

ภาคผนวก 10

เอกสารสอบเทียบเครื่องมือตรวจวัด

เอกสารสอบเทียบเครื่องมือตรวจวัดค่า pH



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 : 22E0980
REFERENCE No : 63904-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : pH METER
MANUFACTURER : DKK-TOA
MODEL : HM-25R
SERIAL No : 760205
ID No : EQL-183
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : PRASERT P.
CALIBRATION DATE : 02-Feb-22

APPROVED BY : 
PONGSAK J.
ISSUED DATE : 02-Feb-22
RECEIVED DATE : 02-Feb-22

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

F-G010 REV 02



QUALITY CALIBRATION CO.,LTD.
235 Petchkasem 63/2 Road, Laksong, Bangkai, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 22E0980

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : pH METER
MANUFACTURER : DKK-TOA
ID No : EQL-183
RECEIVED DATE : 02-Feb-22
AMBIENT TEMPERATURE : 25°C ± 1°C

MODEL : HM-25R
SERIAL NUMBER : 760205
CALIBRATION DATE : 02-Feb-22
RELATIVE HUMIDITY : 57%RH ± 10% RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASUREMENT METHOD BASED ON WI-TQ-062. THE DISPLAY UNIT WAS TESTED BY GENERATING STANDARD VOLTAGE TO THE UNIT AND READ THE VALUE COMPARED WITH CALCULATED VALUE. THE DISPLAY AND ELECTRODE WAS CALIBRATED BY USING STANDARD pH BUFFER SOLUTION.
2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No/ LOT No	CERTIFICATE No	DUE DATE
1) pH STANDARD SOLUTION	00651-06	CC719181	4880-12119147	05-Apr-23
2) pH STANDARD SOLUTION	00651-08	CC718727	4881-12110709	31-Mar-23
3) pH STANDARD SOLUTION	00651-10	CC717045	4882-12065386	17-Mar-23
4) PROCESS CALIBRATOR	744	7514008	21E1392	29-Apr-22
5) BATH	260014	1247 48074	21T9121	10-Sep-22
6) THERMOMETER WITH PROBE	421504	55000379	21T9129	14-Sep-22
7) STANDARD THERMOMETER	2560	A14546	PSL-T0049/64	23-Nov-22

3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO SI UNIT MAINTAINED AT :-
 - NATIONAL INSTITUTE OF STANDARD AND TECHNOLOGY, USA.
 - NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION : WITHOUT ADJUSTMENT

1. DISPLAY UNIT WITH pH ELECTRODE S/N: 002F0035MK

STANDARD pH BUFFER SOLUTION (pH)	UUC READING (pH)	CORRECTION (pH)	ACTUAL READING (mV)	UNCERTAINTY OF MEASUREMENT (± pH)	COVERAGE FACTOR k
4.007	4.01	-0.003	174	0.013	2.0
7.003	7.00	0.003	0.0	0.013	2.0
10.014	10.01	0.004	-172	0.014	2.0

2. DISPLAY UNIT MEASUREMENT TEMPERATURE WITH PROBE

STANDARD READING (°C)	UUC* READING (°C)	IMMERSION DEPTH (mm)	CORRECTION (°C)	UNCERTAINTY OF MEASUREMENT (±°C)
25.003	25.1	80	-0.097	0.21

UUC : UNIT UNDER CALIBRATION

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, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

F-G010 REV 02

เอกสารสอบเทียบเครื่องมือตรวจวัดค่า TKN

Preventive Maintenance

วันที่ 22 เมษายน 2565 (ครั้งที่ 1/1)

บริษัท เทสท์ เทค จำกัด

ชนิดเครื่องมือ : Distillation Unit

รุ่น : VAPODEST 30

หมายเลขเครื่อง : GER003718

ผลิตภัณฑ์ : Gerhardt



บริษัท เอสพีซี อาร์ที จำกัด

ฝ่ายบริการหลังการขาย

โทร 0-2185-4333 ต่อ 3004-3008 Fax 0-2333-1236, 0-2332-9158 E-mail: service.spc@spc-rt.com

ฝ่ายขายและการตลาด

โทร 0-2185-4333 ต่อ 2133-2134 Fax 0-2331-8809, 0-2332-6216 E-mail : marketing.spc@spc-rt.com

Website: www.spc-rt.com

ช่องทางการติดต่อ

บริการหลังการขาย



ทีมงานบริการหลังการขายที่มีความชำนาญ ถูกอ้างอิงมั่นใจได้ในบริการที่มีประสิทธิภาพจากเรา

โทรศัพท์ : 02-185-4333 งานซ่อม เบอร์ต่อ 3004-3008 , งานติดตั้ง เบอร์ต่อ 3002-3003, 3109

โทรสาร : 02-333-1236, 02-332-9158

E-mail : service.spc@spc-rt.com

บริการลูกค้าสัมพันธ์



สอบถามข้อมูลเพิ่มเติมด้านผลิตภัณฑ์ และ บริการ

โทรศัพท์ : 02-185-4333 ต่อ 2133-2134

โทรสาร : 02-2331-8809, 02-332-6216

E-mail: marketing.spc@spc-rt.com

บริการรับเรื่องร้องเรียน (CSI-Center)



ลูกค้าสามารถร้องเรียน แนะนำ ตี-ชม เกี่ยวกับผลิตภัณฑ์ การบริการ หรือเรื่องอื่นใด ของบริษัทฯ

โทรศัพท์ : 02-185-4333 ต่อ 2150, 6001

E-mail: csl.spc@spc-rt.com

สอบเทียบเครื่องมือ



สอบถามข้อมูลเกี่ยวกับบริการสอบเทียบ

โทรศัพท์ : 02-185-4333 ต่อ 3301-3305

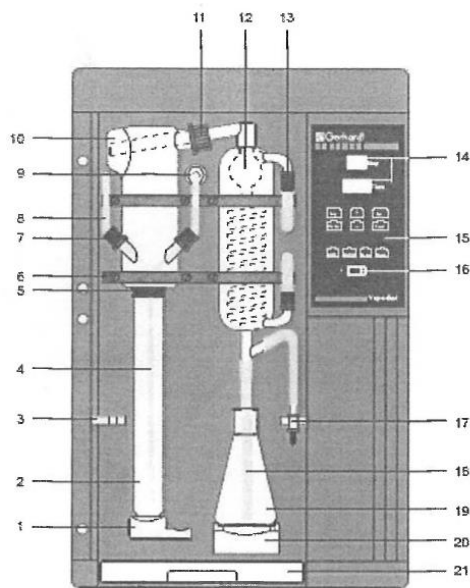
โทรสาร : 02-185 - 4424

E-mail: info.spcc@spc-rt.com

Operational Qualification (OQ)

ตรวจสอบสภาพเครื่อง

FRONT



	PASS	FAIL	N/A	REMARK
1. Quick clamping device with wedge	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Kjeldatherm digestion tube	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3. Holder for steam inlet tubing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4. PTFE-Inlet tubing, steam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5. Viton-cone	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. Clamping for glassware	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7. Screw cap GL18 with silicone seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8. PTFE-Inlet tubing, NaOH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9. PP-Distributor with PP-threaded joint	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10. Distribution head, glass	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11. Screw cap GL32 with silicone seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12. Distillation condenser	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13. Screw cap GL14 with plastic screw connection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14. Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15. Keyboard, chemical-resistant	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16. Main switch, green	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
17. Ventilation valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
18. Distillate outlet tubing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
19. Erlenmeyer flask	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
20. Platform	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
21. Drip tray	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

	PASS	FAIL	N/A	REMARK
22. Tubing reduction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
23. Silicone tubing 6x10 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
24. PP-distributor with PP-thread	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
25. SKT-valve (built in with brass fitting)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
26. Silicone tubing 8x16x80 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
27. Steam generator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
28. PTFE-inlet tubing NaOH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
29. Silicone tubing 8x16 for cooling water inlet	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
30. Silicone tubing 8x16 for cooling water outlet	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
31. Viton-tubing 6x12*50 mm.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
32. Silicone tubing 4x7 mm.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

รายละเอียดการตรวจสอบ

ขั้นตอนการบริการ

ตรวจสอบระบบไฟฟ้า (Electrical Test)

- ☐ ความต้านทานทางไฟฟ้าของเครื่องกับกราวด์
- ☐ กระแสไฟฟ้าที่ใช้งาน

ตรวจสอบสภาพเครื่อง (Optical Test)

- ☐ Main cable
- ☐ Electric wiring
- ☐ Pumps
- ☐ Distribution Head
- ☐ Condensor
- ☐ Steam generator
- ☐ Tubing
- ☐ Viton cone

ตรวจสอบ Function การทำงาน (The Function Test)

- ☐ ระบบสร้างและควบคุมความดันของ Steam
- ☐ ระบบการเติมน้ำเข้า Sample Tube
- ☐ ระบบการเติม Na OH
- ☐ ระบบการ Suction ตั้ง Sample Tube และ Receiver

	PASS	FAIL	N/A	REMARK
5. PUMP				
Pump H ₂ O Steam	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- Non-Return Valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pump H ₂ O Sample	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- Non-Return Valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pump NaOH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- Non-Rutum Valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pump saction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- Non-Rutum Valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6. The Following Program Run :				
Addition H ₂ O 0-99 sec.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Addition NaOH 0-99 sec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Addition H ₃ BO ₃ 0-99 sec.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Reaction Time 0-99 min	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Distillation Time 0-99	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Steam Capacity 30%-100%	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Suction Time 0-99 sec.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The Instrument is in perfect technical shape	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Remark : _____

Engineer : นายณพต สุวานิตย์

Other error messages

Error message	Measures
Wait for steam	Message disappears as soon as stand-by is reached
Add sol. > 1min Continue=Enter	Check programming Enter=continue of interrupted program Reset=Standby-mode
Program undefined	Check programming → Reset
Excess steam pressure	Switch the system off and call service
Sensor error	Switch the system off and call service

เอกสารสอบเทียบเครื่องมือตรวจวัดค่า BOD



QUALITY CALIBRATION CO.,LTD.
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www.qcalibration.com




CERTIFICATE No : 21T8205
REFERENCE No : 62206-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : INCUBATOR
MANUFACTURER : ---
MODEL : ---
SERIAL No : ---
ID No : EQL-166
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : TETNITHI W.
CALIBRATION DATE : 24-Aug-21

APPROVED BY : 
PONGSAK J.
ISSUED DATE : 24-Aug-21
RECEIVED DATE : 24-Aug-21

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

F-G010 REV : 02



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CERTIFICATE No : 21T8205

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : INCUBATOR
MANUFACTURER : ---
ID No : EQL-166
RECEIVED DATE : 24-Aug-21
AMBIENT TEMPERATURE : 24 °C ± 1 °C
MODEL : ---
SERIAL NUMBER : ---
CALIBRATION DATE : 24-Aug-21
RELATIVE HUMIDITY : 53 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED THERMOCOUPLE TYPE K UNDER NO LOAD CONDITION. THE THERMOCOUPLES WERE PLACED ON 13 POINTS AND LOCATED AS THE PICTURE BELOW AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND PLACED THE SEVENTH THERMOCOUPLE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE CHAMBER. THE UNIFORMITY WAS MEASURED BETWEEN REFERENCE PROBE AND OTHER PROBES AT THE SAME TIME.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH TC TYPE K	HYDRA 2635A	7903007	21T6763	05-Jul-22

3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON 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

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 0

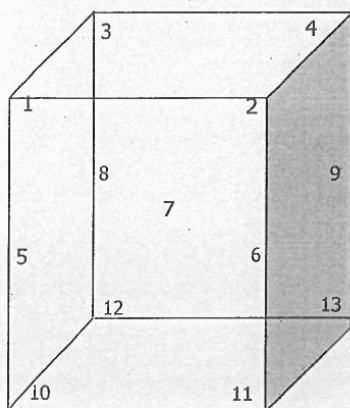
Overall Line Voltage (V) variation : 3

Instrument Condition : Normal

Chamber Size (W*L*H): 190*70*170 cm

CHAMBER PERFORMANCE

Calibration Point (°C)	Controller Temperature (°C)	Indicating Temperature (°C)	Average All Locations (°C)	Temperature Stability (± °C)	Temperature Uniformity (°C)	Overall Variation (°C)
20.0	20.0	20.0	19.8	0.0	0.4	0.5



FRONT

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller temperature (°C)		20.0
Indicating Temperature		20.0
Measured Temperature (°C) at Spread Locations	1	19.7
	2	20.0
	3	19.8
	4	19.9
	5	19.6
	6	19.6
	7 Ref.	19.6
	8	19.6
	9	19.6
	10	19.6
	11	19.9
	12	19.9
	13	19.9
Uncertainty of Measurement(± °C)		0.48

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

NOTE 2 : LOCATION 7 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

F-G010 REV 1.02

เอกสารสอบเทียบเครื่องมือตรวจวัดค่า TTS, TDS



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CERTIFICATE No : 21T8205
REFERENCE No : 62206-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : INCUBATOR
MANUFACTURER : ---
MODEL : ---
SERIAL No : ---
ID No : EQL-166
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SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : TETNITHI W.
CALIBRATION DATE : 24-Aug-21

APPROVED BY : 
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ISSUED DATE : 24-Aug-21
RECEIVED DATE : 24-Aug-21

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F-G010 REV : 02



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CERTIFICATE No : 21T8205

PAGE : 2 OF 2

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ID No : EQL-166
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MODEL : ---
SERIAL NUMBER : ---
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INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
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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

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 0

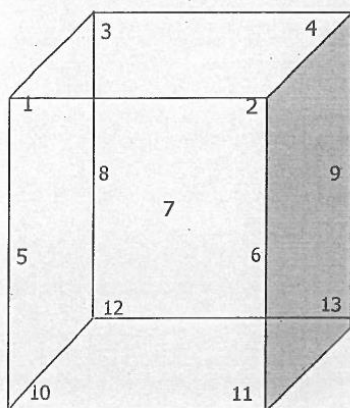
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CHAMBER PERFORMANCE

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FRONT

TEMPERATURE MEASUREMENT ACCURACY TEST

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Indicating Temperature		20.0
Measured Temperature (°C) at Spread Locations	1	19.7
	2	20.0
	3	19.8
	4	19.9
	5	19.6
	6	19.6
	7 Ref.	19.6
	8	19.6
	9	19.6
	10	19.6
	11	19.9
	12	19.9
	13	19.9
Uncertainty of Measurement(± °C)		0.48

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

NOTE 2 : LOCATION 7 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

F-G010 REV 1.02

เอกสารสอบเทียบเครื่องมือตรวจวัดค่า Digital Balance, Water Bath(OIL)



QUALITY CALIBRATION CO.,LTD.
235 Petchkasem 63/2 Road, Laksong, Bangkhae, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584
www.qcalibration.com



CERTIFICATE No : 21M7078
REFERENCE No : 61873-6

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : SARTORIUS
MODEL : QUINTIX 224-1S
SERIAL No : 29302452
ID No : EQL-164
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD.,
SAMAEDAM, BANGKHUNTHIAN, BANGKOK
10150

CALIBRATED BY : PRASERT D.

CALIBRATION DATE : 20-Jul-21

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 21-Jul-21

RECEIVED DATE : 20-Jul-21

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

F-G010 REV 02



Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : QUINTIX 224-1S
MANUFACTURER : SARTORIUS S/N : 29302452
ID No : EQL-164 RECEIVED DATE : 20-Jul-21
AIR PRESSURE : 1010mbar \pm 1mbar CALIBRATION DATE : 20-Jul-21
AMBIENT TEMPERATURE : 27° C \pm 1° C RELATIVE HUMIDITY : 51 %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 ADJUSTED USING WEIGHT OF QUALITY CALIBRATION TO ADJUST. 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	C02210415	09-Feb-23
2) STANDARD WEIGHT	E2	15843	C02210419	10-Feb-23
3) STANDARD WEIGHT	E2	QK-I-349	M2103235S	26-Mar-23

3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON 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 CENTRAL BUREAU OF WEIGHTS&MEASURES

RESULT OF CALIBRATION :- ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

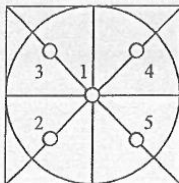
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0.000045 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.0	0.0000	0.0000	0.000075
0.1	0.1000	0.0000	0.000075
0.2	0.2000	0.0000	0.000076
0.5	0.5000	0.0000	0.000076
1.0	1.0000	0.0000	0.000077
5.0	5.0000	0.0000	0.000079
10.0	10.0000	0.0000	0.000082
20.0	20.0000	0.0000	0.000086
40.0	40.0001	-0.0001	0.00012
60.0	60.0001	-0.0001	0.00015
80.0	80.0001	-0.0001	0.00019
100.0	100.0001	-0.0001	0.00019
120.0	120.0001	-0.0001	0.00022
140.0	140.0000	0.0000	0.00025
160.0	160.0002	-0.0002	0.00027
180.0	180.0002	-0.0002	0.00030
200.0	199.9999	0.0001	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	100.0000
2	100.0000
3	100.0001
4	99.9999
5	100.0000
OFF-CENTER LOADING	0.0001

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

F-G010 REV 02



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www.qcalibration.com



CERTIFICATE No : 21T9570
REFERENCE No : 62576-2

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : WATER BATH

MANUFACTURER : ---

MODEL : SUP IV

SERIAL No : ---


ID No : EQL-056

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHAICHARN CH.

CALIBRATION DATE : 23-Sep-21

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 27-Sep-21

RECEIVED DATE : 23-Sep-21

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

F-G010 REV : 02



CERTIFICATE No : 21T9570

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : WATER BATH
MANUFACTURER : ---
ID NUMBER : EQL-056
RECEIVED DATE : 23-Sep-21
AMBIENT TEMPERATURE : 25 °C ± 1 °C
MODEL : SUP IV
SERIAL NUMBER : ---
CALIBRATION DATE : 23-Sep-21
RELATIVE HUMIDITY : 50 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

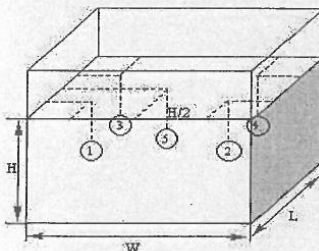
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO ASTM E715-80 (REAPPROVED 2001) BY COMPARISON WITH CALIBRATED RTD. THE PROBES WERE PLACED ON FIVE POINTS AND LOCATED ONE PROBE IN EACH OF THE FOUR CORNERS OF THE BATH AND PLACED THE FIFTH RTD WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE WATER VOLUME (REFERENCE LOCATION) UNDER NO LOAD CONDITION.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	2625A	6603614	21T6761	05-Jul-22

3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON 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



PROBE INSTALLATION
POSITION IN THE BATH

GENERAL INFORMATION

Overall Variation of Ambient Temperature around the Bath (°C) : 2.2
Overall Variation of Line Voltage (V) : 1
Instrument Condition : Normal
Bath Inner Size (W*L*H) : 59*35*20 cm

BATH PERFORMANCE

Calibration Point (°C)	Controller Temperature (°C)	Indicating Temperature (°C)	Average All Locations (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
83.0	83.0	83.0	83.05	0.02	0.05	0.07

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	
83.0	83.0	83.03	83.06	83.07	83.03	83.08	0.14

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





NOTE 2 : 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

F-G010 REV : 02

เอกสารสอบเทียบเครื่องมือตรวจวัดค่า Incubator, Water Bath(เชื้อ)

		QUALITY CALIBRATION CO.,LTD. 235 Petchkasem 63/2 Road, Laksong, Bangkoe, Bangkok 10160 Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584 www.qcalibration.com		
CERTIFICATE No : 22T1726 REFERENCE No : 64109-2		PAGE : 1 OF 2		
Certificate of Calibration				
EQUIPMENT	:	INCUBATOR		
MANUFACTURER	:	MEMMERT		
MODEL	:	IF 160		
SERIAL No	:	D518.0082		
ID No	:	EQL-205		
CONDITION AS RECEIVED	:	USED ITEM		
SUBMITTED BY	:	TEST TECH CO., LTD. 30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM, BANGKHUNTHIAN, BANGKOK 10150		
CALIBRATED BY	:	CHAICHARN CH.		
CALIBRATION DATE	:	21-Feb-22		
APPROVED BY	:	PONGSAK J.		
ISSUED DATE	:	22-Feb-22		
RECEIVED DATE	:	21-Feb-22		
THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF QUALITY CALIBRATION CO., LTD.				

F-G010 REV : 02



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CERTIFICATE No : 22T1726

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF 160
ID No : EQL-205
RECEIVED DATE : 21-Feb-22
AMBIENT TEMPERATURE : 24 °C ± 1 °C
S/N : D518.0082
CALIBRATION DATE : 21-Feb-22
RELATIVE HUMIDITY : 50 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

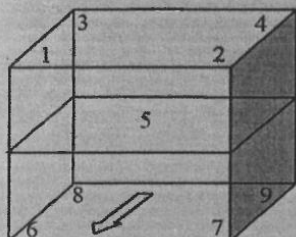
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD Pt100 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND PLACED THE NINTH THERMOMETER PROBE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE CHAMBER. THE UNIFORMITY WAS MEASURED BETWEEN REFERENCE PROBE AND OTHER PROBES AT THE SAME TIME.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	HYDRA 2635A	6635300	21T6765	10-Jul-22

3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON 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



FRONT

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 2
Overall Line Voltage (V) variation : 9
Instrument Condition : Normal
Chamber Size (W*L*H): 56*40*72 cm

CHAMBER PERFORMANCE

Calibration Point (°C)	Controller Temperature (°C)	Indicating Temperature (°C)	Average All Locations (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	35.0	35.0	34.99	0.02	0.14	0.20
36.0	36.0	36.0	36.00	0.03	0.14	0.22
41.5	41.5	41.5	41.46	0.05	0.10	0.19

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	#6	#7	#8	#9	
35.0	35.0	34.91	34.94	34.93	34.93	34.98	35.03	35.08	35.01	35.08	0.25
36.0	36.0	35.93	35.95	35.95	35.94	36.00	36.05	36.10	36.01	36.10	0.25
41.5	41.5	41.46	41.47	41.41	41.47	41.50	41.47	41.45	41.43	41.49	0.36

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

NOTE 2 : LOCATION 5 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

F-G010 REV : 02

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CERTIFICATE No : 21T7073

REFERENCE No : 61873-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
MODEL : WPE 45
SERIAL No : L711.0024
ID No : EQL-147
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHAICHARN CH.

CALIBRATION DATE : 20-Jul-21

APPROVED BY : PONGSAK J.

ISSUED DATE : 21-Jul-21

RECEIVED DATE : 20-Jul-21

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

F-G010 REV : 02



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CERTIFICATE No : 21T7073

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
ID NUMBER : EQL-147
RECEIVED DATE : 20-Jul-21
AMBIENT TEMPERATURE : 24 °C ± 1 °C
MODEL : WPE 45
SERIAL NUMBER : L711.0024
CALIBRATION DATE : 20-Jul-21
RELATIVE HUMIDITY : 50 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO ASTM E715-80 (REAPPROVED 2001) BY COMPARISON WITH CALIBRATED RTD. THE PROBES WERE PLACED ON FIVE POINTS AND LOCATED ONE PROBE IN EACH OF THE FOUR CORNERS OF THE BATH AND PLACED THE FIFTH RTD WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE WATER VOLUME (REFERENCE LOCATION) UNDER NO LOAD CONDITION.

2. REFERENCE STANDARD INSTRUMENTS :-

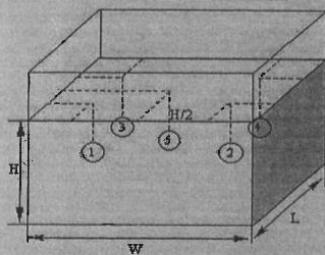
INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	2625A	6603614	21T6761	05-Jul-22

3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON 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



PROBE INSTALLATION
POSITION IN THE BATH

GENERAL INFORMATION

Overall Variation of Ambient Temperature around the Bath (°C) : 1.8
Overall Variation of Line Voltage (V) : 2
Instrument Condition : Normal
Bath Inner Size (W*L*H) : 60*42*24 cm

BATH PERFORMANCE

Calibration Point (°C)	Controller Temperature (°C)	Indicating Temperature (°C)	Average All Locations (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
41.5	41.5	41.5	41.52	0.05	0.03	0.12
44.5	44.5	44.5	44.51	0.05	0.03	0.13

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	
41.5	41.5	41.53	41.52	41.51	41.52	41.54	0.14
44.5	44.5	44.51	44.50	44.50	44.51	44.53	0.14

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

NOTE 2 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT QC 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

F-G010 REV : 02

ภาคผนวก 11

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การฝึกซ้อมอพยพหนีไฟ ประจำปี

