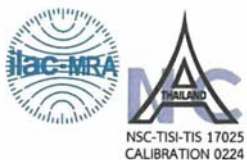


ภาคผนวก ช
เอกสารสอบเทียบเครื่องมือ

ภาคผนวก ช
เอกสารสอบเทียบเครื่องมือ

❖ เอกสารสอบเทียบเครื่องมือ บริษัท อีวีเอ็ม แลบบอราทอรี จำกัด





CALIBRATION CERTIFICATE



Certificate No. : 22SB140
Job No. : KINS2201200

Issue Date : 11 June 2022
Location : Balance Room
Customer Name : EVM LABORATORY CO.,LTD.
10 Soi Pong Sawatdi 10 Tha Sai Sub-district
Mueang Nonthaburi District Nonthaburi Province 11000

Equipment Name : Electronic Balance
Manufacturer : Sartorius
Model : BSA224S-CW
Serial No. : 3141513737
ID No. : B2021001
Weighing Capacity : 220 g
Resolution : 0.0001 g
Received Date : 8 June 2022
Condition of Calibrated item : Good

Calibration Date : 8 June 2022
Ambient Temperature : (25 ± 10) °C
Relative Humidity : (50 ± 30) %
Atmospheric Pressure : (1010 ± 30) mbar
Procedure Used : This calibration was conducted by using in-house calibration procedure number CP-B01-01 based on UKAS LAB14 : 2019

Reference Standard

Instrument	Certificate No.	Traceability	Due Date
Weight Set E2 (1 kg to 1 mg)	C02211601	SPC RT	1-Jun-2024
Weight Set E2 (100 g to 5 mg)	M2106103N	TCS	16-Jun-2024

This certification is traceable to the International System of Unit.

Calibrated by : Mr.Nirud Runggud
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager

The statement of compliance is based on a 95% coverage probability for the expanded uncertainty.
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Phra-nakorn Sri Ayuthaya 13170 Phone 0-2301-7208, Fax : 0-3579-9632, E-mail: pramote.r@dksh.com

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CALIBRATION REPORT

Certificate No. : 22SB140
Job No. : KINS2201200

Result of calibration : Before adjustment.

Applied Weight (g)	Balance Reading (g)	Correction Value (g)	Uncertainty (± g)	Coverage Factor (k)
100.0001	100.0043	-0.0042	0.00010	2.00
200.0000	200.0086	-0.0086	0.00030	2.00

Result of calibration : After adjustment of internal calibration function

1. Repeatability (n = 5 number of measurement)

Nominal Value (g)	Standard deviation of reading (g)
200	0.00000

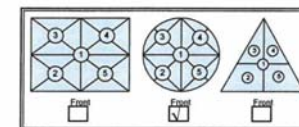


Figure A.1

2. Error of indication from nominal

Applied Weight (g)	Balance Reading (g)	Correction Value (g)	Uncertainty (± g)	Coverage Factor (k)
Unload	0.0000	0.0000	0.00010	2.00
0.0100	0.0100	0.0000	0.00010	2.00
1.0000	1.0000	0.0000	0.00010	2.00
5.0000	5.0000	0.0000	0.00010	2.00
10.0000	10.0000	0.0000	0.00010	2.00
20.0000	20.0000	0.0000	0.00010	2.00
50.0001	50.0001	0.0000	0.00011	2.00
100.0001	100.0000	0.0001	0.00020	2.00
120.0001	120.0001	0.0000	0.00030	2.00
150.0002	150.0001	0.0001	0.00030	2.00
200.0000	200.0000	0.0000	0.00030	2.00

3. Eccentric or off-centre loading (Figure A.1)

Nominal Value 100 (g)				
Position 1	Position 2	Position 3	Position 4	Position 5
Off-Centre	0.0002	0.0001	0.0001	0.0001
Maximum difference between off-centre loading = 0.0002 (g)				

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

The statements of compliance with specification (or requirement) is based on a 95% coverage probability for the expanded uncertainty of the measurement results on with the decision of compliance is based.

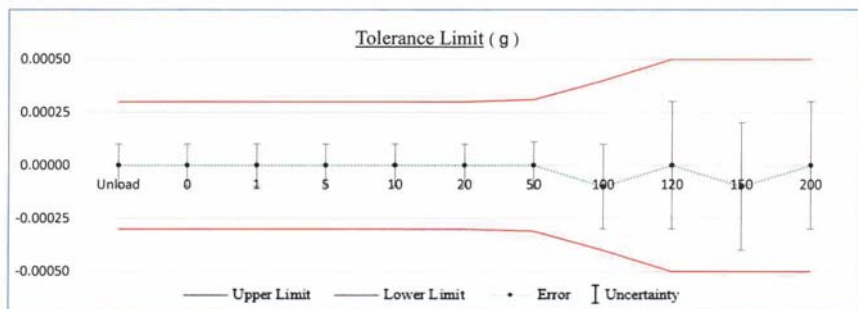
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CALIBRATION REPORT

Certificate No. : 22SB140
Job No. : KINS2201200

Result of calibration : Error of indication from nominal

Applied Weight (g)	Error + Uncertainty (g)	Error - Uncertainty (g)	Gain of UUC : From the specified of the Calibration laboratory (± g)	
Unload	0.0001	-0.0001	0.0003	-0.0003
0.0100	0.0001	-0.0001	0.0003	-0.0003
1.0000	0.0001	-0.0001	0.0003	-0.0003
5.0000	0.0001	-0.0001	0.0003	-0.0003
10.0000	0.0001	-0.0001	0.0003	-0.0003
20.0000	0.0001	-0.0001	0.0003	-0.0003
50.0001	0.0001	-0.0001	0.0003	-0.0003
100.0001	0.0001	-0.0003	0.0004	-0.0004
120.0001	0.0003	-0.0003	0.0005	-0.0005
150.0002	0.0002	-0.0004	0.0005	-0.0005
200.0000	0.0003	-0.0003	0.0005	-0.0005



—END—

ใบตรวจสอบสภาพตัวอย่าง (Check for sample)


Equipment Name : Electronic Balance

Job No. : KINS2201200
Serial No. : 3141513737

Check date 8-Jun-22		รายการตรวจเช็ค (Description)	Check before delivery 8-Jun-22		หมายเหตุ (Remark)
Normal ปกติ	Defective ไม่ปกติ		Normal ปกติ	Defective ไม่ปกติ	
		General			
<input type="checkbox"/>	<input type="checkbox"/>	1. สวิตช์ เปิด-ปิด เครื่อง (On-Off Switch)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. ปุ่มกด (Keybed)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ความสะอาดภายนอกของตัวเครื่องมือ External cleanliness of the equipment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	5. แบตเตอรี่ (Battery)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. คู่มือ (Manual)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. กล่อง (Box)	<input type="checkbox"/>	<input type="checkbox"/>	
		Electronic Balance / Moisture Analyzer			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ (Adapter, power supply 220 / 110V)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสมบูรณ์ชุดกระจกกันลม (Integrity of windshield set)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. ความสมบูรณ์ชุดของระดับน้ำ (Integrity of spirit level)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ขาตั้งเครื่อง (Machine stand)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. ชุดรองจานชั่ง (Stopper/ Pan support)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. จานชั่ง (Pan)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. ฟังก์ชันการทำงาน (Function Internal / External)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาพแวดล้อม ณ ที่ตั้งตั้งเครื่องมือ (นอกสถานที่) Environment at the location of the equipment (On-Site)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

More details :

Checked by : Mr.Nirud Runggud
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager

Certificate of Calibration

Certificate No.: WK206-299-26

Page 1 of 2

Customer : EVM LABORATORY CO., LTD.
10 Soi Pong Sawatdi, 10, Tha Sai Sub-district,
Mueang Nonthaburi District, Nonthaburi Province 11000

Instrument : DO Meter	Ambient Temperature : (25.0 ± 2) °C
Manufacturer : YSI	Humidity : (50.0 ± 15) %RH
Model : 4010-1W	Received Date : 8-Jun-22
Serial No. : 21081451	Calibrated Date : 9-Jun-22
Identity No. : D2021001	Issued Date : 9-Jun-22
Range : See to data	Calibrated Location : In Lab
Resolution : See to data	
Calibration Method : CP-WK-C03	

Reference standard instruments :

Instrument	Serial No.	Certificate No.	Due Date	Traceability to
Zero Oxygen Solution	HI7040L	S0115/20	30-Aug-25	NIST
DO Meter	874477	WK2205-164-25	25-May-23	WK Electric Co.,Ltd.
Digital Thermometer	382081948	WK2110-141-11	28-Oct-22	WK Electric Co.,Ltd.

NIST : National Institute of Standard and Technology.

This result calibrate was found accurate as shown on date place of calibrate only
This certificate is traceability to the International System of Unit (SI)

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 %

Calibrated by : Mr. Usa Phuanghiphat

Approved by :


Mr. Ratchadawut Rungravee
Authorized Signatory

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Calibration Results

Certificate No. : WK206-299-26

Page 2 of 2

Calibration Result of the Accuracy

Function : Dissolved Oxygen Measurement at 25 °C

Item	STD Value	UUC Reading	Error	Unit : mg/l
				Uncertainty (± mg/l)
Zero	0.00	0.02	0.02	0.15
Air Saturate	8.25	8.27	0.02	0.33
DI Water	8.40	8.43	0.03	0.33

Function : Temperature Measurement

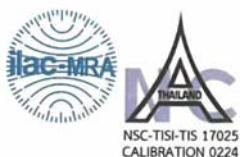
Resolution : 0.1 °C

STD Value	UUC Reading		Error	Unit : °C
	Before Adjustment	After Adjustment		Uncertainty (± °C)
25.00	25.0	Same	0.0	0.18

() Without Adjustment (X) After Adjustment

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**** End of Certificate****



CALIBRATION CERTIFICATE

Certificate No. : 22V163
Job No. : KINS2201212

Issue Date : 16 June 2022

Customer Name : EVM LABORATORY CO.,LTD.
10 Soi Pong Sawatdi 10 Tha Sai Sub-district
Mueang Nonthaburi District Nonthaburi Province 11000

Equipment Name : Piston Pipette
Manufacturer : CAPP
Model : Bravo
Serial No. : PD157071
ID No. : M2021002
Capacity : 1000 µl to 5000 µl
Received Date : 8 June 2022
Condition of Calibrated item : Good

Calibration Date : 11 June 2022
Ambient Temperature : (20 ± 2) °C
Relative Humidity : (50 ± 10) %
Atmospheric Pressure : (1010 ± 30) mbar
Procedure Used : This calibration was conducted by using in-house calibration procedure
number CP-V03-01 based on ISO 8655 : 2002(E) Part 2, 6 (to deliver)

Reference Standard

Instrument	Serial No.	Certificate No.	Traceability	Due Date
Electronic Balance	T1000798	22B26	DKSH	5-Mar-2023
Temperature Humidity Logger	T1202641	21H865	DKSH	23-Oct-2022
Digital Thermometer with probe	62431615	22T91	DKSH	22-Jan-2023
Barometer	DKSH-16-P01	22P1222	TPA	8-Apr-2024

This certification is traceable to the International System of Unit.

Calibrated by : Mr.Nirud Runggud
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager

The statement of compliance is based on a 95% coverage probability for the expanded uncertainty.
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Phra Nakhon Si Ayutthaya 13170 Phone 0 2301-7206, Fax : 0 3579 9832, E-mail: pramote.r@dksh.com

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Business Unit
Technology



CALIBRATION REPORT

Certificate No. : 22V163
Job No. : KINS2201212

Equipment Name : Piston Pipette
Calibration Point : 1000, 3000, 5000 µl
Pipette Tip : Tip : Universal, Size 1000 µl to 5000 µl, Tip Color : White, Lot no. -

Result of calibration : based on the gravimetric determination of the quantity of water which is
converted to true at the standard temperature of 20 °C
: Without Adjustment

Nominal Volume (µl)	Measured Volume (µl)	Error (es)		CV		Uncertainty ± (µl)	Coverage factor (k)
		(µl)	%	(µl)	%		
1000	987.86	-12.14	-0.24	1.582	0.03	1.2	2.28
3000	2979.17	-20.83	-0.42	1.190	0.02	1.5	2.23
5000	5007.82	7.82	0.16	1.920	0.04	1.5	2.25

Note : es : Systematic error
: CV : Coefficient of variation

This result of calibration was found accurate as shown on date and place of calibration only.
The statements of compliance with specification (or requirement) is based on a 95% coverage probability for the
expanded uncertainty of the measurement results on with the decision of compliance is based.

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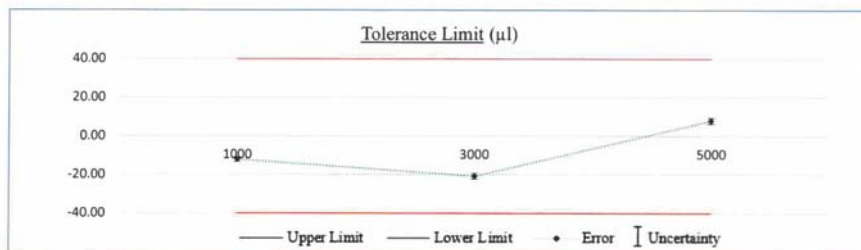
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CALIBRATION REPORT

Certificate No. : 22V163
Job No. : KINS2201212

Result of calibration : Without Adjustment

Nominal Volume (μ l)	Error + Uncertainty (μ l)	Error - Uncertainty (μ l)	Gain of UUC : From ISO 8655 \pm (μ l)	
1000	-10.950	-13.330	40.0	-40.0
3000	-19.330	-22.330	40.0	-40.0
5000	9.320	6.320	40.0	-40.0



--END--

ใบตรวจสอบสภาพตัวอย่าง (Check for sample)

Job No. : KINS2201212


Serial No. : PD157071

Equipment Name : Piston Pipette

Check date 8-Jun-22		รายการตรวจเช็ค (Description)	Check before delivery 11-Jun-22		หมายเหตุ (Remark)
Normal	Defective		Normal	Defective	
		General			
<input type="checkbox"/>	<input type="checkbox"/>	1. สวิทช์ เปิด-ปิด เครื่อง (On-Off Switch)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	2. หน้าจอ (Display, Screen Contrast)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	3. ปุ่มกด (Keybed)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ความสะอาดภายนอกของตัวเครื่องมือ External cleanliness of the equipment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	5. แบตเตอรี่ (Battery)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. คู่มือ (Manual)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. กล่อง (Box)	<input type="checkbox"/>	<input type="checkbox"/>	
		Volume			
<input type="checkbox"/>	<input type="checkbox"/>	1. ไม่มีรอยแตกร้าว (No cracks)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ขีดบอปริมาณ (Main scale of volumetric glassware)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	3. ฝาปิด (Stopper of volumetric flask)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	4. ก๊อก (Stopcock of buret / Auto buret)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. ที่ปรับปริมาตร (Volume adjustment of piston pipette)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. จังหวะ ดูด-ปล่อย (Step suck-release of piston pipette)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ฟิล (Tips wear for piston pipette)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	8. ขวดใส่น้ำสำหรับสอบเทียบ (Glass bottle of auto buret)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	9. ขวดใส่น้ำสำหรับสอบเทียบ (Glass bottle of dispensers)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. ตัวปรับปริมาตร (Volume adjustment of dispensers)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. ท่อดูดน้ำ (Water pipe of dispensers)	<input type="checkbox"/>	<input type="checkbox"/>	

รายละเอียดเพิ่มเติม :

Checked by : Mr.Nirud Runggud
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager



CALIBRATION CERTIFICATE



Certificate No. : 22ST298
Job No. : KINS2201203

Issue Date : 11 June 2022

Location of Calibration : Hot Room

Customer Name : EVM LABORATORY CO.,LTD.
10 Soi Pong Sawatdi 10 Tha Sai Sub-district
Mueang Nonthaburi District Nonthaburi Province 11000

Equipment Name : Temperature Chamber

Manufacturer : Memmert

Model : UF 55

Serial No. : B220.2971

ID No. : O2021001

Resolution : 0.1 °C


Received Date : 8 June 2022

Calibration Date : 8 June 2022

Ambient Temperature : (25 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Mr.Santisuk Toskrai
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager

The statement of compliance is based on a 95% coverage probability for the expanded uncertainty.

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Phra-nakhon Sri-Ayuthaya 13170 Phone 0-2301-7208, Fax : 0-3579-9832, E-mail: pramote.r@dksh.com

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Business Unit
Technology

CALIBRATION REPORT



Certificate No. : 22ST298

Job No. : KINS2201203

Condition of this result of calibration :

1. Calibration Procedure :

- This instrument was calibrated by insert 9 standard RTD PT100 into chamber and Calibration according to CP-T06-01 follow up to TLAS G-20-1/02-08 (E) : Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90 .
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standards Instrument :

Instrument	Serial No. / Ins No.	Certificate No.	Traceability	Due Date
Digital Thermometer with RTD	MY49024831 / No. 3	21T1171	DKSH	13 November 2022
	Channel : 201 to 209			

This certificate is traceable to The International System of Unit.

3. Condition of Calibrated item : Good

3.1 UUC Description :

Time Constant 1 Hour 6 Minute At 85 °C

Air value or air slider level : Off ; Fan Level : 100%

4. Result of Calibration : Without adjustment

4.1 Environment condition :

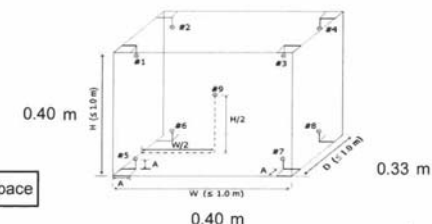
Ambient temperature :	Minimum Value	24.7 °C	Maximum Value	25.3 °C
Relative humidity :	Minimum Value	49.2 %	Maximum Value	65.2 %
Line voltage supplied :	Minimum Value	227 VAC	Maximum Value	229 VAC

4.2 Sensors Installation Diagram :

When ;

A = Distance between sensor and wall of chamber
is 10 % of the length of the each side
(W × D × H)

Sensor installation location in Chamber @ Working Space



Delivering growth – in Asia and beyond.

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CALIBRATION REPORT

Certificate No. : 22ST298

Job No. : KINS2201203

Table 1 : Reporting of Temperature

Calibration point (°C)	Average Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty (k = 2) ± (°C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
85	84.66	84.74	84.77	84.82	84.79	84.79	84.77	84.87	84.82	0.30
104	103.56	103.72	103.69	103.76	103.79	103.78	103.72	103.89	103.81	0.30
180	179.14	179.45	179.38	179.53	179.77	179.54	179.37	179.76	179.58	0.88

Table 2 : Reporting of Characterization Result

Indicator Set Point (°C)	Indicator Reading (°C)		Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
	MAX	MIN			
85.0	85.0	85.0	0.10	0.20	0.36
104.0	104.0	104.0	0.09	0.29	0.49
180.0	180.0	180.0	0.10	0.51	0.79

Note

The reference sensor is preferably located of the geometric center

The measured temperature data readout by software "Benchlink Datalogger 3"

The quoted uncertainty include "Stability" and "Loading effect (20% of Temp Uniformity)"

Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions.

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

Indicating Temperature - the average reading of indicating device that forms the integral part of the enclosure.

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

The statements of compliance with specification (or requirement) is based on a 95% coverage probability for the expanded uncertainty of the measurement results on with the decision of compliance is based.

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CALIBRATION REPORT

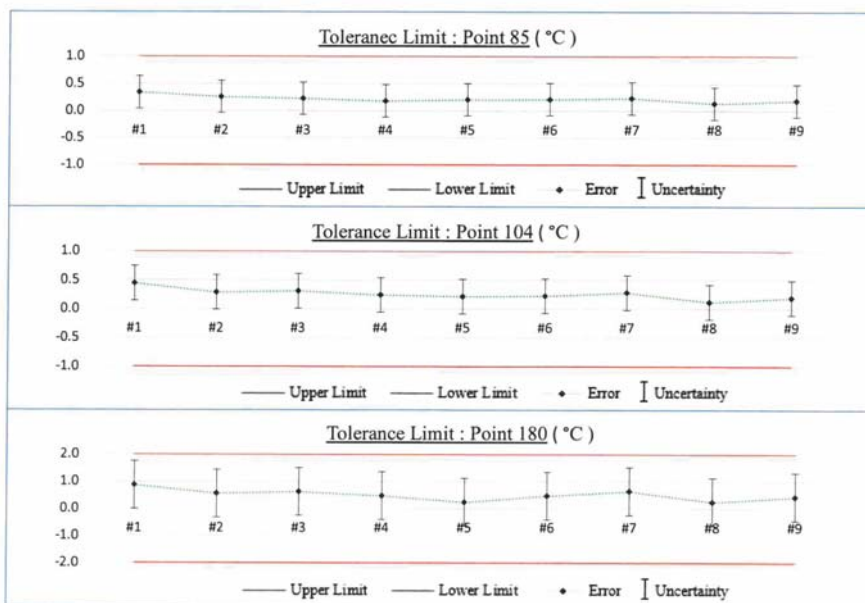
Certificate No. : 22ST298

Job No. : KINS2201203

Result of calibration : Measured Temperature

Calibration Point (°C)	Error + Uncertainty (°C)									Gain of UUC : From the specified of the customer ± (°C)	
	#1	#2	#3	#4	#5	#6	#7	#8	#9		
85	0.64	0.56	0.53	0.48	0.51	0.51	0.53	0.43	0.48	1.0	-1.0
104	0.74	0.58	0.61	0.54	0.51	0.52	0.58	0.41	0.49	1.0	-1.0
180	1.74	1.43	1.50	1.35	1.11	1.34	1.51	1.12	1.30	2.0	-2.0

Calibration Point (°C)	Error - Uncertainty (°C)									Gain of UUC : From the specified of the customer ± (°C)	
	#1	#2	#3	#4	#5	#6	#7	#8	#9		
85	0.04	-0.04	-0.07	-0.12	-0.09	-0.09	-0.07	-0.17	-0.12	1.0	-1.0
104	0.14	-0.02	0.01	-0.06	-0.09	-0.08	-0.02	-0.19	-0.11	1.0	-1.0
180	-0.02	-0.33	-0.26	-0.41	-0.65	-0.42	-0.25	-0.64	-0.46	2.0	-2.0



--END--

Delivering growth – in Asia and beyond.

PAGE 4/4

ใบตรวจสอบสภาพตัวอย่าง (Check for sample)

Job No. : KINS2201203

Equipment Name : Temperature Chamber

Serial No. : B220.2971

Check date 8-Jun-22		รายการตรวจเช็ค (Description)	Check before delivery 8-Jun-22		หมายเหตุ (Remark)
Normal	Defective		Normal	Defective	
ปกติ	ไม่ปกติ	General	ปกติ	ไม่ปกติ	
<input type="checkbox"/>	<input type="checkbox"/>	1. สวิตช์ เปิด-ปิด เครื่อง (On-Off Swich)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. ปุ่มกด (Keyped)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ความสะอาดภายนอกของตัวเครื่องมือ External cleanliness of the equipmant	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	5. แบตเตอรี่ (Battery)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. คู่มือ (Manual)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. กล่อง (Box)	<input type="checkbox"/>	<input type="checkbox"/>	
		Temperature / Humidity			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ (Adapter, power supply 220 / 110V)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	2. สภาพโพรม (Probe Sensors)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การตอบสนองของปุ่มกด (Button response)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	4. interface / USB	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. ช่องระบายอากาศ (Air vent of the chamber)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. ระดับการทำงานของพัดลม (Fan level of the chamber)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. ตะแกรงภายใน (Grille of the chamber)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1pcs
<input type="checkbox"/>	<input type="checkbox"/>	8. ความสะอาดภายในของ (Cleanliness in side the bath)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	9. ความสะอาดภายในของ (Cleanliness in side the chamber)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. ระดับการทำงานปั๊มน้ำ (Pump level of bath)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของ (Stirrer of bath)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาพแวดล้อม ณ พื้นที่ตั้งของเครื่องมือ (นอกสถานที่) Environment at the location of the equipment (On-Site)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

รายละเอียดเพิ่มเติม :

Checked by : Mr.Santisuk Toskrai
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager

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FM-QP-8.5-01-01-R01-07/01/21

68/242 Moo 5, Sawaipracharaj Rd., Tumbol Ladsawai, Amphur Lamukka, Pathumthani 12150

Tel. +66 2993 4773, +66 2153 7132-3 Fax. +66 2994 5509 E-mail : wk.calibrations@gmail.com www.wk-etc.com

Certificate of Calibration

Certificate No.: WK206-299-25

Page 1 of 2

Customer : EVM LABORATORY CO., LTD.
10 Soi Pong Sawatdi, 10, Tha Sai Sub-district,
Mueang Nonthaburi District, Nonthaburi Province 11000

Instrument	: pH/mV Meter	Ambient Temperature	: (25.0 ± 2) °C
Manufacturer	: APERA	Humidity	: (50.0 ± 15) %RH
Model	: PH700	Received Date	: 8-Jun-22
Serial No.	: PH700X1020091119	Calibrated Date	: 9-Jun-22
Identity No.	: N/A	Issued Date	: 9-Jun-22
Range	: See to data	Calibrated Location	: In Lab
Resolution	: See to data		
Calibration Method	: CP-WK-C01		

Reference standard instruments :

Instrument	Serial No.	Certificate No.	Due Date	Traceability to
pH Buffer # 4	794096	61235182	14-Feb-23	NIST
pH Buffer # 7	794087	61243095	17-Feb-23	NIST
pH Buffer # 10	794089	61230217	14-Feb-23	NIST
Digital Thermometer	382081948	WK2110-141-11	28-Oct-22	WK Electric Co.,Ltd.

NIST : National Institute of Standard and Technology.

This result calibrate was found accurate as shown on date place of calibrate only
This certificate is traceability to the International System of Unit (SI)

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 %

Calibrated by : Mr. Usa Phuangphiphat

Approved by : 
Mr. Ratchadawut Rungravee
Authorized Signatory

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Calibration Results

Certificate No. : WK206-299-25

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Calibration Result of the Accuracy

Function : pH Measurement@25 °C
Range : 4 pH to 10 pH
Resolution : 0.01 pH

Unit : pH

STD Solution	UUC Reading		Error	Uncertainty (± pH)
	Before Adjustment	After Adjustment		
4.01	3.89	4.00	-0.01	0.061
7.00	6.83	7.00	0.00	0.061
10.02	9.95	10.00	-0.02	0.065

Function : Temperature Measurement
Resolution : 0.1 °C

Unit : °C

STD Value	UUC Reading		Error	Uncertainty (± °C)
	Before Adjustment	After Adjustment		
25.00	25.0	Same	0.0	0.18

(X) Without Adjustment () After Adjustment

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**** End of Certificate****

CALIBRATION CERTIFICATE

Certificate No. : 22ST297

Job No. : KINS2201202

Issue Date : 11 June 2022

Location of Calibration : BOD Room

Customer Name : EVM LABORATORY CO.,LTD.
10 Soi Pong Sawatdi 10 Tha Sai Sub-district
Mueang Nonthaburi District Nonthaburi Province 11000

Equipment Name : Temperature Chamber

Manufacturer : BIOBASE

Model : BJPX-B250II

Serial No. : 05312026

ID No. : B2021003

Resolution : 0.1 °C


Received Date : 8 June 2022

Calibration Date : 8 June 2022

Ambient Temperature : (25 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Mr.Nirud Runggud
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager

The statement of compliance is based on a 95% coverage probability for the expanded uncertainty.

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DKSH (Thailand) Limited

Technology

141/12 Moo 1, Tambon Payom, TICON Logistics Park (TPARK WANGNO) Phanolyothin Road km. 55.5, Wangnong District,

Phra Nakhon Si Ayutthaya 13170 Phone 0 2004-7208 Fax 0 3579 9832 E-mail: srinichai@dksh.com

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CALIBRATION REPORT

Certificate No. : 22ST297

Job No. : KINS2201202

Condition of this result of calibration :

1. Calibration Procedure :

- This instrument was calibrated by insert 9 standard RTD PT100 into chamber and Calibration according to CP-T06-01 follow up to TLAS G-20-1/02-08 (E) : Guidelines for Calibration and Checks of Temperature Controlled Enclosures
- The temperature scale used was based on ITS - 90 .
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standards Instrument :

Instrument	Serial No. / Ins No.	Certificate No.	Traceability	Due Date
Digital Thermometer with RTD	MY49003268 / No. 1 Channel : 201 to 209	21T1127	DKSH	18 September 2022

This certificate is traceable to The International System of Unit.

3. Condition of Calibrated item : Good

3.1 UUC Description :

Time Constant 1 Hour 6 Minute At 20 °C

Air value or air slider level : Off ; Fan Level : 100%

4. Result of Calibration : Without adjustment

4.1 Environment condition :

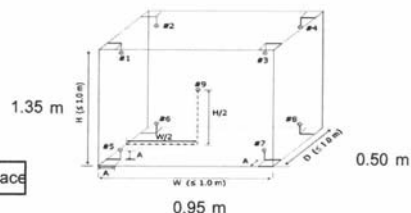
Ambient temperature : Minimum Value 24.7 °C Maximum Value 25.3 °C
Relative humidity : Minimum Value 49.2 % Maximum Value 65.2 %
Line voltage supplied : Minimum Value 227 VAC Maximum Value 229 VAC

4.2 Sensors Installation Diagram :

When ;

A = Distance between sensor and wall of chamber
is 10 % of the length of the each side
(W × D × H)

Sensor installation location in Chamber @ Working Space



CALIBRATION REPORT

Certificate No. : 22ST297

Job No. : KINS2201202

Table1 : Reporting of Temperature

Calibration point (°C)	Average Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty (k = 2) ± (°C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
20	20.54	20.31	20.20	20.28	20.19	20.21	20.21	20.21	20.15	0.32

Table 2 : Reporting of Characterization Result

Indicator Set Point (°C)	Indicator Reading (°C)		Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
	MAX	MIN			
20.0	20.0	20.0	0.09	0.44	0.55

Note

The reference sensor is preferably located of the geometric center

The measured temperature data readout by software "Benchlink Datalogger 3"

The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions.

Overall Variation - The difference of the maximum and minimum measured temperatures throughout observation tin

Indicating Temperature - the average reading of indicating device that forms the integral part of the enclosure.

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

The statements of compliance with specification (or requirement) is based on a 95% coverage probability for the expanded uncertainty of the measurement results on with the decision of compliance is based.

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CALIBRATION REPORT

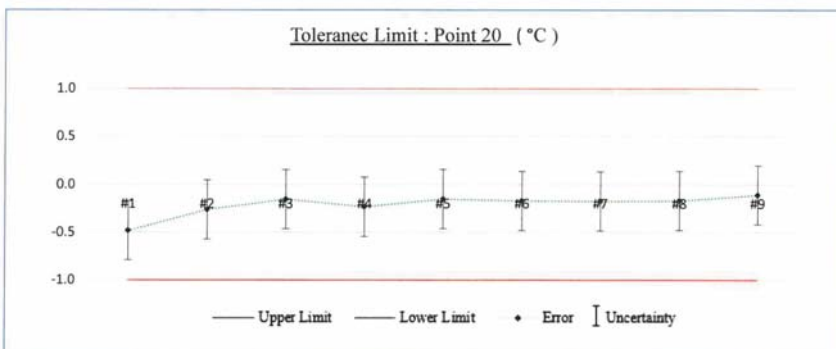
Certificate No. : 22ST297

Job No. : KINS2201202

Result of calibration : Measured Temperature

Calibration Point (°C)	Error + Uncertainty (°C)									Gain of UUC : From the specified of the customer ± (°C)	
	#1	#2	#3	#4	#5	#6	#7	#8	#9		
20	-0.17	0.05	0.15	0.07	0.16	0.14	0.13	0.14	0.20	1.0	-1.0

Calibration Point (°C)	Error - Uncertainty (°C)									Gain of UUC : From the specified of the customer ± (°C)	
	#1	#2	#3	#4	#5	#6	#7	#8	#9		
20	-0.79	-0.57	-0.47	-0.55	-0.46	-0.48	-0.49	-0.48	-0.42	1.0	-1.0



--END--

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ใบตรวจสอบสภาพตัวอย่าง (Check for sample)

Job No. : KINS2201202

Equipment Name : Temperature Chamber

Serial No. : 05312026

Check date 8-Jun-22		รายการตรวจเช็ค (Description)	Check before delivery 8-Jun-22		หมายเหตุ (Remark)
Normal	Defective		Normal	Defective	
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
General					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สวิตช์ เปิด-ปิด เครื่อง (On-Off Swich)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. ปุ่มกด (Keyped)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ความสะอาดภายนอกของตัวเครื่องมือ External cleanliness of the equipmant	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	5. แบตเตอรี่ (Battery)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. คู่มือ (Manual)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. กล่อง (Box)	<input type="checkbox"/>	<input type="checkbox"/>	
Temperature / Humidity					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ (Adapter, power supply 220 / 110V)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	2. สภาพโพรบ (Probe Sensors)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การตอบสนองของปุ่มกด (Button response)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	4. interface / USB	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. ช่องระบายอากาศ (Air vent of the chamber)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. ระดับการทำงานของพัดลม (Fan level of the chamber)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. ตะแกรงภายใน (Grille of the chamber)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	8. ความสะอาดภายในของ (Cleanliness in side the bath)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	9. ความสะอาดภายในของ (Cleanliness in side the chamber)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. ระดับการทำงานปั้มน้ำ (Pump level of bath)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของ (Stirrer of bath)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาพแวดล้อม ณ พื้นที่ตั้งของเครื่องมือ (นอกสถานที่) Environment at the location of the equipment (On-Site)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

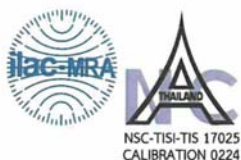
รายละเอียดเพิ่มเติม :

Checked by : Mr.Nirud Runggud
Calibration Engineer

Approved by : Mr.Pramote Ramrong
Laboratory Manager

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FM-QP-8.5-01-01-R01-07/01/21



CALIBRATION CERTIFICATE



Certificate No. : 22ST299
Job No. : KINS2201202

Issue Date : 16 June 2022

Location of Calibration : 3rd Room

Customer Name : EVM LABORATORY CO.,LTD.
10 Soi Pong Sawatdi 10 Tha Sai Sub-district
Mueang Nonthaburi District Nonthaburi Province 11000

Equipment Name : Temperature Chamber

Manufacturer : BIOBASE

Model : BPR-5V588

Serial No. : YC058825210584

ID No. : R2021001

Resolution : 0.1 °C

Received Date : 8 June 2022

Calibration Date : 8 June 2022

Ambient Temperature : (25 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Mr.Nirud Rungdud
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager

The statement of compliance is based on a 95% coverage probability for the expanded uncertainty.

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Technology

141/12 Moo 1, Tambon Payom, TICON Logistics Park (TPARK WANGNOI) Phaholyothin Road km. 55.5, Wangnoi District,

Phra-Nakhon Si Ayutthaya 13170 Phone 0-2301-7208, Fax : 0-3579-9832, E-mail: pramote.r@dksh.com

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Business Unit
Technology



CALIBRATION REPORT

Certificate No. : 22ST299
Job No. : KINS2201202

Condition of this result of calibration :

1. Calibration Procedure :

- This instrument was calibrated by insert 9 standard RTD PT100 into chamber and Calibration according to CP-T06-01 follow up to TLAS G-20-1/02-08 (E) : Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90 .
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standards Instrument :

Instrument	Serial No. / Ins No.	Certificate No.	Traceability	Due Date
Digital Thermometer with RTD	MY49003268 / No. 1 Channel : 201 to 209	21T1127	DKSH	18 September 2022

This certificate is traceable to The International System of Unit.

3. Condition of Calibrated item : Good

3.1 UUC Description :

Time Constant 1 Hour 6 Minute At 4 °C

Air value or air slider level : Off ; Fan Level : 100%

4. Result of Calibration : Without adjustment

4.1 Environment condition :

Ambient temperature : Minimum Value 24.7 °C Maximum Value 25.3 °C

Relative humidity : Minimum Value 49.2 % Maximum Value 65.2 %

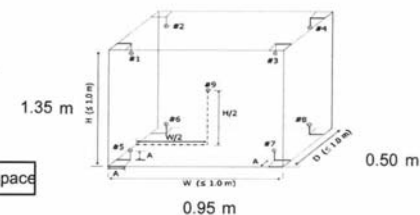
Line voltage supplied : Minimum Value 227 VAC Maximum Value 229 VAC

4.2 Sensors Installation Diagram :

When :

A = Distance between sensor and wall of chamber
is 10 % of the length of the each side
(W × D × H)

Sensor installation location in Chamber @ Working Space



Delivering growth – in Asia and beyond.

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CALIBRATION REPORT

Certificate No. : 22ST299

Job No. : KINS2201202

Table1 : Reporting of Temperature

Calibration point (°C)	Average Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty (k = 2) ± (°C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
4	4.31	4.54	3.66	4.42	3.27	3.60	4.35	3.92	4.82	1.1

Table 2 : Reporting of Characterization Result

Indicator Set Point (°C)	Indicator Reading (°C)		Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
	MAX	MIN			
4.0	4.2	3.8	0.80	1.62	2.90

Note

The reference sensor is preferably located of the geometric center

The measured temperature data readout by software "Benchlink Datalogger 3"

The quoted uncertainty include " Stability " and " Loading effect (20% of Temp Uniformity) "

Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions.

Overall Variation - The difference of the maximum and minimum measured temperatures throughout observation tin

Indicating Temperature - the average reading of indicating device that forms the integral part of the enclosure.

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

The statements of compliance with specification (or requirement) is based on a 95% coverage probability for the expanded uncertainty of the measurement results on with the decision of compliance is based.

Delivering growth – in Asia and beyond.

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CALIBRATION REPORT

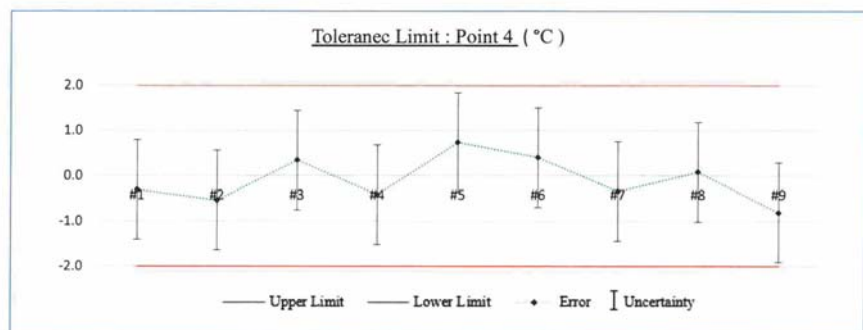
Certificate No. : 22ST299

Job No. : KINS2201202

Result of calibration : Measured Temperature

Calibration Piont (°C)	Error + Uncertainty (°C)									Gain of UUC : From the specified of the customer ± (°C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
4	0.79	0.56	1.44	0.68	1.83	1.50	0.75	1.18	0.28	2.0 -2.0

Calibration Piont (°C)	Error - Uncertainty (°C)									Gain of UUC : From the specified of the customer ± (°C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
4	-1.41	-1.64	-0.76	-1.52	-0.37	-0.70	-1.45	-1.02	-1.92	2.0 -2.0



--END--

Delivering growth – in Asia and beyond.

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ใบตรวจสอบสภาพตัวอย่าง (Check for sample)

Job No. : KINS2201202


Equipment Name : Temperature Chamber

Serial No. : YC058825210584

Check date 8-Jun-22		รายการตรวจเช็ค (Description)	Check before delivery 8-Jun-22		หมายเหตุ (Remark)
Normal	Defective		Normal	Defective	
ปกติ	ไม่ปกติ	<i>General</i>	ปกติ	ไม่ปกติ	
<input type="checkbox"/>	<input type="checkbox"/>	1. สวิตช์ เปิด-ปิด เครื่อง (On-Off Switch)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. ปุ่มกด (Keyped)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ความสะอาดภายนอกของตัวเครื่องมือ External cleanliness of the equipment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	5. แบตเตอรี่ (Battery)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. คู่มือ (Manual)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. กล่อง (Box)	<input type="checkbox"/>	<input type="checkbox"/>	
		<i>Temperature / Humidity</i>			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ (Adapter, power supply 220 / 110V)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	2. สภาพโพรม (Probe Sensors)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การตอบสนองของปุ่มกด (Button response)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	4. interface / USB	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. ช่องระบายอากาศ (Air vent of the chamber)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. ระดับการทำงานของพัดลม (Fan level of the chamber)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. ตะแกรงภายใน (Grille of the chamber)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	1pcs
<input type="checkbox"/>	<input type="checkbox"/>	8. ความสะอาดภายในของ (Cleanliness in side the bath)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	9. ความสะอาดภายในของ (Cleanliness in side the chamber)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. ระดับการทำงานของปั๊ม (Pump level of bath)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของ (Stirrer of bath)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาพแวดล้อม ณ พื้นที่ตั้งของเครื่องมือ (นอกสถานที่) Environment at the location of the equipment (On-Site)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

รายละเอียดเพิ่มเติม :

Checked by : Mr.Nirud Runggud
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager

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FM-QP-8.5-01-01-R01-07/01/21

CALIBRATION CERTIFICATE

Certificate No. : 22ST300

Job No. : KINS2201205

Issue Date : 15 June 2022

Location : Hot Room

Customer Name : EVM LABORATORY CO.,LTD.
10 Soi Pong Sawatdi 10 Tha Sai Sub-district
Mueang Nonthaburi District Nonthaburi Province 11000

Equipment Name : Water Bath

Manufacturer : Memmert

Model : WNB29

Serial No. : L620.0438

ID No. : W2021001

Resolution : 0.1 °C

Received Date : 8 June 2022

Calibration Date : 8 June 2022

Ambient Temperature : (25 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Mr.Santisuk Toskrai
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager

The statement of compliance is based on a 95% coverage probability for the expanded uncertainty.
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DKSH (Thailand) Limited

Technology

141/12 Moo 1, Tambon Payom, TICON Logistics Park (TPARK WANGNOI) Phaholyothin Road km. 55.5, Wangnoi District,
Phra-nakorn Si Ayutthaya 13179 Phone 0-2301 7208, Fax : 0-3579-5632, E-mail: pramote.r@dksh.com

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CALIBRATION REPORT

Certificate No. : 22ST300

Job No. : KINS2201205

1. Calibration Procedure :

- This instrument was calibrated by Digital Thermometer with RTD Fast respond (Agilent 1) into it's Liquid Bath and Calibration according to CP-T05-01 based on ASTM E 715-80 (Reapproved 2006) : Gravity-Convection and Forced-Circulation Water Bath.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standards Instrument :

Instrument	Serial No./Ins No.	Certificate No.	Traceability	Due Date
Digital Thermometer with RTD	MY49024831 / No. 3	21T1171	DKSH	13 November 2022
	Channel : 301 to 305			

This certificate is traceable to The International System of Unit.

3. Condition of Calibrated item : Good

3.1 UUC Description :

Time Constant : 1 Hour 6 Minute At 85 °C

Circulate Pump Level : 1

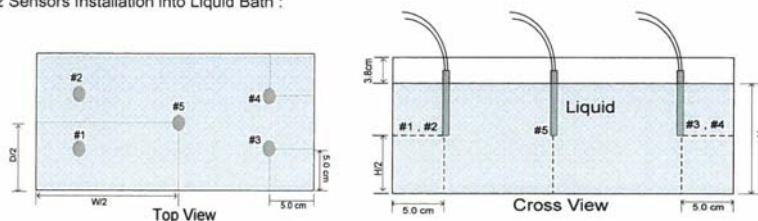
Testing liquid bath use media is Water

4. Result of Calibration : Without Adjustment

4.1 Environment condition :

Ambient temperature : Minimum Value 24.7 °C Maximum Value 25.3 °C
Relative humidity : Minimum Value 49.2 % Maximum Value 65.2 %
Line voltage supplied : Minimum Value 225.3 VAC Maximum Value 227.7 VAC

4.2 Sensors Installation into Liquid Bath :



Position Diagrams

CALIBRATION REPORT

Certificate No. : 22ST300

Job No. : KINS2201205

Table2 : Reporting of Temperature

Calibration point (°C)	Average Measured Temperature (°C) @ Sensor No. (Sensor No.5 is REF)					Uncertainty (k = 2) ± (°C)
	#1	#2	#3	#4	#5	
85.0	85.43	85.26	85.63	85.50	85.60	0.27

Table 3 : Reporting of Characterization Result

Indicator Set point (°C)	Indicator Reading (°C)		Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
	MAX	MIN			
85.0	85.0	85.0	0.13	0.49	0.53

Note :

The measured temperature data readout by software "Benchlink Datalogger 3"

The quoted uncertainty include " Stability " and exclude " Loading effect (20% of Temp Uniformity) "

Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the bath under steady state conditions.Overall Variation - The difference of the maximum and minimum measured temperatures throughout observation time.Indicating Temperature - the average reading of indicating device that forms the integral part of the enclosure.

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

The statements of compliance with specification (or requirement) is based on a 95% coverage probability for the expanded uncertainty of the measurement results on with the decision of compliance is based.

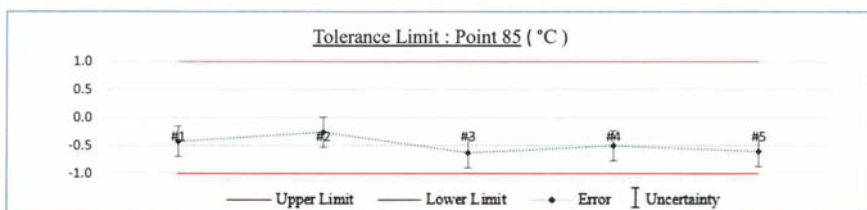
CALIBRATION REPORT

Certificate No. : 22ST300

Job No. : KINS2201205

Result of calibration : Measured Temperature

Calibration Point (°C)	Error + Uncertainty (°C)					Error - Uncertainty (°C)					Gain of UUC : From the specified of the customer ± (°C)	
	#1	#2	#3	#4	#5	#1	#2	#3	#4	#5		
85	-0.16	0.01	-0.36	-0.23	-0.33	-0.70	-0.53	-0.90	-0.77	-0.87	1.0	-1.0



—END—

ใบตรวจสอบสภาพตัวอย่าง (Check for sample)

Job No. : KINS2201205


Serial No. : L620.0438

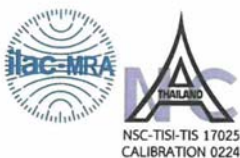
Equipment Name : Water Bath

Check date 8-Jun-22		รายการตรวจเช็ค (Description)	Check before delivery 8-Jun-22		หมายเหตุ (Remark)
Normal	Defective		Normal	Defective	
ปกติ	ไม่ปกติ			ปกติ	
		General			
<input type="checkbox"/>	<input type="checkbox"/>	1. สวิทช์ เปิด-ปิด เครื่อง (On-Off Switich)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. ปุ่มกด (Keyped)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ความสะอาดภายนอกของตัวเครื่องมือ External cleanliness of the equipmant	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	5. แบตเตอรี่ (Battery)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. คู่มือ (Manual)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. กล่อง (Box)	<input type="checkbox"/>	<input type="checkbox"/>	
		Temperature / Humidity			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ (Adapter, power supply 220 / 110V)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	2. สภาพโพรบ (Probe Sensors)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การตอบสนองของปุ่มกด (Button response)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	4. interface / USB	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	5. ช่องระบายอากาศ (Air vent of the chamber)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. ระดับการทำงานของพัดลม (Fan level of the chamber)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตะแกรงภายใน (Grille of the chamber)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความสะอาดภายในของ (Cleanliness in side the bath)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	9. ความสะอาดภายในของ (Cleanliness in side the chamber)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. ระดับการทำงานปั้มน้ำ (Pump level of bath)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของ (Stirrer of bath)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาพแวดล้อม ณ พื้นที่ตั้งของเครื่องมือ (นอกสถานที่) Environment at the location of the equipment (On-Site)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

รายละเอียดเพิ่มเติม :

Checked by : Mr.Santisuk Toskrai
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager



CALIBRATION CERTIFICATE

Certificate No. : 22M27
Job No. : KINS2201214

Issue Date : 16 June 2022

Customer Name : EVM LABORATORY CO.,LTD.
: 10 Soi Pong Sawatdi 10 Tha Sai Sub-district
: Mueang Nonthaburi District Nonthaburi Province 11000

Equipment Name : Standard Weights
Manufacturer : -
Model : -
Serial No. : 64M1618-1
ID No. : S2021001
Condition of Calibrated item : Good
Received Date : 8 June 2022
Calibration Date : 11 June 2022
Ambient Temperature : (20 ± 1.5) °C per hour with a maximum ± 2 °C per 12 hours
Relative Humidity : (50 ± 10) % per hour with a maximum ± 15% per 4 hours
Atmospheric Pressure : (1010 ± 30) mbar
Procedure Used : This calibration was conducted by using in-house calibration procedure
: number CP-M01-01 based on OIML-R111-1: 2004 (E)

Reference Standard

Instrument	Serial No.	Certificate No.	Traceability	Due date
Weight E2 (1g to 20 kg)	3XCO	M1906201S	TCS	22-Jun-2022

This certification is traceable to the International System of Unit.

Calibrated by : Mr.Nirud Runggud
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager

The statement of compliance is based on a 95% coverage probability for the expanded uncertainty.
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Technology

141/12 Moo 1, Tambon Payom, TICO Logistics Park (TPARK WANGNOI) Phaholyothin Road km. 55.5, Wangnoi District,

Phra-nakhon Si Ayutthaya 13170. Phone 0-2301-7208. Fax: 0-3579-9832. E-mail: pramote.@@dksh.com

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PAGE 1/3




CALIBRATION REPORT

Certificate No. : 22M27
Job No. : KINS2201214

Result of calibration : Without Adjustment

Nominal Value	Weight No. ID No.	Conventional Mass	Uncertainty (k = 2)	Maximum permissible error
50 mg	-	50 mg + 0.019 mg	± 0.01 mg	± 0.04 mg Class F1
100 mg	-	100 mg + 0.018 mg	± 0.02 mg	± 0.05 mg Class F1
2 g	-	2 g + 0.055 mg	± 0.04 mg	± 0.12 mg Class F1
5 g	-	5 g + 0.077 mg	± 0.05 mg	± 0.16 mg Class F1
100 g	-	100 g + 0.110 mg	± 0.16 mg	± 0.50 mg Class F1


This result of calibration was found accurate as shown on date and place of calibration only.
The statements of compliance with specification (or requirement) is based on a 95% coverage probability for the expanded uncertainty of the measurement results on with the decision of compliance is based.

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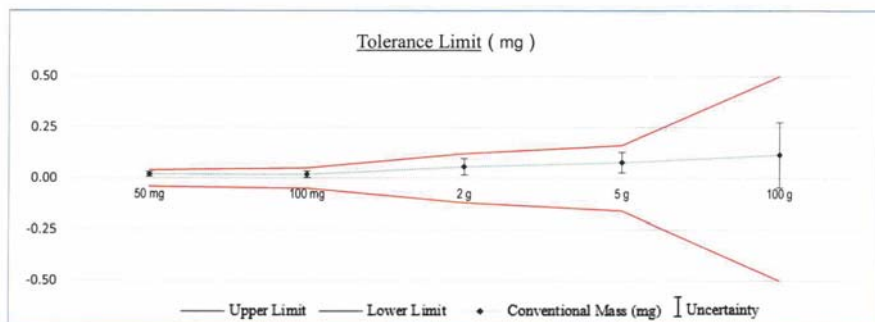
PAGE 2/3

CALIBRATION REPORT

Certificate No. : 22M27
Job No. : KINS2201214

Result of calibration : Without Adjustment

Nominal Value	Conventional + Uncertainty	Conventional - Uncertainty	Maximum permissible error (OIML R 111-1)	
50 mg	0.031 mg	0.007 mg	0.04 mg	-0.04 mg
100 mg	0.034 mg	0.002 mg	0.05 mg	-0.05 mg
2 g	0.095 mg	0.015 mg	0.12 mg	-0.12 mg
5 g	0.127 mg	0.027 mg	0.16 mg	-0.16 mg
100 g	0.270 mg	-0.050 mg	0.50 mg	-0.50 mg



--END--

ใบตรวจสอบสภาพตัวอย่าง (Check for sample)

Equipment Name : Standard Weights
Job No. : KINS2201214
Serial No. : 64M1618-1

Check date 8-Jun-22		รายการตรวจเช็ค (Description)	Check before delivery 11-Jun-22		หมายเหตุ (Remark)
Normal	Defective		Normal	Defective	
ปกติ	ไม่ปกติ	General	ปกติ	ไม่ปกติ	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสะอาดภายนอกของตัวเครื่องมือ External cleanliness of the equipment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. กล่อง (Box)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		Mass			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. รอยขีดข่วน (Abrasion)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความเรียบผิว (Surface smoothness)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. ลักษณะรูปทรง (Shape characteristics)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ความเป็นมันวาวของพื้นผิว (Luster of the surface)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. คีมคีบค้อนน้ำหนัก (Tweezers)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

รายละเอียดเพิ่มเติม :

Checked by : Mr.Nirud Runggud
Calibration Engineer

Approved by : 
Mr.Pramote Ramrong
Laboratory Manager



Inctech Metrological Center Co.Ltd.
39/1 Soi 82, Sukhapiban 5 Rd., O ngoen,
Saimai, Bangkok 10220, Thailand
Tel. (662) 909-8820 (Auto 10 lines) www.imcinstrument.com



Certificate of Calibration

Certificate No. : MT21-5286
Page : 1 of 2

Customer : EVM Laboratory Co.,Ltd.
Address : 10 Soi Pong Sawatdi 10 Tha Sai Sub-district Mueang Nonthaburi District
Nonthaburi Province 11000
Description : Liquid in Glass Thermometer
Manufacturer : Precision
Model : 0 - 100 °C
Serial No. : N/A
Identification No. : T100-21-001/1
Calibration Place : Temperature Laboratory
Order No. : 2836/21
Received date : Oct 11, 2021
Calibration date : Oct 11, 2021
Environment Condition :
Temperature : (23+/-3) °C
Humidity : (50+/-15) %RH
Calibration Method : Calibration were conducted using In-house calibration procedure CP-MT-001 According to comparison with Standard Digital Thermometer with 2 PRT.
The calibration methods based on ITS-90.

Reference Standard Instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
Standard Digital Thermometer with 2 PRT	1586A/5609/5609	41130006/00543/03713	TE20-0351	Dec 06, 2021

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

Traceability : This measurement are traceable to the International System of Unit (SI), through
National Institute of Metrology Thailand (NIMT)

The reported uncertainty of measurement was base on standard uncertainty multiplied by coverage factor $k = 2$,
providing a level of confidence of not less than 95%



Calibrated by : Miss Jarunee Tubsay
Issue date : Oct 11, 2021

Approved by : (Mr. Panuwat Phuklan)

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Certificate No. : MT21-5286
Page : 2 of 2

Result : Without Adjustment
Function : Temperature measurement
Resolution : 0.1 °C
Type : Total immersion
Calibration point : 0, 20, 25, 30 °C

Immersion depth (mm)	Calibration point (°C)	Standard reading (°C)	UUC* reading (°C)	UUC* correction (°C)	Uncertainty of measurement (+/- °C)
-	0	0.003	0.0	0.003	0.08
-	20	20.002	20.0	0.002	0.08
-	25	25.002	25.0	0.002	0.08
-	30	30.006	30.0	0.006	0.08
-	0	0.007	0.0	0.007	0.08

UUC* = Unit under calibration



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Saimai, Bangkok 10220, Thailand
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Certificate of Calibration

Certificate No. : MT21-4488

Page : 1 of 2

Customer : EVM Laboratory Co.,Ltd.

Address : 10 Soi Pong Sawatdi 10 Tha Sai, Muang Nonthaburi, Nonthaburi 11000

Description : Block Digestion System

Manufacturer : behr Labor

Model : K8

Serial No. : 106 1275

Identification No. : N/A

Calibration Place : Temperature Laboratory

Order No. : 2296-21

Received date : Aug 20, 2021

Calibration date : Aug 21, 2021

Environment Condition :

Temperature : (23+/-3) °C

Humidity : (50+/-15) %RH

Calibration Method : Calibration were conducted using In-house calibration procedure CP-MT-001 According to comparison with Standard Digital Thermometer with 2 PRT.

Reference Standard Instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
Standard Digital Thermometer with 2 PRT	1586A/5609/5609	41130006/00543/03713	TE20-0351	Dec 06, 2021

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

Traceability : This measurement are traceable to the International System of Unit (SI), through National Institute of Metrology Thailand (NIMT)

The reported uncertainty of measurement was base on standard uncertainty multiplied by coverage factor $k = 2$, providing a level of confidence of not less than 95%



Calibrated by : Mr.Choophong Khumdet

Issue date : Aug 21, 2021

Approved by :

(Mr.Panuwat Phuktan)

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Certificate No. : MT21-4488

Page : 2 of 2

Function : Temperature measurement

Calibration point : 380 °C

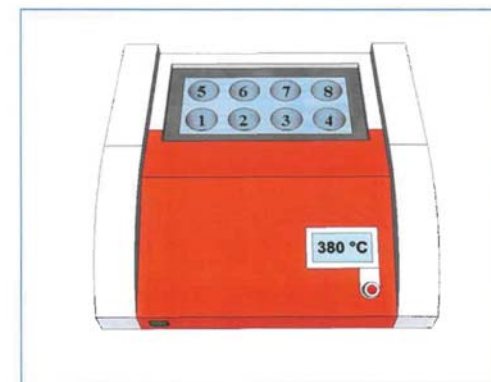
Immersion depth : 50 mm

Result : Without adjustment

Resolution : 1 °C

Media : Sand

Position No.	UUC* setting (°C)	UUC* reading (°C)	Standard reading (°C)	UUC* correction (°C)	Uncertainty of measurement (+/- °C)
1	380	380	380.76	0.76	0.58
2	380	380	380.82	0.82	0.58
3	380	380	380.68	0.68	0.58
4	380	380	380.71	0.71	0.58
5	380	380	380.68	0.68	0.58
6	380	380	380.77	0.77	0.58
7	380	380	380.80	0.80	0.58
8	380	380	380.73	0.73	0.58



Front View

UUC* = Unit under calibration

❖ เอกสารเครื่องมือเทียบ บริษัท ท็อปส์-แลบ คอนซัลแตนท์ จำกัด





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert.No.: 21CH720/1
Page.: 1 of 3

Certificate of Calibration

This Certificate was issued to replace to the Certificate No. 21CH720

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : Seven Compact S220
Serial No. : B635935610
ID No. : TLC-L067
Condition As-Received: Used Item
Received Date : 28 May 2021
Calibration Date : 2 - 8 June 2021
Reference : 2105-0880DN-1
Submitted by : **Tops-Lab Consultants Co.,Ltd**
189 Moo 3, Bangrakpattana,
Bangbuathong, Nonthaburi 11110

Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with standard
voltage calibrator and direct measurement with
reference material (RM)
- CP-CH8 by comparison with standard thermometer

Calibrated by : Warakorn Lerngagtrakul

Approved by : 
Approved Signatory

(✓) Malee Butkruea
() Salthip Meangmai
() Warakorn Lerngagtrakul

Issue Date : 21 June 2021

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 head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0029133



Cert.No.: 21CH720/1
Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument : -

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	43160066	130RC092	21E1223/1	27 Apr 2022
2) Ref. Standard Thermometer	2188080	130RC044	2011389	19 Nov 2021

This certification is traceable to the International System of Unit maintained at:-
- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	725926	13 Jan 2023
pH 6.985	CPA chem	722285	19 Dec 2021
pH 10.012	CPA chem	725928	12 Jan 2022

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration Results

Function : mV Measurement

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

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
	pH	mV	mV	pH		
pH Meter	4.000	177.48	177.4	4.000	0.058	2.00
S/N.: B635935610	7.000	0.00	0.0	7.000	0.058	2.00
	10.000	-177.48	-177.4	10.000	0.058	2.00

a 1059265



Cert.No.: 21CH720/1
Page.: 3 of 3

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (\pm)	Coverage factor k
pH Electrode S/N.: 6455014	4.008	4.006	174.6	0.0045	2.00
	6.985	6.987	0.6	0.0081	2.00
	10.012	10.007	-172.5	0.013	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLab Expert Pro-ISM

- Serial No. : 6455014

Dimension of probe;

- Length : 120 mm.

- Diameter : 12 mm.

- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (\pm °C)	Coverage factor k
23.0	23.005	23.0	-0.005	0.20	2.00
25.0	25.004	25.0	-0.004	0.20	2.00
27.0	27.005	27.0	-0.005	0.20	2.00

Remark : - UUC* = Unit Under Calibration

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

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malu.

a 1059264



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 : 22T4927
REFERENCE No : 65109-6

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF 55
SERIAL No : D215.1343
ID No : TLC-L070
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TOPS-LAB CONSULTANTS CO., LTD.
189 MOO.3 BANGRAKPHATTHANA
BANGBUATHONG NONTABURI 11110

CALIBRATED BY : CHAICHARN CH.

CALIBRATION DATE : 23-May-22

APPROVED BY : PONGSAK J.

ISSUED DATE : 31-May-22

RECEIVED DATE : 23-May-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, Bangkac, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 22T4927

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF 55
ID No : TLC-L070
RECEIVED DATE : 23-May-22
AMBIENT TEMPERATURE : 21 °C ± 1 °C

S/N : D215.1343
CALIBRATION DATE : 23-May-22
RELATIVE HUMIDITY : 52 %RH ± 10 %RH

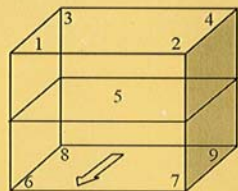
CONDITION OF THIS RESULTS OF CALIBRATION

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 : 3

Overall Line Voltage (V) variation : 7

Instrument Condition : Normal

Chamber Size (W*L*H): 40*33*40 cm

CHAMBER PERFORMANCE

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	35.0	0.13	0.34	0.47
44.5	44.5	0.07	0.33	0.52

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	34.93	35.06	35.12	35.18	35.16	34.89	34.95	35.01	35.14	0.25
44.5	44.5	44.71	44.70	44.81	44.75	44.72	44.82	44.54	44.79	44.95	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

**Harikul Science Co.,Ltd.**

694 Soi Ratchadanivet 24, Pracharatbamphen,
Samsaennok, Huaikhwang, Bangkok 10310
Tel: 0-2274-2456 Fax: 0-2274-2443
Email: info@harikul.com, www.harikul.com
Certificate of Calibration

CERT.No.: HS-R016F

Calibration Date : 2 Jun 21

Submitted by : TOPS-LAB CONSULTANTS CO.,LTD.

189 moo3 Bangrakpattana Bangbuathong Nonthaburi

11110

Avg Room Temp : 20 °C

Avg Water Temp : 20 °C

Air Pressure : 760.00 mmHg

Salinity : 0 ppt

Model : YSI 5000

S/N : 13K100714

Probe : YSI 5010

S/N : 13J100364

ID NO. : TLC-L019

Air Temp ref : S/N. E00522

Barometric ref : S/N. E00522

Water Temp ref : S/N. 11431

Technician : Kittipong M.

Calibration Details

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

Mean Measurement	9.08	mg/l	-	-
Inaccuracy	0.01	mg/l	-	-

Overall Status (PASS)

Manufacturer Specification

Accuracy = +/- 0.02 mg/l

1) This certificate is issued based on the result that are found as shown on date and place of test only.

2) The calibration procedure followed in accordance with Harikul Science Co., Ltd.

3) This result shall not be used for advertising purpose.

Technician Signature

Laboratory Manager

**QUALITY CALIBRATION CO.,LTD.**235 Petchkasem 63/2 Road, Laksong, Bangkac, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584www.qcalibration.comCERTIFICATE No : 21M5660
REFERENCE No : 61413-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : ELECTRONIC BALANCE

MANUFACTURER : METTLER TOLEDO

MODEL : MS205DU

SERIAL No : B420605448

ID No : TLC-L038

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : TOPS-LAB CONSULTANTS CO., LTD.
189 MOO 3 BANGRAKATTANA
BANGBUATHONG NONTHABURI 11110

CALIBRATED BY : ATSAWIN Y.

CALIBRATION DATE : 08-Jun-21

APPROVED BY : PONGSAK J.

ISSUED DATE : 09-Jun-21

RECEIVED DATE : 08-Jun-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 : 21M5660

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : ELECTRONIC BALANCE MODEL : MS205DU

MANUFACTURER : METTLER TOLEDO S/N : B420605448

ID No : TLC-L038 RECEIVED DATE : 08-Jun-21

AIR PRESSURE : 1008mbar \pm 1mbar CALIBRATION DATE : 08-Jun-21

AMBIENT TEMPERATURE : 25° C \pm 1° C RELATIVE HUMIDITY : 52 %RH \pm 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS 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	M21032358	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 :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL
2. TARE FUNCTION : NORMAL
3. REPEATABILITY OF READING AT 200 g WAS 0.000055 g
4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.0	0.00000	0.00000	0.000066
0.1	0.10002	-0.00002	0.000066
0.2	0.20003	-0.00003	0.000067
0.5	0.50003	-0.00003	0.000065
1.0	1.00004	-0.00004	0.000066
2.0	2.00002	-0.00002	0.000067
5.0	5.00000	0.00000	0.000068
10.0	9.99999	0.00001	0.000070
20.0	19.99994	0.00006	0.000075
50.0	49.99987	0.00013	0.00013
100.0	99.9998	0.0002	0.00019
200.0	199.9995	0.0005	0.00032

5. OFF CENTER LOADING ERROR

POINT	READING (g)
1	99.9997
2	99.9998
3	99.9997
4	99.9998
5	99.9998
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

**QUALITY CALIBRATION CO.,LTD.**

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CERTIFICATE No : 21T5663
REFERENCE No : 61413-4

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : HOT AIR OVEN (AIR CHAMBER)
MANUFACTURER : BINDER
MODEL : FED 53
SERIAL No : 07-29050
ID No : TLC-L004
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TOPS-LAB CONSULTANTS CO., LTD.
189 MOO 3 BANGRAKATTANA BANGBUATHONG
NONTABURI 11110

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 08-Jun-21

APPROVED BY : PONGSAK J.

ISSUED DATE : 09-Jun-21

RECEIVED DATE : 08-Jun-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

**QUALITY CALIBRATION CO.,LTD.**

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CERTIFICATE No : 21T5663

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : HOT AIR OVEN (AIR CHAMBER)
MANUFACTURER : BINDER
MODEL : FED 53
ID No : TLC-L004
RECEIVED DATE : 08-Jun-21
AMBIENT TEMPERATURE : 25 °C ± 1 °C
S/N : 07-29050
CALIBRATION DATE : 08-Jun-21
RELATIVE HUMIDITY : 51 %RH ± 10 %RH

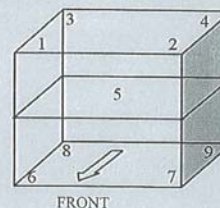
CONDITION OF THIS RESULTS OF CALIBRATION

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 NINE POINTS AND LOCATED ONE THERMOCOUPLE 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 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	8009008	2017223	11-Jul-21

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 : 2

Overall Line Voltage (V) variation : 12

Instrument Condition : Normal

Chamber Size (W*L*H): 40*33*40 cm

CHAMBER PERFORMANCE

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
104	104	0.6	1.9	2.9
180	180	1.0	3.8	5.1

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	
104	104	105.0	102.9	103.8	103.5	103.9	105.4	104.0	104.4	104.8	1.1
180	180	181.4	177.7	179.3	178.8	180.4	179.3	177.2	179.6	178.9	1.8

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 : 21T5670

REFERENCE No : 61414-3

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
MODEL : WNB 14
SERIAL No : L410.1294
ID No : TLC-L009
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TOPS-LAB CONSULTANTS CO., LTD.
189 MOO 3 BANGRAKATTANA BANGBUATHONG
NONTABURI 11110

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 08-Jun-21

APPROVED BY : PONGSAK J.
ISSUED DATE : 09-Jun-21
RECEIVED DATE : 08-Jun-21

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F-G010 REV : 02

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CERTIFICATE No : 21T5670

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
ID NUMBER : TLC-L009
RECEIVED DATE : 08-Jun-21
AMBIENT TEMPERATURE : 25 °C ± 1 °C
MODEL : WNB 14
SERIAL NUMBER : L410.1294
CALIBRATION DATE : 08-Jun-21
RELATIVE HUMIDITY : 50 %RH ± 10 % RH

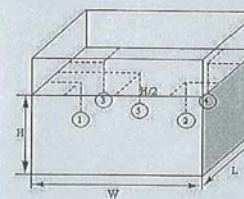
CONDITION OF THIS RESULTS OF CALIBRATION

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	20T6466	06-Jul-21

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 ADJUSTMENTPROBE INSTALLATION
POSITION IN THE BATH**GENERAL INFORMATION**

Overall Variation of Ambient Temperature around the Bath (°C) : 0
Overall Variation of Line Voltage (V) : 10
Instrument Condition : Normal
Bath Inner Size (W*L*H) : 36*33*16 cm

BATH PERFORMANCE

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
85.0	85.0	0.14	0.20	0.46
95.0	95.0	0.15	0.53	0.72

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	
85.0	85.0	85.10	85.00	85.06	84.91	85.11	0.21
95.0	95.0	93.67	93.28	93.41	93.15	93.43	0.21

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

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Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584
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CERTIFICATE No : 22T4934
REFERENCE No : 65110-5

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : AUTOCLAVE
MANUFACTURER : ZEALWAY
MODEL : GI54TW
SERIAL No : A515D096
ID No : TLC-L081
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TOPS-LAB CONSULTANTS CO., LTD.
189 MOO.3 BANGRAKPHATTHANA
BANGBUATHONG NONTABURI 11110

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 23-May-22

APPROVED BY :
PONGSAK J.

ISSUED DATE : 23-May-22

RECEIVED DATE : 23-May-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.**

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CERTIFICATE No : 22T4934

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : AUTOCLAVE
MANUFACTURER : ZEALWAY
ID NUMBER : TLC-L081
RECEIVED DATE : 23-May-22
AMBIENT TEMPERATURE : 29° C ± 1° C
MODEL : GI54TW
SERIAL NUMBER : A515D096
CALIBRATION DATE : 23-May-22
RELATIVE HUMIDITY : 57 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BASED ON BS 2646 : Part 5 : 1993 BY COMPARISON WITH CALIBRATED THERMOCOUPLE TYPE K UNDER NO LOAD CONDITION. THE THERMOCOUPLES WERE PLACED ON FIVE LOCATIONS AS SHOWN IN THE PICTURE. TWO PROBES WERE PLACES NEAR TOP AND BOTTOM WALL AND EACH PROBE WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND PLACED THE THIRD PROBE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE INSTRUMENT CHAMBER. PROBE NUMBER 4 WAS ATTACHED TO THE LOAD TEMPERATURE PROBE, IF FITTED, WITHIN 20 mm OF ITS TIP. PROBE NUMBER 5 WAS PLACED IN THE CHAMBER DRAIN OR VENT WITHIN 100 mm OF ITS CONNECTION TO THE CHAMBER.

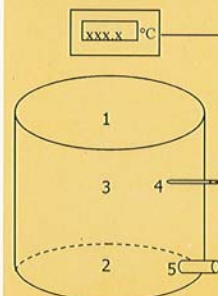
2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH TC TYPE K	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 variation : 0 °C
Autoclave Condition : Normal
Chamber Size (Diameter*H): 32 * 75 cm

CHAMBER PERFORMANCE

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)	Pressure (MPa)	Holding time (min)	Operating Cycle time (min)
121.0	121.0	0.1	0.2	0.3	0.12	15	60

TEMPERATURE MEASUREMENT ACCURACY TEST(° C)

Cont Temp	Ind Temp	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	#5	
121.0	121.0	121.78	121.79	121.66	121.74	121.80	0.65

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

NOTE 2 : THE STABILITY TERM IN THE UNCERTAINTY BUDGET WAS REPLACED BY THE STANDARD REPEATABILITY.

NOTE 3: LOCATION 3 WAS REFERENCE LOCATION.

NOTE 4: 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