

ภาคผนวกที่ 4

สรุปเอกสารสอบเทียบอุปกรณ์เครื่องมือ

เอกสารการสอบเทียบเครื่องมือตรวจวัดคุณภาพน้ำ



Certificate of Calibration

Certificate No. : 68-430004-1 Page : 1 of 2

Submitted by :

C.E.M Technology (Thailand) Co.,Ltd.

219/43 Moo.12 Petchkasem Rd. Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

Equipment :

Digital Conductivity meter (Pocket)

Manufacturer : XS Instruments Model : PC 5

Serial No. : GB 0706/024 ID No. : WW-23-001

Environment :

On site calibration was carried out at the Laboratory.

C.E.M Technology (Thailand) Co., Ltd.

Ambient Temperature (26.0 to 27.0)° C

Relative Humidity (45 to 50) %

Date of Received :

11 February 2025

Date of Calibration :

11 February 2025

Date of Issue :

17 February 2025

Calibrated by :

Pernpon Changu

Calibration Method : In-house method CAL-M4301 direct measurement by conductivity buffer solution

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

Standard Buffer Solution

Material	Lot No.	Exp.Date	Traceability
84 µS/cm	0300	01 June 2027	National Institute of Standards and Technology (NIST), U.S.A., S.R.M.
1413 µS/cm	970986	25 April 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
12.88 mS/cm	970987	25 April 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

(Pernpon Changu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-430004-1 Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Conductivity measurement

Before Adjustment

Standard Conductivity Solution	UUC Reading	Correction	Uncertainty (±)	Unit
84*	79.7	4.3	1.1	µS/cm
1413	1602	-189	9.0	µS/cm
12.88	12.81	0.07	0.082	mS/cm

After Adjustment : at 84, 1413 µS/cm 12.880 mS/cm

Standard Conductivity Solution	UUC Reading	Correction	Uncertainty (±)	Unit
84*	84.0	0.0	1.1	µS/cm
1413	1413	0	9.0	µS/cm
12.88	12.88	0.00	0.082	mS/cm

Remark

UUC : Unit Under Calibration

* This parameter are out of accreditation's scope.

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

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





Certificate of Calibration

Page : 1 of 2

Certificate No. : 68-400172-1

Submitted by : C.E.M Technology (Thailand) Co., Ltd.

219/43 Moo.12 Petchkasem Rd. Omnoi, Krathumbam, Samutsakorn 74130 (Head Office)

Equipment : Temperature controlled enclosure (Refrigerator)

Manufacturer : Samchai

Range : N/A °C

Serial No. : 85545

Model : LD2 DC 70

Resolution : 1 °C

ID No. : N/A

Environment : On site calibration was carried out at the Laboratory.

C.E.M Technology (Thailand) Co., Ltd.

Ambient Temperature : (27.0 to 28.0) °C

Relative Humidity : (50 to 55) %

Line Voltage : (223.0 to 225.0) V

Date of Received : 21 March 2025

Date of Calibration : 21 March 2025

Date of Issue : 22 March 2025

Calibrated by : Permpoon Champu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

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

Standard Digital Thermometer with RTD Probe

ID No. Cert. No. Due Date Traceability

400046 & 400047 68-400007-2 29 Jul 2025 National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpoon Champu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Page : 2 of 2

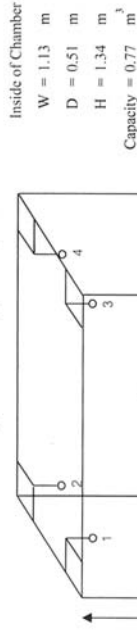
Certificate No. : 68-400172-1

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
4	4	4	5.13	4.85	3.25	3.11	4.43	4.77	2.75	2.77	4.01	0.73

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
4	4	4	1.29	0.08	2.55

Remark: The uncertainty is not combine uniformity of the air chamber

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

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

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Certificate of Calibration

Certificate No. : 68-400089-2

Page : 1 of 2

Submitted by :

C.E.M Technology (Thailand) Co., Ltd.

219/43 Moo.12 Petchkasem Rd. Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

Equipment :

Temperature Indicator with Thermistor Probe

Temperature Indicator

Manufacturer : XS Instruments Model : PC 5

Range : N/A °C Resolution : 0.1 °C

Serial No. : GB 0706/024 ID No. : WW-23-001

Thermistor probe

Model : N/A

Diameter : 10 mm.

Sheath Material : Plastic

Length : 65 mm.

ID No. : WW-23-001

Environment :

On site calibration was carried out at the Laboratory,

C.E.M Technology (Thailand) Co., Ltd.

Ambient Temperature : (26.0 to 27.0) °C

Relative Humidity : (45 to 50) %

Line Voltage : (224.5 to 226.0) VAC

Date of Received :

11 February 2025

Date of Calibration :

11 February 2025

Date of Issue :

17 February 2025

Calibrated by :

Permpoon Chanpu

Calibration Method :

This instrument was calibrated by In-house method comparison technique CAL-M4003

by compared with PRT in the liquid bath at the constant controlled temperature.

The temperature scale used was based on ITS-90

This certification is traceable to the International System of Units

Reference Standard Instruments :

1. Platinum Resistance Thermometer (PRT)

ID No. Cert. No. Due Date Traceability

400002 TT-0095-24 01 Jul 2026 National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No. Cert. No. Due Date Traceability

400033 24E633 21 Feb 2026 National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpoon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400089-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
65	15.002	15.1	-0.1	0.19
65	30.005	30.0	0.0	0.19
65	45.004	44.9	0.1	0.19

Remark

UUC : Unit Under Calibration

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

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

-0.03-



การดูแลบำรุงรักษาเชิงป้องกัน Preventive Maintenance



บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด

ฝ่ายบริการหลังการขาย

โทร 0 2 639 7000 E-mail: service.tec.th@dksh.com

ฝ่ายขายและการตลาด

โทร 0 2 639 7000 E-Mail : marketing.tec.th@dksh.com

Website : www.dksh.co.th/technology/scientific-thailand

เงื่อนไขการให้บริการ Preventive Maintenance

บริษัทฯ จะส่งวิศวกรผู้ชำนาญ เพื่อให้บริการตรวจซ่อมบำรุงของอุปกรณ์บริการ เฉพาะ ในวันและเวลา ราชการ หากมีความประสงค์ที่จะรับบริการนอกเหนือจากวัน เวลา ราชการ (วันหยุดเสาร์ – อาทิตย์ หรือวันหยุด นักชดถุณ) บริษัทฯ จะคิดค่าบริการเพิ่มเติมตามอัตราที่กฎหมายแรงงานกำหนดไว้

ขอบข่ายบริการ

- ตรวจสภาพการทำงานต่าง ๆ ของเครื่องมือ
- ทดสอบประสิทธิภาพการทำงานของเครื่องมือ
- รายการผลการตรวจสอบเครื่องมือ

หมายเหตุ

- ราคาไม่รวมถึงค่าบริการซ่อมหรือ เปลี่ยนอะไหล่ที่ชำรุดเสียหาย หรือหมดสภาพการใช้งาน
- ในกรณีที่ผู้รับบริการอยู่นอกเขตที่ให้บริการ บริษัทฯ จำเป็นต้องคิดค่าใช้จ่ายเพิ่มเติม ได้แก่ ค่าเดินทาง เป็นต้น
- บริษัทฯ ขอสงวนสิทธิ์ในการเปลี่ยนแปลงราคา โดยไม่แจ้งให้ทราบล่วงหน้า



ช่องทางการติดต่อ

DKSH Technology Limited (บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด)
เลขที่ 2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพฯ 10260
เลขประจำตัวผู้เสียภาษี 010-555-001-4547 (สำนักงานใหญ่)



Call center 0 2 639 7000



DKSH Scientific



www.dksh.com/scientific-thailand



marketing.tec.th@dksh.com



@dkshscientific

Preventive Maintenance Contract

จำนวนในการทำสัญญาบริการครั้งต่อปี
ครั้งที่ 1. วันที่ 14/05/2025.....

รายละเอียดผู้รับบริการ

หน่วยงาน	บริษัท จี.อี.เอ็ม เทคโนโลยี (ไทยแลนด์) จำกัด		
ที่อยู่	219/43 หมู่12 ถนนพหลโยธิน ตำบลอ้อมน้อย อำเภอกระทุ่มแบน จังหวัดสมุทรสาคร 74130		
โทรศัพท์	0869054664	แฟกซ์	-

ผู้ติดต่อ

ชื่อ - นามสกุล	คุณศิริพร พินพา		
ตำแหน่ง	เจ้าหน้าที่ห้องปฏิบัติการ		
โทรศัพท์	0869054664	เบอร์โทร	- แฟกซ์ -
E-mail	lab.cemtech1@gmail.com		

รายละเอียดผู้ให้บริการ

บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด (ฝ่ายบริการหลังการขาย) (สำนักงานใหญ่) เลขที่ 2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพฯ 10260 โทรศัพท์ 0 2 693 7000 Email: Jirayut.js@dksh.com เจ้าหน้าที่ประสานงาน : คุณจิรายุช สดอาด			
เจ้าหน้าที่ผู้ให้บริการ	นายจิรายุช สดอาด		
ตำแหน่ง	Specialist, Technical Service.		
โทรศัพท์	0938138736	แฟกซ์	-
E-mail	Jirayut.js@dksh.com		

ลงนามผู้รับบริการ	ลงนามผู้ให้บริการ
ตัวจริง (.....)	ตัวจริง
ตำแหน่ง	ตำแหน่ง
วันที่ / ประทับตราบริษัท	วันที่ / ประทับตราบริษัท

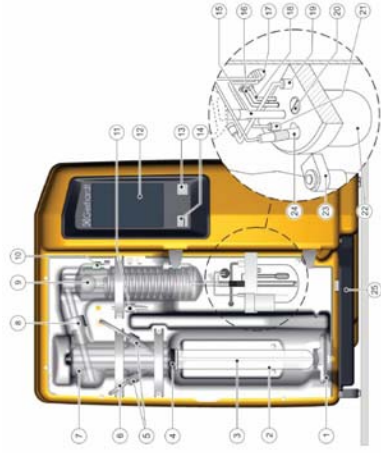
<i>Jirayut Saky-Aud</i> (นาย.จิรายุช.สดอาด)
Specialist, Technical Service.
14/05/2025

JOB:WQ-00070598.....MODEL:VAP.200.....S/N: CER5200180181

Operational Qualification (OQ)

๑๕๖๐๘๐๒๑๗๑๓๖๓๑๔

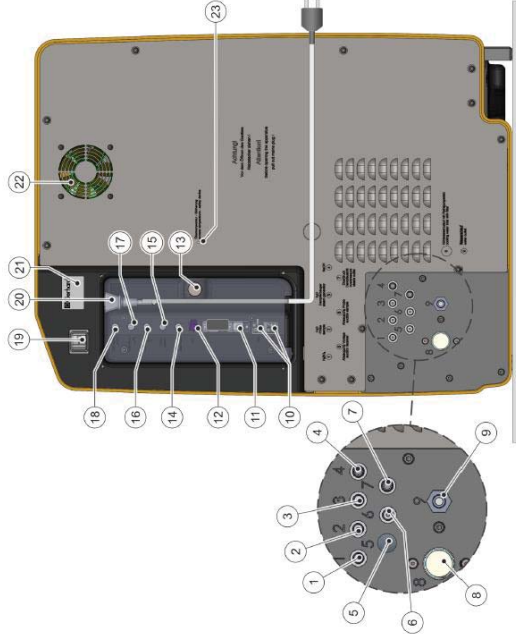
FRONT



No		PASS	FAIL	N/A
1	Quick clamping device with clamping block	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Digestion tube 250/300 ml	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	PTFE steam inlet tubing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Connection stopper , Viton	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Screw cap GL18	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	PTFE-inlet tubing NaOH	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Distribution head made of glass	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Screw cap GL32	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Distillation condenser made of glass	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Screw cap GL14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Ventilation valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Control panel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Operating Button	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	USB interface (with protective cap)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Silicone tubing 8/10 for distillate discharge **	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
16	Verprene tubing 4/8 , receiver suction **	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
17	Cable duct for electrode cable + titration tube**	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
18	Silicone tubing 4/7 , boric acid inlet**	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
19	Sensor for level monitoring including connector**	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
20	Agitator motor with propeller**	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
21	Titration acid inlet tube **	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
22	Receiver glass**	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
23	Holder for pH electrode , removable**	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
24	pH electrode (combined electrode)**	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
25	Drip tray PP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

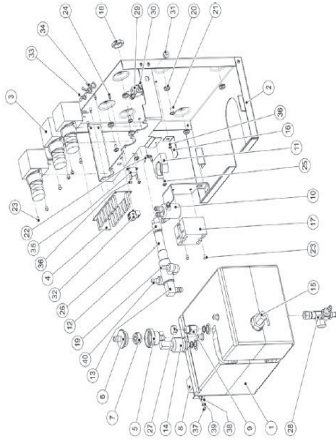
** only VAP 450

REAR



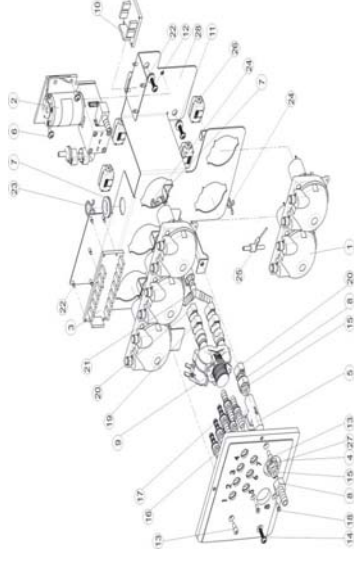
No		PASS	FAIL	N/A
1	Tube connection for sample H3BO3 supply	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Tube connection for sample H2O supply	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Tube connection for steam generator H2O supply	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Tube connection for NaOH supply	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Tube connection for receiver glass extraction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Tube connection for sample waste extraction	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Tube connection , overpressure steam outlet	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Connection for cooling water supply (with cleaning sieve)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Tube connection for cooling water outlet	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	4 X USB Interface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	1 X RS-232 Interface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	LAN Interface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Screw cap for Perspex cover	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Connection socket for sample waste tank level monitoring	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
15	Connection (not used)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Connection socket for H2O tank level monitoring	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Connection socket for H3BO3 tank level monitoring	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Connection socket for NaOH tank level monitoring	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Overcurrent circuit breaker	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Apparatus socket (mains cable connection)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Rating plate with serial number	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Exhaust air fan	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Excess temperature switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Inside Steam generator



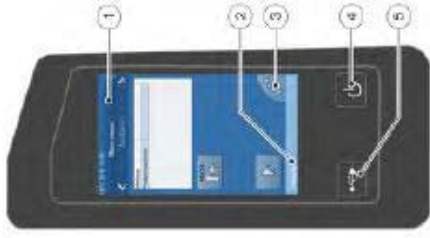
No		PASS	FAIL	N/A
1	Steam generator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Steam generator traverse	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Pinch valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Circuit board distributor	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Valve tubing connection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Housing safety valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Safety valve SKT	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Excess temperature protection , steam generator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Safety valve G 1/8 0,5 bar	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Ventilation glass pinch valve VAPODEST	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Hose clamp for ventilation clamp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Distributor PP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Angle connection PP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Pressure transmitter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Level switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Fixing bracket steam generator	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Relay HT+	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	VA Hexagon nut 1/2"	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Angle connection 1/8"	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Bushing nipple 6-10-14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	VA Lens head screw M5 X 10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Grounding connection , 2-pole	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	VA Lens head screw M4 X 6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Spacer bolt 5 mm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	VA Lens head screw M4 X 10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Tubing connection	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	Hose clamp 14.5 mm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	Module ball valve with nozzles	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	Cross manifold with spout	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30	Seal copper G 1/8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31	Locking screw 1/8"	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32	Pin strip	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33	Bundle clamp 12 H 4500	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34	Bundle clamp 12 H 4502	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35	Temperature switch 80°C	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36	VA Lens head screw M3 X 6	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37	VA Hexagon nut M4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38	Lins head screw M4 X 8	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39	VA Spring washer	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40	Angle connection , reduced , 1/8" PP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Module Pump holder VAP200 - 450 V3



No		PASS	FAIL	N/A
1	Peristaltic pump	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Diaphragm pump NaOH, with non-return valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Circuit board	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Tubing connection module	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Flow controller	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Lens head screw M5 x 10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Bushing nozzle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Screw in socket	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Magnetic valve 2/2 way	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Circuit board distributor	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Bushing nozzle	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Screw 5 x 25	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Cylinder screw	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Screw 5 x 20	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Seal EPDM 15 x 4	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Tubing connection piece 51x10x6,5	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Tubing connection piece 51x10x10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Screw M4x10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Clamp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Clamp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Y-tube connector	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Spacer bolt 5 mm	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Bundle clamp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Bundle clamp	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Retrofit earthing pumpv	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Snap ferrite	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	Nut G 3/8"	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	Pump holder plate	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Control panel



No		PASS	FAIL
1	Title bar	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Status bar	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Navigation button	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	Smart switch with multiple functions	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5	USB interface	<input checked="" type="checkbox"/>	<input 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
- ระบบการเติมน้ำเข้าสู่ Sample Tube
- ระบบการเติม Na OH
- ระบบการเติม H3BO3

ข้อมูลสนับสนุนด้านเทคนิค (General Technical Support)

การบำรุงรักษาทั่วไป (Basic maintenance)

Cleaning program

Glass parts and tubes must be cleaned daily before starting analysis in order to prevent clogging by crystallising chemicals.

The following settings are recommended for this:

parameters	Value
H ₂ O addition	150 ml
NaOH addition	0 ml
Distillation time	7 min
Steam power	100 %
Reaction time	0 s
Suction sample	30 s

→ Insert a digestion tube (without sample) and start the program.
→ All liquid carrying parts are cleaned. In the case of strong soiling, approx. 10 ml of sulphuric acid can also be added to the digestion tube.

General error message

Fault description	Cause	Remedy
Flowing water pressure lower than 1 bar	Cooling water pressure lower than 1 bar	Open water tap. Check water pressure. Check coolant tube. Program continues automatically once error has been fixed.
'Sample tube missing'	Sample tube missing	Insert sample tube. Continue program or restart.
'Reaction room protective door open'	Protection door not closed	Close protection door. Program continues automatically once error has been fixed.
'Reagent storage/ waste'	One or more storage tanks are empty The sample waste tank is full.	Fill storage tank. Check correct sealing of the universal sensors. The running program can be continued after rectification of the error. Empty sample waste tank. Check correct sealing of the universal sensors. The running program can be continued after rectification of the error.

Analytical errors

Fault description	Cause	Remedy
Analyte results too high	The chemicals used are contaminated with nitrogen compounds.	Detailed checking of the chemicals. Determination of a blank value. Replace the chemicals if necessary.
	Valent reaction in the digestion tube: sodium hydroxide drops get into the receiver.	Increase of the water addition amount.
	Glass bridges of the condenser is broken or worn out, sodium hydroxide drops get into the receiver.	Replacement of the glass condenser.
	Glass cleaning agents in the digestion tube.	Clean digestion tube in advance with distilled water.
	Entrainment of ammonia from the previous sample.	Increase distillation time. Check whether sample was previously sufficiently alkalinised.
	Incomplete distillation; distillation time too short.	No quantitative explosion of the ammonia content. The distillation amount should be 100 ml.
Analyte result too low or no result	Ammonia escapes at leaking places.	Solled or defective Viton plugs; clean or replace. Check seals (O.L. screw connections) on the condenser and receiver. Check valve at the condenser is gummed up; clean or replace. Digestion tube is damaged at the neck; replace.
	Adding amount of the sodium hydroxide too little; no ammonia development.	Distribution head glass leaks; replace. Check the constant flow rate of the NaOH pump (see technical data).
	Too low boric acid amount in the receiver; escaping ammonia is not completely bonded.	Increase of the boric acid amount.
	Tube not completely immersed in the acid receiver.	Increase of the acid amount.
	Formation of stable ammonia compounds with sodium hydroxide destroyed with sodium hydroxide.	This problem only occurs with catalysts containing phosphorus. The distillation destroys these compounds.

การดูแลบำรุงรักษาเชิงป้องกัน Preventive Maintenance



บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด

ฝ่ายบริการหลังการขาย

โทร 0 2 639 7000 E-mail: service.tcc.th@dksh.com

ฝ่ายขายและการตลาด

โทร 0 2 639 7000 E-Mail : marketing.tcc.th@dksh.com

Website : www.dksh.co.th/technology/scientific-thailand

เงื่อนไขการให้บริการ Preventive Maintenance

บริษัทฯ จะส่งวิศวกรผู้ชำนาญ เพื่อให้บริการตามขอบข่ายของบริการ เฉพาะ ในวันและเวลา ราชการ หากมีความประสงค์ที่จะรับบริการนอกเหนือจากรัน เวลา ราชการ (วันหยุดเสาร์ – อาทิตย์ หรือวันหยุด นักศึกษา) บริษัทฯ จะคิดค่าบริการเพิ่มเติมตามอัตราที่กฎหมายแรงงานกำหนดไว้

ขอบข่ายการบริการ

- ตรวจสอบสภาพการทำงานต่าง ๆ ของเครื่องมือ
- ทดสอบประสิทธิภาพการทำงานของเครื่องมือ
- รายการผลการตรวจสอบเครื่องมือ

หมายเหตุ

- ราคานี้ ไม่รวมถึงค่าบริการซ่อม หรือ เปลี่ยนอะไหล่ที่ชำรุดเสียหาย หรือหมดสภาพการใช้งาน
- ในกรณีที่ผู้รับบริการอยู่นอกเขตพื้นที่ให้บริการ บริษัทฯ จำเป็นต้องคิดค่าใช้จ่ายเพิ่มเติม ได้แก่ ค่าเดินทาง เป็นต้น
- บริษัทฯ ขอสงวนสิทธิ์ในการเปลี่ยนแปลงราคา โดยไม่แจ้งให้ทราบล่วงหน้า

ช่องทางการติดต่อ



DKSH Technology Limited (บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด)
เลขที่ 2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพฯ 10260
เลขประจำตัวผู้เสียภาษี 010-555-001-4547 (สำนักงานใหญ่)



Call center 0 2 639 7000



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Preventive Maintenance Contract

จำนวนใบการทำสัญญาบริการ ...ใบ... ครั้งต่อปี
ครั้งที่ 1...ใบที่ 14/05/2025.....

รายละเอียดผู้รับบริการ

หน่วยงาน	บริษัท ซี.อี.เอ็ม เทคโนโลยี (ไทยแลนด์) จำกัด		
ที่อยู่	219/43 หมู่ 12 ถนนเพชรเกษม ตำบลอ้อมน้อย อำเภอกอทุ่มแบน จังหวัดสมุทรสาคร 74130		
โทรศัพท์	0869054664	แฟกซ์	-

ผู้ติดต่อ

ชื่อ - นามสกุล	คุณศิริพร พิมพ์				
ตำแหน่ง	เจ้าหน้าที่ห้องปฏิบัติการ				
โทรศัพท์	0869054664	เบอร์มือถือ	-	แฟกซ์	
E-mail	lab.cemtech1@gmail.com				

รายละเอียดผู้ให้บริการ

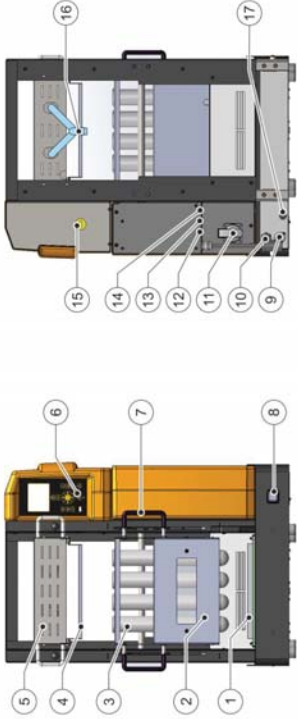
บริษัท ดีเคเอสเอช เทคโนโลยี จำกัด (ฝ่ายบริการหลังการขาย) (สำนักงานใหญ่)			
เลขที่ 2533 ถนนสุขุมวิท แขวงบางจาก เขตพระโขนง กรุงเทพฯ 10260			
โทรศัพท์ 0 2 693 7000 Email: jirayut.js@dksh.com			
เจ้าหน้าที่ประสานงาน : คุณจิรายุ สดอด			
เจ้าหน้าที่ผู้ให้บริการ	นายจิรายุ สดอด		
ตำแหน่ง	Specialist/Technical Service.		
โทรศัพท์	0938138736		แฟกซ์
E-mail	Jirayut.js@dksh.com		

ลงนามผู้รับบริการ		ลงนามผู้ให้บริการ	
ตัวจริง	(.....)	ตัวจริง	(นาย จิรายุ สดอด)
ตำแหน่ง		ตำแหน่ง	Specialist, Technical Service.
วันที่ / ประทับตราบริษัท		วันที่ / ประทับตราบริษัท	14/05/2025

JOB No: WQ-00070598.....MODEL: KT.20s..... S/N: GER5720180118

Part 3: ตรวจสอบสภาพเครื่อง

Front and rear view of KT-L version



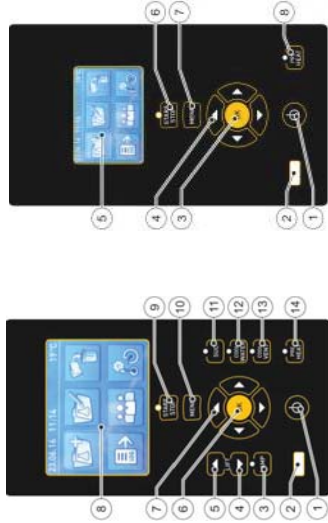
No.		PASS	Fail	N/A	Remark
1	KJELDATHERM digestion block	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	เสื่อมสภาพ
2	Insert rack	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3	Digestion tube	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Stainless steel drip tray	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5	Exhaust manifold	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6	Controls module, removable	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7	Handle for insert rack	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8	Mains switch with overcurrent protection function	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9	Connection for lift unit	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10	Mains cable with plug	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11	Power supply for TURBOSOG	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12	Connects controller module to block	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13	Connection for fan for cooling samples (optional)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
14	Connection for external cooling water valve (optional)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
15	Connects controller module to block	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16	Connection for Iso-Versinic hose (extraction)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
17	Excess temperature fuse	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
18	Lift	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Part 4: จะเขียนและรายงานผลการให้บริการ Preventive Maintenance

4.1 ตรวจสอบไฟฟ้า

ใช้ไฟ 220 V 50 Hz	Pass	Fail	N/A	Remark
กระแสไฟฟ้าตามพิกัดเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.2 ตรวจสอบสภาพอุปกรณ์ภายนอก	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
สายไฟของเครื่อง	Pass	Fail	N/A	Remark
ท่อแก้วรวมไอกรด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
สายขมวดกับท่อแก้วรวมไอกรด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
สภาพของ Aluminum block	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
การขึ้นลงของ Lift	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	เสื่อมสภาพ
Light	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Current Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Thermostat	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

4.ตรวจเช็คระบบการทำงาน



☐ KT-L

☒ KT

	Pass	Fail	N/A	Remark
Switch controller on or off.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
USB port	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
LAMP button	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
LIFT down button	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
LIFT up button	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
OK button	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Navigation buttons	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
START/STOP button	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MENU button	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SUC button	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
COOL/WATER button (optional)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
COOL / FENT" button (optional)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PRE HEAT" button	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
การขึ้นของอุณหภูมิมากกว่า10องศาต่อนาทีที่25องศา	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
การทำงานของตัวป้องกันอุณหภูมิสูงเกิน	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
การทำงานของระบบควบคุมอุณหภูมิ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

การบำรุงรักษาทั่วไป (Basic maintenance)

- การย้อยตัวอย่างเกิดจากการเค็ดที่รุนแรงอันเนื่องจากตัวอย่างนั้นสามารถป้องกันได้โดยแนะนำให้ย้อยตัวด้วยการตั้งการเพิ่มอุณหภูมิเป็นระดับเช่น ย้อยที่ระดับอุณหภูมิ 250 C ครบเวลา 15 นาทีจึงเปลี่ยนเป็นอุณหภูมิ 380 C เพื่อป้องกันการสั่นออกมา
- เมื่อใช้เสร็จ ไม่ควรปล่อยให้ Tube เย็นกับตัวเครื่อง
- ต้องนำเอาคาลองไอการใส่ทุกครั้งหลังจากใช้งานเสร็จ เพื่อป้องกันการหยดของไอกรดที่จะหยดลงมาก็ตัวเครื่อง
- ทำความสะอาดตัวหลุมย้อยด้วยน้ำหรือผ้าชุบน้ำในกรณีที่มีคราบกรดลงมาคิดอยู่ในหลุม

เพื่อป้องกันไม่ให้เกิดราดังกล่าวไปกับการแผ่อุณหภูมิ



Certificate of Calibration

Equipment: Cooled Incubator
Model: KB 240
Serial No.(or ID): 20180000012164 (WW-16-001)
Manufacturer: Binder
Condition: In Condition
Shelves(pc.): 3

Customer: C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

Environment Condition: Temperature: 22 °C ± 1.8 °C
Humidity: 61 %RH ± 5.3 %RH
Voltage: 230 VAC ± 1.5 VAC

Calibration Place: C.E.M Technology (Thailand) Co., Ltd. (Laboratory Room)
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

Calibration By: Mr. Tweewong Thaitiang
Calibration Date: 10 February 2025
The Method used: In house method, CAL-WI-16, base on TLAS-G20
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Certificate No. C10240018

(Mr. Tweewong Thaitiang)
Person in charge
This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

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DKSH Technology Limited
2533 Sukhumvit Road, Bangkok, Prachinanon, Bangkok 10260
Phone: +66 2839 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

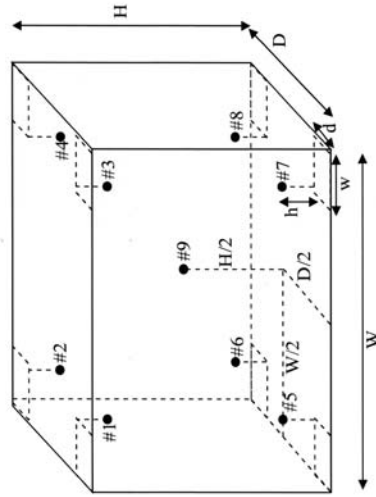
Delivering Growth - in Asia and Beyond.

CAL-FM-C31-10: 12 Sep 2022



Certificate No.: C31250348

Page: 2 of 3



Standard Installation Locations

Volume (Calibration Zone)= 122 (Liters)

Inside chamber: W = 65 (cm) D = 50 (cm) H = 76 (cm)
Standard Locations (#1, #2, #3, #4): w = 7 (cm) d = 5 (cm) h = 8 (cm)
Standard Locations (#5, #6, #7, #8): w = 7 (cm) d = 5 (cm) h = 8 (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	201	202	203	204	205	206	207	208	209

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the

measured temperature at the reference location which are observed at same time or at close observation time as

possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference

probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation: The difference of maximum and minimum measured temperatures throughout observation time.

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Delivering Growth - in Asia and Beyond.

CAL-FM-C31-10: 12 Sep 2022



Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, TLAS-G20. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

- Decision rule:**
- ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk < 50% PFA.
 - ☒ Choice B Non-binary statement with guard band ($w = 1$ U), Pass or Fail Specific Risk < 2.5% PFA and Condition Pass or Condition Fail Specific Risk < 50% PFA.
 - ☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r$ U).
; PFA = Probability of False Accept

(Mr. Udon Srichana)
Authorized signatory

Without adjustment

Desired Temperature : 20.0°C Tolerances : 1.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 20.0 °C

Locations	Measured (°C)	Correction* (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	20.14	0.14	0.33	1.0	Pass
#2	20.14	0.14	0.34	1.0	Pass
#3	19.96	-0.04	0.38	1.0	Pass
#4	20.14	0.14	0.35	1.0	Pass
#5	20.11	0.11	0.33	1.0	Pass
#6	20.17	0.17	0.34	1.0	Pass
#7	20.00	0.00	0.37	1.0	Pass
#8	20.06	0.06	0.35	1.0	Pass
#9	20.38	0.38	0.33	1.0	Pass

Correction* = Measured Temperature - Desired Temperature

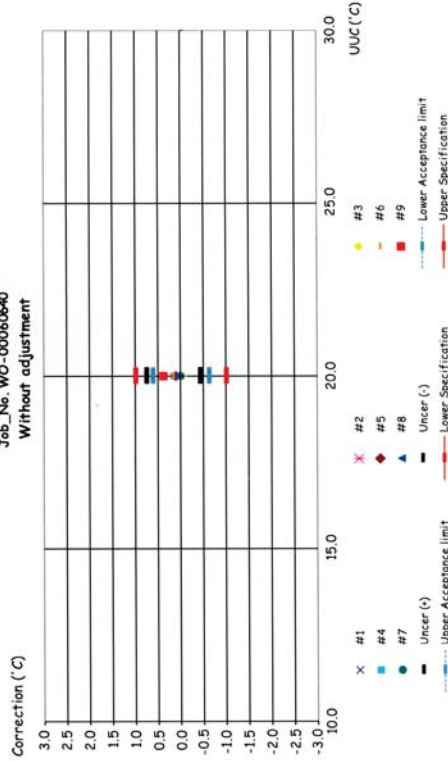
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity

Corr_Distribution & Max_Measurement Uncertainty

Job_No. WO-00060640

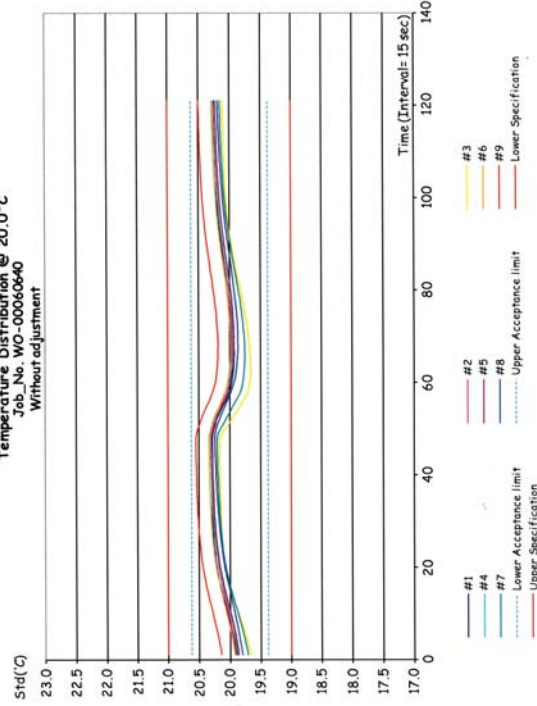
Without adjustment



Temperature Distribution @ 20.0°C

Job_No. WO-00060640

Without adjustment





ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00060640

ชนิดเครื่องมือ: Cooled Incubator
รุ่น: KB 240
หมายเลขเครื่อง: 2018000012164 (WW-16-001)

ตรวจสอบ (รับ)	ผลการตรวจสอบ	ตรวจสอบ (ส่ง)		หมายเหตุ
		10 Feb 2025	ไม่มีกีด	
ปกติ	ไม่มีกีด	ปกติ	ไม่มีกีด	
General				
<input checked="" type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	5. การทำงาน ฟัดลม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	6. สวิทช์ Lever of Ventilation valve	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	7. สวิทช์ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	8. สวิทช์ Door seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	11. การทำงานของระบบทำความร้อน	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	12. สวิทช์ตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	13. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ:

Mr. Tiewwong Thaihiang
Service Engineer

บริษัท ติวแอง เทค จำกัด
DKSH Technology Limited
2533 หมู่ 9 ต.บึงสามพัน อ.บึงสามพัน จ.พิจิตร 36100
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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Certificate No.: C31250348

Page: 3 of 3

Calibration Results: Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 20.0 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	20.14	0.14	0.33
#2	20.14	0.14	0.34
#3	19.96	-0.04	0.38
#4	20.14	0.14	0.35
#5	20.11	0.11	0.33
#6	20.17	0.17	0.34
#7	20.00	0.00	0.37
#8	20.06	0.06	0.35
#9	20.38	0.38	0.33

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
20.0	20.0	20.0	20.14	20.14	19.96	20.14	20.11	20.17	20.00	20.06	20.38	0.38

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
20.0	0.57	0.26	0.89

Note: * Maximum uncertainty of the each position

The End of Certificate

บริษัท ติวแอง เทค จำกัด
DKSH Technology Limited
2533 หมู่ 9 ต.บึงสามพัน อ.บึงสามพัน จ.พิจิตร 36100
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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CAL-FM-C31-10-12 Sep 2022



Certificate of Calibration

Equipment: Hot Air Oven
Model: UF 55
Serial No.(or ID): B219.0142 (WW-05-002)
Manufacturer: Memmert
Condition: In Condition
Shelves(pc.): 2

Customer: C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

Environment Condition: Temperature: 28 °C ± 1.0 °C
Humidity: 61 %RH ± 5.3 %RH
Voltage: 230 VAC ± 1.5 VAC

Calibration Place: C.E.M Technology (Thailand) Co., Ltd. (Laboratory Room)
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

Calibration By: Mr. Tweewong Thaitiang
Calibration Date: 10 February 2025
The Method used: In house method, CAL-WI-16, base on TLAS-G20
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.
Certificate No. C10240018

Person in charge
(Mr. Tweewong Thaitiang)
Authorized signatory
(Mr. Udon Srichana)
This certificate is issued for the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

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Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

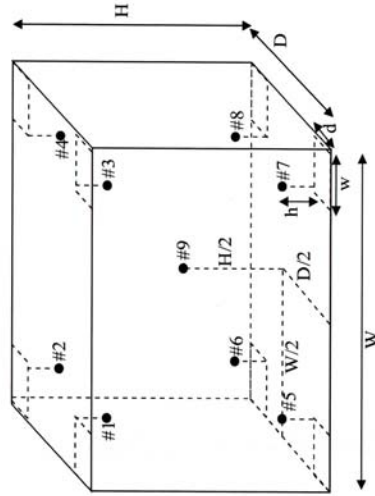
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CAL-FM-C31-10: 12 Sep 2022



Certificate No.: C31250347

Page: 2 of 4



Standard Installation Locations

Volume (Calibration Zone)= 21 (Liters)

Inside chamber: W = 40 (cm) D = 33 (cm) H = 40 (cm)

Standard Locations (#1, #2, #3, #4): w = 5 (cm) d = 5 (cm) h = 5 (cm)

Standard Locations (#5, #6, #7, #8): w = 5 (cm) d = 5 (cm) h = 5 (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	101	102	103	104	105	106	107	108	109

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the

possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference

probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

Overall Variation: The difference of maximum and minimum measured temperatures throughout observation time.

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CAL-FM-C31-10: 12 Sep 2022



Certificate No.: C31250347 Page: 3 of 4

Calibration Results:

Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

Locations	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
#1	104.29	0.29	0.40
#2	104.01	0.01	0.40
#3	104.34	0.34	0.40
#4	104.23	0.23	0.39
#5	104.43	0.43	0.40
#6	104.19	0.19	0.40
#7	103.78	-0.22	0.40
#8	104.21	0.21	0.40
#9	104.47	0.47	0.41

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
104.0	104.0	104.0	104.29	104.01	104.34	104.23	104.43	104.19	103.78	104.21	104.47	0.41

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
104.0	0.76	0.18	1.04

Note: * Maximum uncertainty of the each position

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CAL-FM-C31-10: 12 Sep 2022



Certificate No.: C31250347 Page: 4 of 4

Without adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 180.0 °C

Locations	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
#1	180.20	0.20	0.43
#2	179.54	-0.46	0.43
#3	180.39	0.39	0.43
#4	180.09	0.09	0.43
#5	180.62	0.62	0.43
#6	179.97	-0.03	0.43
#7	179.53	-0.47	0.48
#8	180.27	0.27	0.43
#9	180.57	0.57	0.43

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
180.0	xxx	180.0	180.20	179.54	180.39	180.09	180.62	179.97	179.53	180.27	180.57	0.48

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
180.0	1.26	0.19	1.39

Note: * Maximum uncertainty of the each position

The End of Certificate

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CAL-FM-C31-10: 12 Sep 2022



Refer to Certificate No.: C31250347 Page: 1 of 2

Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, TLAS-G20. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

- Decision rule:**
- ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$). Specific Risk < 50% PFA.
 - ☒ Choice B Non-binary statement with guard band ($w = 1$ U). Pass or Fail Specific Risk < 2.5% PFA and Condition Pass or Condition Fail Specific Risk < 50% PFA.
 - ☐ Choice C Customer defined. Customers may define arbitrary multiple of r to have applied as guard band ($w = r$ U).
: PFA – Probability of False Accept



(Mr. Udon Srichana)
Authorized signatory

Without adjustment

Desired Temperature : 104.0°C Tolerances : 1.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

Locations	Measured (°C)	Correction* (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	104.29	0.29	0.40	1.0	Pass
#2	104.01	0.01	0.40	1.0	Pass
#3	104.34	0.34	0.40	1.0	Pass
#4	104.23	0.23	0.39	1.0	Pass
#5	104.43	0.43	0.40	1.0	Pass
#6	104.19	0.19	0.40	1.0	Pass
#7	103.78	-0.22	0.40	1.0	Pass
#8	104.21	0.21	0.40	1.0	Pass
#9	104.47	0.47	0.41	1.0	Pass

Correction* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

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CAL-FM-C31-10: 12 Sep 2022



Refer to Certificate No.: C31250347 Page: 2 of 2

Statements of conformity:(Cont.)

Without adjustment (Cont.)

Desired Temperature : 180.0°C Tolerances : 2.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 180.0 °C

Locations	Measured (°C)	Correction* (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	180.20	0.20	0.43	2.0	Pass
#2	179.54	-0.46	0.43	2.0	Pass
#3	180.39	0.39	0.43	2.0	Pass
#4	180.09	0.09	0.43	2.0	Pass
#5	180.62	0.62	0.43	2.0	Pass
#6	179.97	-0.03	0.43	2.0	Pass
#7	179.53	-0.47	0.48	2.0	Pass
#8	180.27	0.27	0.43	2.0	Pass
#9	180.57	0.57	0.43	2.0	Pass

Correction* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

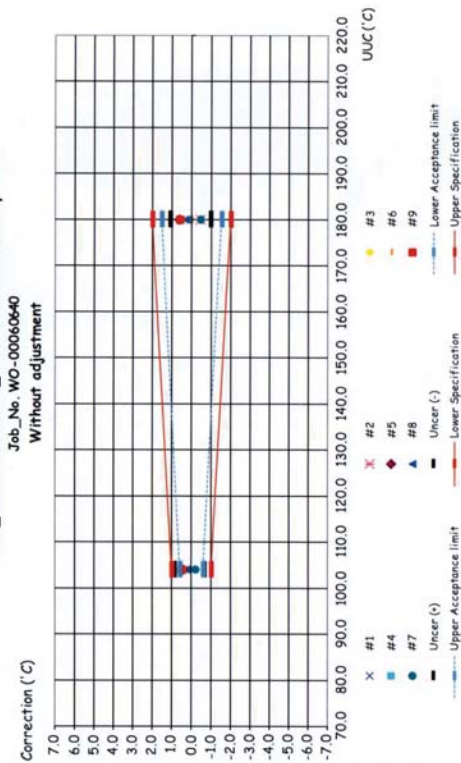
The End of Statements of Conformity

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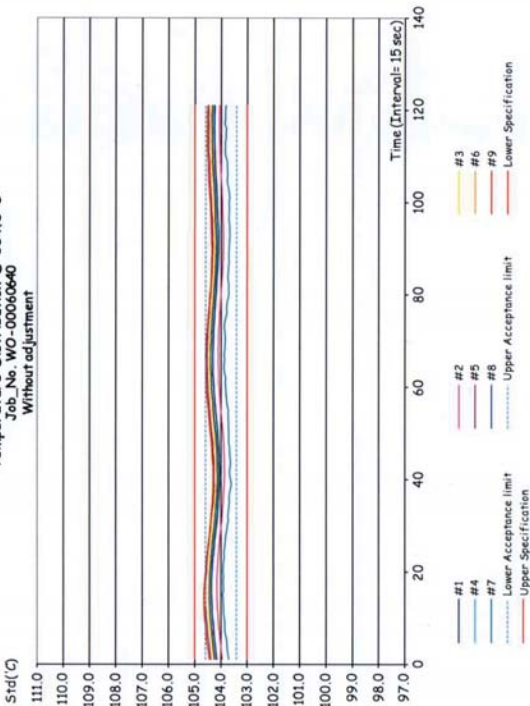
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CAL-FM-C31-10: 12 Sep 2022

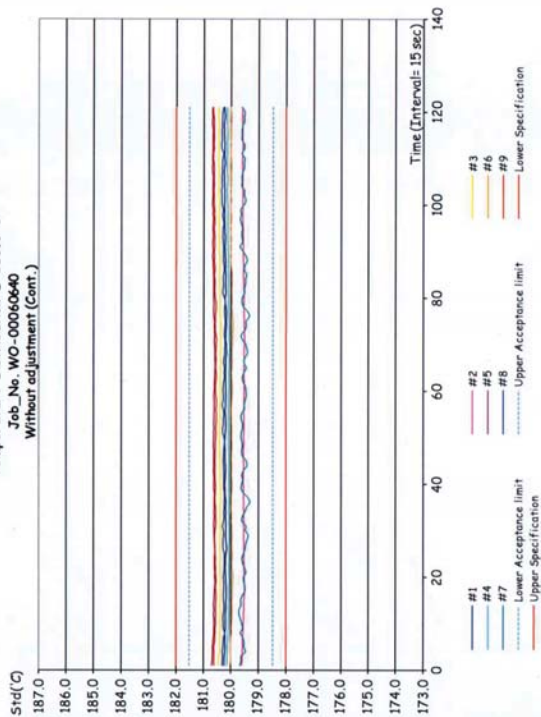
Corr_Distribution & Max_Measurement Uncertainty



Temperature Distribution @ 104.0°C



Temperature Distribution @ 180.0°C





ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00060640

ชนิดเครื่องมือ: Hot Air Oven รุ่น: UF 55

หมายเลขเครื่อง: B219.0142 (WW-05-002)

ตรวจสอบ (รุ่น)		รายการตรวจเช็ค	ตรวจสอบ (สัปดาห์)		หมายเหตุ
10 Feb 2025			10 Feb 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน ฟัดลม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. สวิทช์ Lever of Ventilation valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สวิทช์ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สวิทช์ Door seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของระบบทำความร้อน	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สวิทช์ตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	13. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ:

Mr. Tweewong Thaitiang
Service Engineer

บริษัท ดีเคเอส อีเซีย แอนด์ เบยอนด์ จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
2533 Sukhumvit Road Bangkhalat, Prathung, Bangkok 10260
Phone: +66 2839 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Banggood, Pakkred, Northaburi 11120
Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail: calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



NSG-TSI-TS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-400089-3

Page : 1 of 2

Submitted by :

C.E.M Technology (Thailand) Co.,Ltd.

219/43 Moo.12 Petchkasem Rd. Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

Equipment :

Temperature Indicator with Thermistor Probe

Temperature Indicator

Manufacturer : Apera Model : PC 910

Range : N/A °C Resolution : 0.1 °C

Serial No. : PC910X1220811001 ID No. : WW-03-002

Thermistor probe

Model : N/A

Sheath Material : Stainless

Diameter : 4.8 mm.

Length : 100 mm.

Serial No. : N/A

ID No. : WW-03-002

Environment :

On site calibration was carried out at the Laboratory,

C.E.M Technology (Thailand) Co., Ltd.

Ambient Temperature : (26.0 to 27.0) °C

Relative Humidity : (45 to 50) %

Line Voltage : (224.5 to 226.0) VAC

Date of Received :

11 February 2025

Date of Calibration :

11 February 2025

Date of Issue :

17 February 2025

Calibrated by :

Pempon Chumpu

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4003

by compared with PRT in the liquid bath at the constant controlled temperature.

The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

ID No. Cert. No. Due Date

400002 TT-0095-24 01 Jul 2026

2. Standard Digital Thermometer

ID No. Cert. No. Due Date

400033 24F633 21 Feb 2026

Approved by :

(Pempon Chumpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.



CAL-F0031-03

Certificate of Calibration

Certificate No. : 68-400089-3

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
100	25.003	25.2	-0.2	0.19

Remark

UUC : Unit Under Calibration

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

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

-0.00-



Certificate of Calibration

Certificate No. : 68-420017-3

Page : 1 of 2

Submitted by :

C.E.M Technology (Thailand) Co., Ltd.

219/43 Moo.12 Petchkasem Rd, Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

Equipment :

pH Meter with electrode

pH meter

Manufacturer : Apera

Model : PC 910

Range : N/A pH

Resolution : 0.01 pH

Serial No. : PC910X1220811001

ID No. : WW-03-002

Electrode

Model : LabSen 211

Serial No. : 2110009/213

ID No. : WW-03-002

Environment :

On site calibration was carried out at the Laboratory,

C.E.M Technology (Thailand) Co., Ltd.

Ambient Temperature : (26.0 to 27.0) °C

Relative Humidity : (45 to 50) %

Date of Received : 11 February 2025

Date of Calibration : 11 February 2025

Date of Issue : 17 February 2025

Calibrated by : Permpoon Chanpu

Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator

and using certified reference material (CRM)

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

1. Multiproduct Calibrator

ID No.	Cert.No.	Due Date	Traceability
400005	SG-E-00307/66	23 Aug 2025	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert.No.	Lot No.	Exp. Date	Traceability
4.008	61293328	1027612	15 Sep 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.987	61297593	1027614	15 Sep 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61306165	1027613	15 Sep 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

(Permpoon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate No. : 68-420017-3

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading (pH)	Correction (mV)	Uncertainty (\pm mV)
4, 7, 10	177.4800	4	4.00	177	0.59
	0.0000	7	7.00	0	0.58
	-177.4800	10	10.00	-178	0.59

Function :

pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (\pm pH)
4, 7, 10	4.008	4.00	0.01	0.0097
	6.987	7.00	-0.01	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

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

- 0.010 -

Certificate No. : 68-430004-2

Page : 1 of 2

Submitted by :

C.E.M Technology (Thailand) Co., Ltd.

21943 Moo.12 Petchkasem Rd. Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

Equipment :

Digital Conductivity meter with probe

Manufacturer : Apera Model : PC 910

Serial No. : PC910X1220811001 ID No. : WW-03-002

Electrode

Model : N/A Serial No. N/A

ID No. : WW-03-002

Environment :

On site calibration was carried out at the Laboratory.

C.E.M Technology (Thailand) Co., Ltd.

Ambient Temperature (26.0 to 27.0) °C

Relative Humidity (45 to 50) %

Date of Received :

11 February 2025

Date of Calibration :

11 February 2025

Date of Issue :

17 February 2025

Calibrated by :

Permpoon Chanpu

Remark

Calibration Method : In-house method CAL-M4301 direct measurement by conductivity buffer solution

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

Standard Buffer Solution

Material	Lot No.	Exp. Date	Traceability
84 μ S/cm	0300	01 June 2027	National Institute of Standards and Technology (NIST), U.S.A., S.R.M
1413 μ S/cm	970986	25 April 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
12.88 mS/cm	970987	25 April 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

(Permpoon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-430004-2

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Conductivity measurement

Before Adjustment

Standard	UUC Reading	Correction	Uncertainty (±)	Unit
Conductivity Solution				
84*	81.9	2.1	1.1	µS/cm
1413	1444	-31	9.0	µS/cm
12.88	12.41	0.47	0.082	mS/cm

After Adjustment : at 25.000, 84, 147, 1413 µS/cm 12.880, 80, 111.80 mS/cm

Standard	UUC Reading	Correction	Uncertainty (±)	Unit
Conductivity Solution				
84*	84.0	0.0	1.1	µS/cm
1413	1413	0	9.0	µS/cm
12.88	12.88	0.00	0.082	mS/cm

Remark

UUC : Unit Under Calibration

* This parameter is out of accreditation's scope.

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

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



Certificate of Calibration

Certificate No. : 68-400089-1

Page : 1 of 2

Submitted by :

C.E.M Technology (Thailand) Co.,Ltd.

219/43 Moo.12 Petchkasem Rd. Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

Equipment :

Temperature Indicator with Thermistor Probe

Temperature Indicator

Manufacturer : Thermo Scientific Model : VERSA STAR PRO

Range : N/A °C Resolution : 0.1 °C

Serial No. : 12260 ID No. : WW-03-001

Thermistor probe

Model : N/A

Sheath Material : Stainless

Diameter : 6.5 mm. Length : 120 mm.

Serial No. : PT1-18812 ID No. : WW-03-001

Environment :

On site calibration was carried out at the Laboratory,

C.E.M Technology (Thailand) Co., Ltd.

Ambient Temperature : (26.0 to 27.0) °C

Relative Humidity : (45 to 50) %

Line Voltage : (224.5 to 226.0) VAC

Date of Received :

11 February 2025

Date of Calibration :

11 February 2025

Date of Issue :

17 February 2025

Calibrated by :

Permpon Chanpu

Calibration Method :

This instrument was calibrated by In-house method comparison technique CAL-M4003

by compared with PRT in the dry-well calibrator at the constant controlled temperature.

The temperature scale used was based on ITS-90

Reference Standard Instruments :

This certification is traceable to the International System of Units

1. Platinum Resistance Thermometer (PRT)

ID No. Cert.No. Due Date Traceability

400002 TT-0095-24 01 Jul 2026 National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No. Cert.No. Due Date Traceability

400033 24E633 21 Feb 2026 National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400089-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
130	25.004	25.1	-0.1	0.19

Remark

UUC : Unit Under Calibration

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

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

-o00-



Certificate of Calibration

Certificate No. : 68-420017-1

Page : 1 of 2

Submitted by :

C.E.M Technology (Thailand) Co., Ltd.

219/43 Moo.12 Petchkasem Rd, Onnnoi, Krathumban, Samutsakorn 74130 (Head Office)

Equipment :

pH Meter with electrode

pH meter

Manufacturer : Thermo Scientific

Model : VERSA STAR PRO

Range : N/A

Resolution : 0.01

pH

Serial No. : 12260

ID No. : WW-03-001

Electrode

Model : 9156BNWP

Serial No. : VV1-15843

ID No. : WW-03-001

Environment : On site calibration was carried out at the Laboratory,

C.E.M Technology (Thailand) Co., Ltd.

Ambient Temperature : (26.0 to 27.0) °C

Relative Humidity : (45 to 50) %

Date of Received : 11 February 2025

Date of Calibration : 11 February 2025

Date of Issue : 17 February 2025

Calibrated by : Perngpon Champu

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

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

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00307/66	23 Aug 2025	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.008	61293328	1027612	15 Sep 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.987	61297593	1027614	15 Sep 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61306165	1027613	15 Sep 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

(Perngpon Champu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-420017-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading (pH) (mV)	Correction (mV)	Uncertainty (\pm mV)
4, 7, 10	177.4800	4	4.00 177.4	0.1	0.12
	0.0000	7	7.00 0.0	0.0	0.086
	-177.4800	10	10.00 -177.4	-0.1	0.12

Function :

pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (\pm pH)
4, 7, 10	4.008	4.01	0.00	0.0097
	6.987	7.00	-0.01	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

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

-oOo-




Certificate of Calibration

Certificate No. : 68-400089-1

Page : 1 of 2

Submitted by :

C.E.M Technology (Thailand) Co.,Ltd.

219/43 Moo.12 Petchkasem Rd. Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

Equipment :

Temperature Indicator with Thermistor Probe

Temperature Indicator

Manufacturer : Thermo Scientific Model : VERSA STAR PRO

Range : N/A $^{\circ}$ C Resolution : 0.1 $^{\circ}$ C

Serial No. : 12260 ID No. : WW-03-001

Thermistor probe

Model : N/A

Diameter : 6.5 mm.

Serial No. : PT1-18812 ID No. : WW-03-001

On site calibration was carried out at the Laboratory,
C.E.M Technology (Thailand) Co., Ltd.

Environment :

Ambient Temperature : (26.0 to 27.0) $^{\circ}$ C

Relative Humidity : (45 to 50) %

Line Voltage : (224.5 to 226.0) VAC

Date of Received : 11 February 2025

Date of Calibration : 11 February 2025

Date of Issue : 17 February 2025

Calibrated by : Permpon Chanpu

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

The temperature scale used was based on ITS-90

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

1. Platinum Resistance Thermometer (PRT)

ID No. Cert.No. Due Date

400002 TT-0095-24 01 Jul 2026

2. Standard Digital Thermometer

ID No. Cert.No. Due Date

400033 24E633 21 Feb 2026

Approved by :

(Permpon Chanpu)

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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Certificate No. : 68-400089-1

Result of Calibration : Without Adjustment

UUC Condition As Received : Good

Function : Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
130	25.004	25.1	-0.1	0.19

Remark

UUC : Unit Under Calibration

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

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

-o00-



THAI CALIBRATION SERVICES CO., LTD.

19/8 Moo 9 Soi Raikong 30 Puttamonthon 5 Rd., Sampran, Nakornpatom 73210
Tel. 0-3439-7682-5 Fax: 0-3439-7687
www.thaicai.com E-mail : sale@thaicalibration.com, lab@thaicalibration.comNSC-TISI-TIS 7028
CALIBRATION 0189

CALIBRATION CERTIFICATE

Certificate No.S2503003S

page 1 of 2

Customer :

C.E.M TECHNOLOGY (THAILAND) CO., LTD.

219/43 Moo 12 Petchkasem Road, Omnoi,

Kraihumban, Samutsakorn 74130

Equipment :

Non-automatic weighing instrument (Electronic instrument)

Manufacturer :

Sartorius

Model :

BSA224S-CW

Accuracy class :

-

Capacity :

220 g

Resolution :

0.0001 g

Serial No. :

3139614148

ID No. :

CL-01-003

Place of calibration : กรุงเทพมหานคร

Order No. :

68S0877-1

Ambient temperature :

(20.2 ± 5.0) °C

Relative humidity :

(54.5 ± 10.0) %

Received date :

01-Mar-2025

Date of calibration :

01-Mar-2025

Date of issue :

01-Mar-2025

Condition of the balance : Good working conditions

Calibration method

This instrument was calibrated according to the EURAMET Calibration Guide No. 18.

Condition of reference standard weight

Instrument	Nominal value	Serial No.	Certificate No.	Due-date	Density (kg/m ³)
1 Standard weight set	1 mg to 2 kg	15845+15849	M2410001S	5-Oct-2025	7930

Traceability of the reference standard weight

This certificate is traceable to SI unit through Mass Calibration Laboratory Thai Calibration Services Co., Ltd., NSC-ONSC accredited no. Calibration 0189.

Calibrated By :

Sathaporn Rueangpluppla

Technician

Approved Signatory :

Somwang Wongduang

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except with the prior written approval of the head of TCS calibration laboratory.

TCS-F-138 Issue 01/Rev.01/12 Jun 2023

NO. 42531



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19/8 Moo 9 Soi Raking 30 Puttamonthon 5 Rd., Sampran, Nakornpatom 73210
Tel. 0-3439-7682-5 Fax: 0-3439-7687
www.thaical.com E-mail : sale@thaicalibration.com, lab@thaicalibration.com



CALIBRATION CERTIFICATE

Certificate No.S2503003S

page 2 of 2

The repeatability of indication

Nominal Value (g)	Standard Deviation of reading (g)	Maximum difference between successive reading (g)	n
200	0.00000	0.0000	5

The effect of eccentric application of a load on the indication (test load : 100 g)

Position	Balance Reading (g)
Point 1	100.0000
Point 2	100.0000
Point 3	99.9999
Point 4	99.9998
Point 5	100.0000
Eccentric Value	0.0002



The error of indication

Nominal Value (g)	Value of Reference Standard Weight (g)	Balance Reading (g)	Correction (g)	Uncertainty (±) (g)	k
Unload	0.0000	0.0000	0.0000	0.000082	2.00
1	1.0000	1.0000	0.0000	0.000085	2.00
2	2.0000	2.0000	0.0000	0.000087	2.00
5	5.0000	5.0001	-0.0001	0.000090	2.00
10	10.0000	10.0000	0.0000	0.000094	2.00
20	20.0000	20.0000	0.0000	0.00011	2.00
50	50.0000	50.0000	0.0000	0.00013	2.00
100	100.0000	100.0000	0.0000	0.00019	2.00
120	120.0000	120.0001	-0.0001	0.00024	2.00
150	150.0000	150.0000	0.0000	0.00027	2.00
200	200.0002	200.0000	+0.0002	0.00033	2.00

Remark : Adjustment, Internal weight

Uncertainty of measurement

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor (k), which for a normal distribution corresponds to a coverage probability of approximately 95% (confidence level).

This report will certify of the calibrated equipment only.

--End--

TCS-F-138 Issue 01/Rev.01/12 Jun 2023

NO. 42532



THAI CALIBRATION SERVICES CO., LTD.

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Tel. 0-3439-7682-5 Fax: 0-3439-7687
www.thaical.com E-mail : sale@thaicalibration.com, lab@thaicalibration.com



CALIBRATION CERTIFICATE

Certificate No.S2505043S

page 1 of 2

Customer :

C.E.M. TECHNOLOGY (THAILAND) CO., LTD.

219/43 Moo 12, Petchkasem Rd., Omnoi,

Krathumban, Samutsakorn 74130

Equipment : Non-automatic weighing instrument (Electronic instrument)

Manufacturer : Sartorius

Model : QUINTIX224-IS

Accuracy class : 220000 mg

Capacity : 0.1 mg

Resolution : 0.035009070

Serial No. : C1-01-002

ID No. : 0035009070

Place of calibration : วัดพระศรีฯ

Order No. :

Ambient temperature :

Relative humidity :

Received date :

Date of calibration :

Date of issue :

Condition of the balance : Good working conditions

68S1799-1

(23.9 ± 1.0) °C

(38.9 ± 5.0) %

30-Apr-2025

30-Apr-2025

03-May-2025

Calibration method

This instrument was calibrated according to the EURAMET Calibration Guide No. 18.

Condition of reference standard weight

Instrument	Nominal value	Serial No.	Certificate No.	Due-date	Density (kg/m³)
1 Standard weight set	1 mg to 2 kg	15885+15849	M2410001S	5-Oct-2025	7950

Traceability of the reference standard weight

This certificate is traceable to SI unit through Mass Calibration Laboratory Thai Calibration Services Co., Ltd., NSC-ONSC accredited no. Calibration 0189.

Calibrated By :

Aekhasak Silart

Technician

Approved Signatory :

Somwang Wongduang

This calibration certificate may not be reproduced other than in full, except with the prior written approval of the head of TCS calibration laboratory.

TCS-F-138 Issue 01/Rev.01/12 Jun 2023

NO. 3113



THAI CALIBRATION SERVICES CO., LTD.

19/8 Moo 9 Soi Raikong 30 Puttamonthon 5 Rd., Sampran, Nakornpatom 73210

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www.thaical.com E-mail : sale@thaicalibration.com, lab@thaicalibration.com



NSC-TISI-TIS 17025
CALIBRATION 0189

CALIBRATION CERTIFICATE

Certificate No.S2505043S

page 2 of 2

The repeatability of indication

Nominal Value (mg)	Standard Deviation of reading (mg)	Maximum difference between successive reading (mg)	n
200000	0.04	0.1	5

The effect of eccentric application of a load on the indication (test load : 100000 mg)

Position	Balance Reading (mg)
Point 1	99999.8
Point 2	99999.8
Point 3	99999.8
Point 4	99999.6
Point 5	99999.6
Eccentric Value	0.2



The error of indication

Nominal Value (mg)	Value of Reference Standard Weight (mg)	Balance Reading (mg)	Correction (mg)	Uncertainty (\pm) (mg)	k
Unload	0.0	0.0	0.0	0.14	2.21
100	100.0	100.0	0.0	0.14	2.21
200	200.0	200.1	-0.1	0.14	2.21
500	500.0	500.0	0.0	0.14	2.20
1000	1000.0	1000.0	0.0	0.14	2.20
2000	2000.0	2000.0	0.0	0.14	2.20
5000	5000.0	5000.1	-0.1	0.14	2.18
10000	10000.0	10000.0	0.0	0.14	2.16
20000	20000.0	20000.0	0.0	0.15	2.13
50000	50000.0	50000.0	0.0	0.16	2.08
100000	100000.0	99999.8	+0.2	0.21	2.00
200000	200000.2	199999.7	+0.5	0.34	2.00

Remark : Without adjustment

Uncertainty of measurement

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor (k), which for a normal distribution corresponds to a coverage probability of approximately 95% (confidence level).

This report will certify of the calibrated equipment only.

--End--