

ภาคผนวกที่ 5

เอกสารสอบเทียบเครื่องมือการตรวจวิเคราะห์คุณภาพน้ำ

สรุปตารางรายการเอกสารสอบเทียบความถูกต้องของเครื่องมือตรวจวิเคราะห์คุณภาพน้ำ

รายการตรวจวิเคราะห์	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ
- pH	- pH Meter
- Total Suspended Solids	- Electronic Balance
- Total Dissolved Solids	- Electronic Balance
- Settleable Solids	- Electronic Balance
- BOD ₅	- BOD Analyzer
- COD	- COD Reactor
- TKN	- Kjeldahl Block Digestion
- Sulfide	- Electronic Balance
- Grease & Oil	- Electronic Balance
- TCB	- Incubator
- FCB	- Incubator

CERTIFICATE OF CALIBRATION FOR

NOMENCLATURE : pH METER
MANUFACTURER : HANNA
MODEL / TYPE : HI3512/HI1332/HI7662-T
SERIAL NO. : 08685754/11250B7M/092806BN[PH04/56]
CLID. NO. : 272501562
JOB CONTROL NO. : 250617070523
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24 ROAD, JOMPOL,
CHATUCHAK, BANGKOK 10900

DATE OF RECEIVED : 17 June 2025

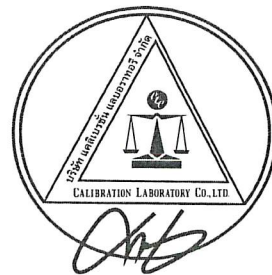
DATE OF ISSUED : 20 June 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Sukgasem Seehanart
Wenick Inchaisri
Calibration Engineer



Approved By : Mongkol Yotsoontorn
Authorized Signatory
20 June 2025



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. Q25070523

F3-011-05/12-23

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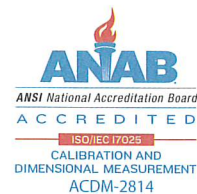


CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

2/10-11,14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230

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



REPORT OF CALIBRATION

FOR

NOMENCLATURE : **pH METER**
MANUFACTURER : **HANNA**
MODEL / TYPE : **HI3512/HI1332/HI7662-T**
SERIAL NO. : **08685754/11250B7M/092806BN[PH04/56]**
DATE OF CALIBRATION : **18 June 2025**

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-CPCH-01** [pH Meter]. The calibration was performed by direct measurement with Certified Reference Material (CRM).

This instrument was calibrated under procedure No. **CLC-CPTH-04** [Temperature] based on **ASTM E 644-04** as calibration guidelines. The calibration was performed by using Calibration Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. pH Standard Solution, NIMT TRM CODE TRM-S-2003, TRM CODE TRM-S-2007.
2. pH Standard Solution, Control Company Catalog Number 06664260,11754256, Lot Number CC787362.
3. Calibration Bath, Kambic Model OB-22/2 ULT S/N. 17115653.
4. Precision Thermometer, ASL Model F250 S/N. 1334023800.
5. IPRT, Wika Model CTP5000-250-D S/N. PO00043543-1-10-1.

Certificate No. **Q25070523**

F3-011-05/12-23

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@clccalibration



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



TRACEABILITY :

1. The measurements are traceable to International System of Units (SI) , through National Institute of Metrology (Thailand).
Lot Number. 080124 , 120124. Due Date 23 January 2026.
2. The measurements are traceable to International System of Units (SI) , through Control Company.
Certificate No. 4281-14495731 , Due Date 27 September 2025.
3. The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co., Ltd.
Certificate No. Q24120999, Due Date 26 November 2025.
4. The measurements are traceable to International System of Units (SI) , through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 1042/67, Due Date 16 October 2025.
5. The measurements are traceable to International System of Units (SI) , through National Institute of Metrology (Thailand).
Certificate No. TT-0146-24, Due Date 28 October 2025.

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-4/02 M:2022)"

Certificate No. Q25070523

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@clccalibration

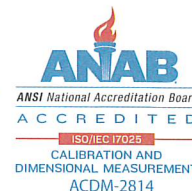


CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230

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



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

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 ($\pm$ pH)	k Factor
4.003	4.005	168.2	-0.002	0.010	2,00
7.005	7.010	-8.1	-0.005	0.013	2,00
10.015	10.010	-177.7	+0.005	0.014	2,00

Technical Note. Setting function CAL 3 point (4,7,10).

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 4 of 68

2. TEMPERATURE RESULT

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

Technical Note. Type of sensor : Thermistor

Probe $\varnothing$ 3 mm

Materials : Metal Sheath.

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of $k = 2,00$.

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 56 of 68

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

End of Certificate

Certificate No. Q25070523

F3-011-05/12-23

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@clccalibration



CERTIFICATE No : 25M2256

REFERENCE No : 76365-3

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE

MANUFACTURER : SARTORIUS

MODEL : BSA224S-CW

SERIAL No : 36591843

ID No : BA09/61

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : ATSAWIN Y.

CALIBRATION DATE : 07-Mar-25

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 13-Mar-25

RECEIVED DATE : 07-Mar-25

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.





CERTIFICATE No : 25M2256

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : BSA224S-CW
MANUFACTURER : SARTORIUS S/N : 36591843
ID No : BA09/61 RECEIVED DATE : 07-Mar-25
AIR PRESSURE : 1009mbar $\pm$ 1mbar CALIBRATION DATE : 07-Mar-25
AMBIENT TEMPERATURE : 24° C $\pm$ 1° C RELATIVE HUMIDITY : 52 %RH $\pm$ 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS NOT ADJUSTED BEFORE CALIBRATION. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

2. REFERENCE STANDARD INSTRUMENTS :-

<u>INSTRUMENT</u>	<u>MODEL</u>	<u>SERIAL No</u>	<u>CERTIFICATE No</u>	<u>DUE DATE</u>
1) STANDARD WEIGHT SET	E2	QK-I-151	C02250116	28-Jan-27
2) STANDARD WEIGHT	E2	15843	C02250117	29-Jan-27

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

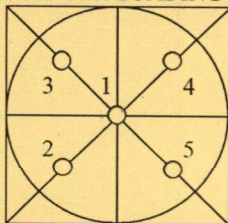
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0.000071 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY ($\pm$ g)
0.00	0.0000	0.0000	0.00012
0.10	0.1000	0.0000	0.00012
0.20	0.2000	0.0000	0.00012
0.50	0.5000	0.0000	0.00012
1.00	1.0000	0.0000	0.00012
2.00	2.0000	0.0000	0.00012
5.00	5.0000	0.0000	0.00012
10.00	10.0000	0.0000	0.00012
20.00	20.0001	-0.0001	0.00012
50.00	50.0000	0.0000	0.00014
100.00	100.0001	-0.0001	0.00019
200.00	200.0001	-0.0001	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	100.0000
2	100.0000
3	100.0000
4	100.0000
5	100.0000
OFF-CENTER LOADING	0.0000

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA
THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT





CERTIFICATE No : 26M2268

REFERENCE No : 80204-3

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE

MANUFACTURER : SARTORIUS

MODEL : BSA224S-CW

SERIAL No : 36591843

ID No : BA 09/61

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : SUCHAT S.

CALIBRATION DATE : 05-Mar-26

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 06-Mar-26

RECEIVED DATE : 05-Mar-26





CERTIFICATE No : 26M2268

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : BSA224S-CW
MANUFACTURER : SARTORIUS S/N : 36591843
ID No : BA 09/61 RECEIVED DATE : 05-Mar-26
AIR PRESSURE : 1004mbar $\pm$ 1mbar CALIBRATION DATE : 05-Mar-26
AMBIENT TEMPERATURE : 25° C $\pm$ 1° C RELATIVE HUMIDITY : 50 %RH $\pm$ 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS NOT ADJUSTED BEFORE CALIBRATION. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) STANDARD WEIGHT SET	E2	QK-I-151	C02250116	28-Jan-27
2) STANDARD WEIGHT	E2	15843	C02250117	29-Jan-27

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

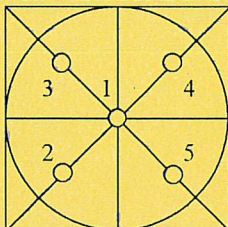
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0.000055 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY ($\pm$ g)
0.0	0.0000	0.0000	0.00010
0.1	0.1000	0.0000	0.00011
0.2	0.2000	0.0000	0.00010
0.5	0.5000	0.0000	0.00011
1.0	1.0000	0.0000	0.00011
2.0	2.0000	0.0000	0.00011
5.0	5.0000	0.0000	0.00011
10.0	10.0000	0.0000	0.00011
20.0	20.0001	-0.0001	0.00011
50.0	50.0000	0.0000	0.00013
100.0	100.0001	-0.0001	0.00019
200.0	200.0001	-0.0001	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	100.0000
2	100.0000
3	100.0000
4	100.0000
5	100.0000
OFF-CENTER LOADING	0.0000

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



CERT.No.: HS-W015C

Calibration Date : 18 Mar 25
Submitted by : S.P.S CONSULTING SERVICE CO.,LTD
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol,
Chatuchak, Bangkok, Thailand 10900

Avg Room Temp : 20 °C
Avg Water Temp : 20 °C
Air Pressure : 760.00 mmHg
Salinity : 0 ppt

Model : YSI 5000
S/N : 15B100751
Probe : YSI 5010
S/N : 22D100097
ID NO. : -
Air Temp ref : S/N. F8065C26
Barometric ref : S/N. F8065C26
Water Temp ref : -
ID NO. HS001
Technician : Kittipong M.

Calibration Details

Calibration Point	100% air sat. (@20 °C, DO = 9.09 mg/l)	(status)	(status)
Measurement 1 (mg/l)	9.08	(PASS)	-
Measurement 2 (mg/l)	9.08	(PASS)	-
Measurement 3 (mg/l)	9.08	(PASS)	-
Measurement 4 (mg/l)	9.07	(PASS)	-
Measurement 5 (mg/l)	9.07	(PASS)	-
Measurement 6 (mg/l)	9.07	(PASS)	-
Measurement 7 (mg/l)	9.07	(PASS)	-
Measurement 8 (mg/l)	9.07	(PASS)	-
Measurement 9 (mg/l)	9.07	(PASS)	-
Measurement 10 (mg/l)	9.07	(PASS)	-

Mean Measurement	9.07	mg/l	-	-
Inaccuracy	0.02	mg/l	-	-

Overall Status (PASS)

Manufacturer Specification

Accuracy = +/- 0.02 mg/l

- 1) This certificate is issued based on the result that are found as shown on date and place of test only.
- 2) The calibration procedure followed in accordance with Harikul Science Co., Ltd.
- 3) This result shall not be used for advertising purpose.



Technician Signature
(Kittipong Maekwong)



Laboratory Manager
(Natenapha Pisatkunchon)

CERT.No.: HS-X014C

Certificate of Calibration

Calibration Date : 16 March 2026

Model : YSI 5000

Submitted by : S.P.S CONSULTING SERVICE CO.,LTD

S/N : 15B100751

7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol,

Probe : YSI 5010

Chatuchak, Bangkok, Thailand 10900

S/N : 22D100097

ID NO. :

Avg Room Temp : 20 °C

Air Temp ref : S/N. F8065C26

Avg Water Temp : 20 °C

Barometric ref : S/N. F8065C26

Air Pressure : 760.00 mmHg

Water Temp ref : -

Salinity : 0 ppt

ID NO. HS001

Technician : Kittipong M.

Calibration Details

Calibration Point	100% air sat. (@20 °C, DO = 9.09 mg/l)	(status)	(status)
Measurement 1 (mg/l)	9.09	(PASS)	-
Measurement 2 (mg/l)	9.09	(PASS)	-
Measurement 3 (mg/l)	9.09	(PASS)	-
Measurement 4 (mg/l)	9.09	(PASS)	-
Measurement 5 (mg/l)	9.09	(PASS)	-
Measurement 6 (mg/l)	9.08	(PASS)	-
Measurement 7 (mg/l)	9.08	(PASS)	-
Measurement 8 (mg/l)	9.08	(PASS)	-
Measurement 9 (mg/l)	9.08	(PASS)	-
Measurement 10 (mg/l)	9.08	(PASS)	-

Mean Measurement	9.09	mg/l	-	-
Inaccuracy	0.00	mg/l	-	-

Overall Status (PASS)

Manufacturer Specification

Accuracy = +/- 0.02 mg/l

- 1) This certificate is issued based on the result that are found as shown on date and place of test only.
- 2) The calibration procedure followed in accordance with Harikul Science Co., Ltd.
- 3) This result shall not be used for advertising purpose.



Technician Signature
(Kittipong Maekwong)



Laboratory Manager
(Natenapha Pisatkunchon)



QUALITY CALIBRATION CO., LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com

CERTIFICATE No : 25T0521

REFERENCE No : 75853-2

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : COD REACTOR

MANUFACTURER : HACH

MODEL : DRB 200

SERIAL No : 15110C0498

ID No : CRB 06/59

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : CHAICHARN CH.

CALIBRATION DATE : 03-Feb-25

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 03-Feb-25

RECEIVED DATE : 15-Jan-25





QUALITY CALIBRATION CO., LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 25T0521

PAGE : 2 OF 2

Calibration Report

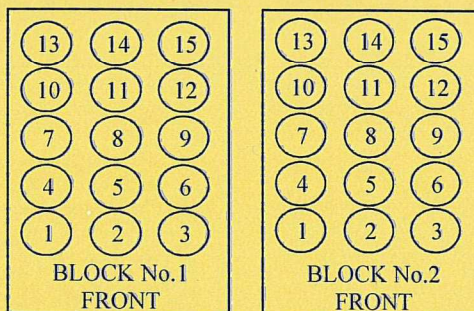
EQUIPMENT : COD REACTOR
MANUFACTURER : HACH
ID NUMBER : CRB 06/59
RECEIVED DATE : 15-Jan-25
AMBIENT TEMPERATURE : 23° C ± 1° C
MODEL : DRB 200
SERIAL NUMBER : 15110C0498
CALIBRATION DATE : 03-Feb-25
RELATIVE HUMIDITY : 53 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

- THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASUREMENT METHOD WITH CALIBRATED THERMOCOUPLE TYPE K UNDER NO LOAD CONDITION. THE THERMOCOUPLES WERE PLACED ON POINTS AND LOCATED AS THE PICTURE.
- REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH TC TYPE K	HYDRA 2635A	7301307	24T6467	26-Jun-25
- THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
- THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
- THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



Block No.		1	2
Calibration Point (°C)		150	150
Controller temperature (°C)		145	145
Indicating Temperature		145	145
Measured Temperature (° C) at Spread Locations	1	150.23	150.64
	2	149.73	149.78
	3	150.29	150.29
	4	150.04	150.49
	5	150.09	150.51
	6	150.74	150.67
	7	149.97	150.66
	8	150.76	150.57
	9	150.54	150.51
	10	149.44	149.94
	11	150.12	150.64
	12	149.93	150.33
	13	149.19	149.82
	14	148.96	149.70
	15	149.09	149.79
Uncertainty of Measurement(± °C)		0.88	0.88

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : LOCATION 10 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k =2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT





QUALITY CALIBRATION CO., LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com

CERTIFICATE No : 26T0464

REFERENCE No : 79659-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : COD REACTOR

MANUFACTURER : HACH

MODEL : DRB 200

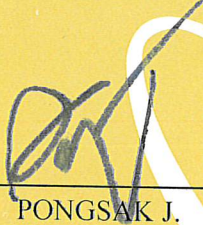
SERIAL No : 15110C0497

ID No : DRB 04/59

SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : SOMCHAI S.

CALIBRATION DATE : 30-Jan-26

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 30-Jan-26

RECEIVED DATE : 30-Jan-26

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.





QUALITY CALIBRATION CO., LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 26T0464

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : COD REACTOR
MANUFACTURER : HACH
ID NUMBER : DRB 04/59
RECEIVED DATE : 30-Jan-26
AMBIENT TEMPERATURE : 23° C ± 1° C
MODEL : DRB 200
SERIAL NUMBER : 15110C0497
CALIBRATION DATE : 30-Jan-26
RELATIVE HUMIDITY : 54 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASUREMENT METHOD WITH CALIBRATED THERMOCOUPLE TYPE K UNDER NO LOAD CONDITION. THE THERMOCOUPLES WERE PLACED ON POINTS AND LOCATED AS THE PICTURE.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT

MODEL

SERIAL No

CERTIFICATE No

DUE DATE

1) DATA LOGGER WITH TC TYPE K

HYDRA 2635A

6849323

25T5342

18-Jun-26

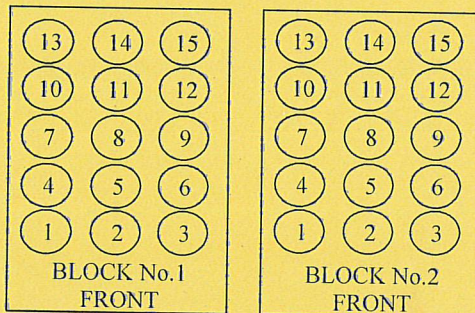
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



TEMPERATURE MEASUREMENT ACCURACY TEST

Block No.		1	2
Controller temperature (°C)		144	145
Indicating Temperature		144	145
Measured Temperature (°C) at Spread Locations	1	149.3	149.8
	2	149.1	149.9
	3	149.9	149.6
	4	150.0	149.3
	5	149.8	149.5
	6	149.9	149.1
	7	149.7	149.7
	8	149.5	149.9
	9	149.8	149.4
	10	148.5	149.4
	11	149.1	150.2
	12	149.2	150.0
	13	149.0	149.6
	14	149.1	150.3
	15	148.5	149.0
Uncertainty of Measurement(± °C)		0.89	0.89

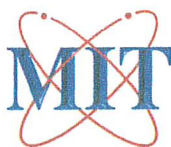
NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : LOCATION 10 WAS REFERENCE LOCATION.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT





MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

214 Bangwaek Rd. Bangpai Bangkae Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Page 1 of 2

Certificate No. : S2025070410-0004

Date Issued : 24-Jul-25

Customer : S.P.S. CONSULTING SERVICE CO., LTD.
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment : Block Digestion (Gerhardt, TR)

Manufacturer : Gerhardt

Model : -

Serial No. : 4061832

ID No./Tag No. : KJ 01/43

Date Received : 22-Jul-25

Date Calibrated : 22-Jul-25

Calibrated by : Auttapol Kunaumpal

Calibration Method or Calibration Procedure Used

In-house method : CP-49 base on TLAS G-20 by comparing against Standard Thermometer.

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.

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by:

K. Nathong
(Nathapong Krudaum)



Certificate No. : S2025070410-0004

Environment : Ambient Temperature : Start record 25.5 °C, Stop record 25.5 °C
Relative Humidity : Start record 50.4 %RH, Stop record 50.1 %RH

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
380	380	380	1.03	1.73	2.57

Calibration Temperature (°C)	Standard Reading (°C), Probe No. 10 is Reference Probe					Uncertainty ⁴ (±°C)
380	No. 1	No. 2	No. 3	No. 4	No. 5	1.9
	380.49	380.79	380.68	380.85	380.56	
	No. 6	No. 7	No. 8	No. 9	No. 10	
	380.60	379.85	380.28	379.65	380.55	
	No. 11	No. 12	No. 13	No. 14	No. 15	
	380.38	380.54	380.49	380.75	380.37	
	No. 16	No. 17	No. 18	No. 19	No. 20	
	380.25	379.64	379.73	380.52	380.79	

Without adjustment

No.1	No.2	No.3	No.4
No.5	No.6	No.7	No.8
No.9	No.10	No.11	No.12
No.13	No.14	No.15	No.16
No.17	No.18	No.19	No.20

Top view position

Condition As-Received : Used Item

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

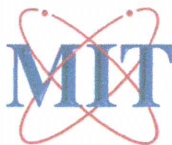
Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202502406-0002 for Digital Thermometer with Probe (Agilent) Module 2 (172) Type K Serial No. US37011 Due 10-Oct-25

- Notes :
1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
 2. 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.
 3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
 4. The uncertainty of measurement is included temperature stability.

End of Certificate



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

214 Bangwaek Rd. Bangpai Bangkac Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 <http://www.mit.in.th>



CALIBRATION CERTIFICATE

Page 1 of 2

Certificate No. : S2025070410-0003

Date Issued : 24-Jul-25

Customer : S.P.S. CONSULTING SERVICE CO., LTD.
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment : Incubator

Manufacturer : BINDER

Model : BD 115

Serial No. : 12-16967

ID No./Tag No. : IN 05/56

Date Received : 22-Jul-25

Date Calibrated : 22-Jul-25

Calibrated by : Auttapol Kunaumpal

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.

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by:

K. Nathang
(Nathapong Krudaum)



Certificate No. : S2025070410-0003

Environment : Ambient Temperature : Start record 25.1 °C, Stop record 25.1 °C
Relative Humidity : Start record 48.9 %RH, Stop record 49.3 %RH

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
35	35.0	35.0	0.13	0.37	0.57
41.5	41.5	41.5	0.10	0.35	0.49

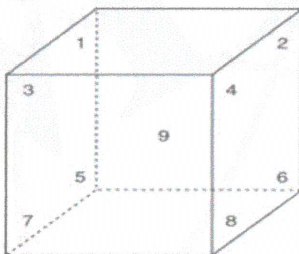
Without adjustment

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)
35	34.97	34.91	34.96	34.82	34.81	34.86	34.83	35.11	34.95	0.23
41.5	41.51	41.37	41.40	41.26	41.27	41.42	41.43	41.53	41.50	0.23

STD = Standard

Note : Probe No. 9 is Reference Probe

Setting Air Fresh No. OFF



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. L202412300-0027 for Temperature Indicator with Sensor Serial No. US37020317, Due 09-Sep-25

Notes : 1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.

2. 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.

3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.

4. The uncertainty of measurement is included temperature stability.

5. 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