34	0.44	1.02

Certificate No. Q21006484

F3-011-04/01-12

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NIST-TEST-TIN 17025
CALIBRATION 0059
CLC

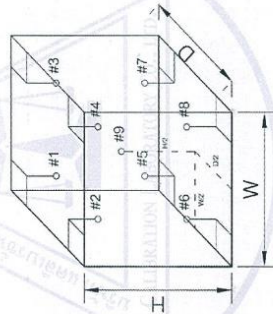
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

DUC		Measured Temperature (°C) @ Probe No.9 is Ref.										Uncertainty ± (°C)	Coverage factor k
Setting (°C)	Indicating (°C)	1	2	3	4	5	6	7	8	9			
20.0	20.0	20.49	20.42	20.27	20.33	20.41	20.34	20.19	20.16	20.28		0.67	2.00

Technical Note : W = 50 cm, D = 48 cm, H = 110 cm.

The Scope of Accredited TISI Certificate No. 19C087/0655 Issue 1 Page 105 of 111



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

End of Certificate

Certificate No. Q21006484

F3-011-04/01-12

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CALIBRATION LABORATORY CO., LTD.

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ISO/IEC 17025
CALIBRATION 0659
CLC

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284991[DTH-01]
CLID. NO. : 232100200
JOB CONTROL NO. : 210121006416

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 21 January 2021 DATE OF ISSUED : 26 January 2021

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

Calibrated By :

Oranut Kamchatphai
Calibration Engineer



Approved By :
Mongkol Yotsontorn
Authorized Signatory

26 January 2021

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q21006416
F3-011-04/01-12

page 1 of 3



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CALIBRATION LABORATORY CO., LTD.

210-11, 14, 55 Soi Prasert Manukit 29 Yeak 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
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ISO/IEC 17025
CALIBRATION 0659
CLC

REPORT OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284991[DTH-01]
DATE OF CALIBRATION : 25 January 2021

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$ Relative Humidity : $(55 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-74 as calibration guidelines.
The calibration was performed by using Chilled Mirror Hygrometer and Temperature & Humidity Chamber which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, EdgeTech Model Dew Master SN. 36151.
Temperature & Humidity Chamber, PGC Model 9141-5114 SN.0802282.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Thunder Scientific Corporation.
Certificate No. 18263, Due Date 29 April 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q21006416
F3-011-04/01-12

page 2 of 3



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CALIBRATION LABORATORY Co., LTD.

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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring digital thermohygro meter.

CALIBRATION DATA

1. CORRECTION OF TEMPERATURE

Test point (°C)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty ± (°C)
20.0	20.03	19.4	+0.63	0.40
25.0	25.04	24.4	+0.64	
30.0	30.13	29.5	+0.63	

2. CORRECTION OF HUMIDITY

STD Temperature (°C)	STD Reading (%RH)	DUC Reading (%RH)	Correction (%RH)	Uncertainty ± (%RH)
25	40.0	36	+4.0	1.3
25	60.0	56	+4.0	1.5

Note. The Scope of Accredited TISI Certificate No. 19C087/0655 Issue 1 Page 36 of 111

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

Certificate No. Q21006416

F3-011-04/01-12

End of Certificate

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CALIBRATION LABORATORY Co., LTD.

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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : REFRIGERATOR
MANUFACTURER : MEDICOOL
MODEL / TYPE : BB-117
SERIAL NO. : BB117-190725001[LA-003]
CLID. NO. : 332100156
JOB CONTROL NO. : 210122006485

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

545 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 22 January 2021 DATE OF ISSUED : 28 January 2021

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

Calibrated By :

Wenick Inchaisri

Calibration Engineer



Approved By :

Mongkol Yotsontorn

Authorized Signatory

28 January 2021

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q21006485

F3-011-04/01-12

page 1 of 4





CALIBRATION LABORATORY CO., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yeak 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
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REPORT OF CALIBRATION

FOR

NOMENCLATURE : REFRIGERATOR
MANUFACTURER : MEDICOOL
MODEL / TYPE : BB-117
SERIAL NO. : BB117-190725001[LA-003]
LOCATION SITE : LABORATORY
DATE OF CALIBRATION : 23 January 2021

ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 26 °C
Relative Humidity : 50 % to 55 %

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-165 based on TLAS G-20 as calibration guidelines.
The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N. 5592550.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.
Certificate No. Q20067187, Due Date 13 August 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-402 M:2013)"

Certificate No. Q21006485

F3-011-04/01-12

page 2 of 4



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Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring refrigerator.

CALIBRATION DATA

1. REFRIGERATOR PERFORMANCE

Setting (°C)	DUC		Measured Uniformity (°C)	Measured Stability (°C)	Measured Overall Variation (°C)
	4.0	Indicating (°C)			
4.0		4.0	0.51	0.92	2.17

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Certificate No. Q21006485

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NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

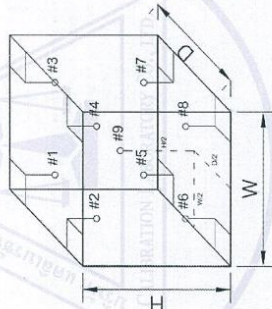
CALIBRATION DATA

2. TEMPERATURE DISTRIBUTION

DUC		Measured Temperature (°C)@Probe No.9 is Ref.									Uncertainty ± (°C)	Coverage factor k
Setting (°C)	Indicating (°C)	1	2	3	4	5	6	7	8	9		
4.0	4.0	3.47	3.83	3.21	3.80	3.41	3.32	3.12	3.13	3.43	1.15	2.00

Technical Note : W = 50 cm, D = 50 cm, H = 120 cm.

The Scope of Accredited TISI Certificate No. 19C087/0655 Issue 1 Page 105 of 111



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

End of Certificate

Certificate No. Q21006485
F3-011-04/01-12

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NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284980[DTH-02]
CLID. NO. : 232100201
JOB CONTROL NO. : 210121006417

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 21 January 2021

DATE OF ISSUED : 26 January 2021

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

Calibrated By :

Oranut Kamchatphai
Calibration Engineer



Approved By :

Mongkol Yoisoontorn
Authorized Signatory

26 January 2021

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q21006417
F3-011-04/01-12

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NSC-TIS-TIS 17025
CALIBRATION 0659
CLC

REPORT OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284980[DTH-02]
DATE OF CALIBRATION : 25 January 2021

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$ Relative Humidity : $(55 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-74 as calibration guidelines.

The calibration was performed by using Chilled Mirror Hygrometer and Temperature & Humidity Chamber which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, Edgetech Model Dew Master S/N. 36151.
Temperature & Humidity Chamber, PGC Model 9141-5114 S/N.0802282.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Thunder Scientific Corporation. Certificate No. 18263, Due Date 29 April 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q21006417

F3-011-04/01-12

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edccalibration



CALIBRATION LABORATORY CO., LTD.

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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



NSC-TIS-TIS 17025
CALIBRATION 0659
CLC

REPORT OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER
MANUFACTURER : DIGICON
MODEL / TYPE : TH-02A
SERIAL NO. : 1919E0284980[DTH-02]
DATE OF CALIBRATION : 25 January 2021

ENVIRONMENT CONDITIONS :

Temperature : $(23 \pm 2) ^\circ\text{C}$ Relative Humidity : $(55 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-74 as calibration guidelines.

The calibration was performed by using Chilled Mirror Hygrometer and Temperature & Humidity Chamber which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

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Certificate No. Q21006417

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