

ภาคผนวก ง

ใบรับรองการสอบเทียบเครื่องมือ



right solutions.
right partner.

รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

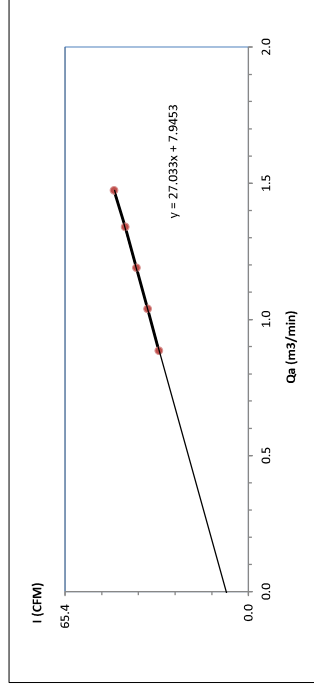
Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Ambient	Particulate Matter (PM-10)	High Volume	SGK_F50064	-	-	-
Ambient	Particulate Matter (PM-10)	Digital Balance	BKK_EN0043	30-May-25	30-May-26	12
Ambient	Total Suspended Particulate	High Volume	SGK_F50059	-	-	-
Ambient	Total Suspended Particulate	Digital Balance	BKK_EN0043	30-May-25	30-May-26	12
Songkhla Lab	Arsenic	ICP-AES	SGK_CL0048	4-Feb-25	3-Aug-26	18
Songkhla Lab	Arsenic	Cold Room	SGK_CL0065	1-Jul-24	1-Jan-26	18
Songkhla Lab	Cadmium	ICP-AES	SGK_CL0048	4-Feb-25	3-Aug-26	18
Songkhla Lab	Cadmium	Cold Room	SGK_CL0065	1-Jul-24	1-Jan-26	18
Songkhla Lab	Chromium	ICP-AES	SGK_CL0048	4-Feb-25	3-Aug-26	18
Songkhla Lab	Chromium	Cold Room	SGK_CL0065	1-Jul-24	1-Jan-26	18
Songkhla Lab	Copper	ICP-AES	SGK_CL0048	4-Feb-25	3-Aug-26	18
Songkhla Lab	Copper	Cold Room	SGK_CL0065	1-Jul-24	1-Jan-26	18
Songkhla Lab	Iron	ICP-AES	SGK_CL0048	4-Feb-25	3-Aug-26	18
Songkhla Lab	Iron	Cold Room	SGK_CL0065	1-Jul-24	1-Jan-26	18
Songkhla Lab	Lead	ICP-AES	SGK_CL0048	4-Feb-25	3-Aug-26	18
Songkhla Lab	Lead	Cold Room	SGK_CL0065	1-Jul-24	1-Jan-26	18
Songkhla Lab	Manganese	ICP-AES	SGK_CL0048	4-Feb-25	3-Aug-26	18
Songkhla Lab	Manganese	Cold Room	SGK_CL0065	1-Jul-24	1-Jan-26	18
Songkhla Lab	Zinc	ICP-AES	SGK_CL0048	4-Feb-25	3-Aug-26	18
Songkhla Lab	Zinc	Cold Room	SGK_CL0065	1-Jul-24	1-Jan-26	18
Songkhla Lab	Mercury	ICP-AES	SGK_CL0048	4-Feb-25	3-Aug-26	18
Songkhla Lab	Mercury	Cold Room	SGK_CL0065	1-Jul-24	1-Jan-26	18
Songkhla Lab	pH at 25 °C	Electronic Top-Loading Balance	SGK_CL0030	19-Oct-24	19-Apr-26	18
Songkhla Lab	Total Dissolved Solids 180°C	Electronic Top-Loading Balance	SGK_CL0045	10-Jan-25	10-Jan-26	12
Songkhla Lab	Total Dissolved Solids 180°C	Oven	SGK_CL0024	19-Oct-24	19-Apr-26	18
Songkhla Lab	Turbidity	Turbidity Meter	SGK_F50046	30-May-25	30-May-26	12
Songkhla Lab	BOD	Incubator	SGK_CL0028	10-Jan-25	10-Jan-26	18
Songkhla Lab	BOD	DO Meter With Sensor	SGK_CL0101	24-Feb-25	24-Feb-26	12
Songkhla Lab	Oil & Grease	Electronic Top-Loading Balance	SGK_CL0045	10-Jan-25	10-Jan-26	12
Songkhla Lab	Oil & Grease	Oven	SGK_CL0024	19-Oct-24	19-Apr-26	18
Songkhla Lab	Oil & Grease	Water Bath	SGK_CL0035	10-Jan-25	10-Jan-26	18
Songkhla Lab	Sulfide	Cold Room	SGK_CL0065	1-Jul-24	1-Jan-26	18
Songkhla Lab	Total Suspended Solids	Electronic Top-Loading Balance	SGK_CL0045	10-Jan-25	10-Jan-26	12
Songkhla Lab	Total Suspended Solids	Oven	SGK_CL0024	19-Oct-24	19-Apr-26	18
Songkhla Lab	Total Kjeldahl Nitrogen	KJELDATHERM@BLOCK-DETECTION	SGK_CL0092	25-Feb-25	25-Feb-26	12
Songkhla Lab	Total Coliform	Autoclave	SGK_ML0001	1-Jul-24	1-Jan-26	18
Songkhla Lab	Total Coliform	Incubator	SGK_ML0013	3-Jul-25	3-Jan-27	18
Songkhla Lab	Total Coliform	pH Meter	SGK_ML0016	2-Jul-24	2-Jan-26	18
Songkhla Lab	Total Coliform	Water Bath	SGK_ML0021	1-Jul-24	1-Jan-26	18
Songkhla Lab	<i>Escherichia coli</i>	Autoclave	SGK_ML0002	1-Jul-24	1-Jan-26	18
Songkhla Lab	<i>Escherichia coli</i>	Incubator	SGK_ML0013	3-Jul-25	3-Jan-27	18
Songkhla Lab	<i>Escherichia coli</i>	pH meter	SGK_ML0016	2-Jul-24	2-Jan-26	18
Songkhla Lab	<i>Escherichia coli</i>	Water Bath	SGK_ML0021	1-Jul-24	1-Jan-26	18
Songkhla Lab	Fecal Coliform	Autoclave	SGK_ML0001	1-Jul-24	1-Jan-26	18
Songkhla Lab	Fecal Coliform	Incubator	SGK_ML0013	3-Jul-25	3-Jan-27	18
Songkhla Lab	Fecal Coliform	pH Meter	SGK_ML0016	2-Jul-24	2-Jan-26	18
Songkhla Lab	Fecal Coliform	Water Bath	SGK_ML0021	1-Jul-24	1-Jan-26	18
Water Lab	Nitrate	Ion Chromatography	BKK_EN0069	24-Jun-25	24-Jun-26	12
Water Lab	Chloride	Ion Chromatography	BKK_EN0069	24-Jun-25	24-Jun-26	12
Water Lab	Sulfate	Ion Chromatography	BKK_EN0069	24-Jun-25	24-Jun-26	12



High Volume Air Sampler Calibration Worksheet

Project Site :	Southern Star Hotel Co.,Ltd.	Barometric Pressure (mm Hg) :	758.0
Calibrate Location :	บริเวณพื้นที่โครงการ	Temperature (°C) :	29.0
Calibrate Date :	8-Sep-25	High Volume ID :	SGK_F50064
Calibration Sheet No.:	C-080925-SGK_F50064	High Volume Model :	TE-5009X
Calibrator ID:	SGK_F50034	High Volume S/N :	5579
Calibrator Model :	TE-5028A	Calibrator Slope :	0.98245
Calibrator S/N :	3449	Calibrator Intercept :	-0.02325

Test No.	Delta H ₂ O (inch)	Qa (m ³ /min)	I: Chart (CFM)	Linear Regression
1	1.8	0.885	32	Slope : 27.0330
2	2.5	1.039	36	Intercept : 7.9453
3	3.3	1.190	40	Correlation Coefficient: 0.9997
4	4.2	1.340	44	
5	5.1	1.474	48	



Calibrated by

Signature

(Mr. Apiwat Chanta)
SGK Field Services Scientist (2)

Approved by :

Signature

(Mr. Supot Salamteah)
Field Services Section Head

Accredited by

NSC-TISI-TIS 17025

Calibration 0426



Calibration certificate

Calibration Certificate No. 25BC10197

Object	Electronic non-automatic weighing instrument	This calibration certificate documents the traceability to national standards. Uncertainties of measurements are taken into account when only statements of compliance are made. This certificate was prepared by Sartorius Corporation in accordance to the current ISO/IEC 17025:2017 standard and Sartorius Work Instruction (Method) SOP WI 08. This certificate relate and apply this equipment only.
Manufacturer	Ohaus	
Type	EX225D/AD	
Serial QM Ident. no.	C309774648 BKK_EN0403	
Customer	ALS Laboratory Group (Thailand)Co., Ltd.	
Order no.	261969	104 Phatthanakarn 40,Phattanakarn Rd.,Khwaeng Phatthanakarn ,Khet Suan Luang,Bangkok 10250
Number of pages	6	261969
Date of calibration	30 May 2025	30/05/26

This calibration certificate may not be reproduced other than in full except with the permission of NSC-TISI-TIS-17025 and the issuing laboratory. Calibration certificates without signature are not valid.

The user is obliged to have the object recalibrated at appropriate intervals.

Date30 May 2025

Approval of the Calibration Certificate

Person in charge



Mr. Chonchai Inthana

Chonchai Inthana

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang
10310 Bangkok

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Version 6.5

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Calibration certificate No.: 25BC10197

Calibration Certificate

Calibration object

Multi range instrument

ModelEX225D/AD

Serial NumberC309774648

QM Ident. no | Inventory no.BKK_EN0403 | ---

Range12

Maximum capacity (Max. load)120.00000 g220.0000 g

Measured range120.00000 g220.0000 g

Scale interval0.00001 g0.0001 g

Place of calibration

AddressAccording to page 1

Department | Cost centerEnvironment Department. | ---

Building | Floor--- | 1st Floor.

RoomLaboratory Room.

Maximum temperature variation at place of calibration5 K

Calibration procedure

EURAMET cg-18, V4.0 - Guidelines on the Calibration of Non-Automatic Weighing Instruments

Test equipment	Test equipment type	Test equipment ID	Valid until
Thermometer	Testo 174(Traceable to Si unit through ENTECH)		11 Nov 2025
Test weight set OIML R111 E2	Certificate No.M2308197S ,E2(Traceable to SI unit through TCS)		23 Aug 2025

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang
10310 Bangkok

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Range 1

Adjustment Status

The measuring device was internally adjusted before the calibration.

Environmental and measuring conditions

Date of calibration
30 May 2025
Temperature at place of calibration | Temp. diff.
21.7 °C | 0.5 K
 $T_{\text{weights}} - T_{\text{place}}$
Measuring conditions
The installation site is suitable. The device was levelled. Balance was loaded up to Max before test.
Comments
Humidity 60.0 %RH.

Measurement results | Measurement uncertainties

Repeatability		Eccentricity	
Test load (nominal): 1 g 100 g		Test load (nominal): 50 g	
1 g	100 g	Center	49.9996 g
0.99983 g	99.9971 g	Front left	49.9993 g
0.99991 g	99.9971 g	Back left	49.9993 g
0.99992 g	99.9974 g	Back right	49.9994 g
0.99993 g	99.9973 g	Front right	49.9990 g
0.99992 g	99.9974 g	Maximum deviation from centric loading indication	
0.99991 g	99.9970 g	Δ _{load} max = 0.00006 g	
0.99983 g	99.9973 g		
0.99984 g	99.9972 g		
0.99995 g	99.9971 g		
0.99995 g	99.9969 g		
s = 0.000014 g s = 0.000017 g			

Error of indication

Testload	Indication	Error	Expansion factor	Uncertainty	Uncertainty relative
L	I	E	k	U(E)	U _{rel} (E)
0.00000 g	0.00000 g	0.00000 g	2.00	0.000030 g	---
0.01000 g	0.00995 g	-0.00005 g	2.00	0.000037 g	0.37 %
0.10000 g	0.09991 g	-0.00009 g	2.00	0.000038 g	0.038 %
0.50000 g	0.49985 g	-0.00015 g	2.00	0.000040 g	0.0080 %
1.00000 g	0.99991 g	-0.00009 g	2.00	0.000041 g	0.0041 %
5.00002 g	4.99997 g	-0.00005 g	2.00	0.000050 g	0.0010 %
10.00002 g	10.00003 g	0.00001 g	2.00	0.000069 g	0.00069 %
50.00002 g	49.99972 g	-0.00030 g	2.00	0.000091 g	0.00018 %
70.00004 g	69.99975 g	-0.00029 g	2.00	0.00017 g	0.00024 %
100.00001 g	99.99958 g	-0.00043 g	2.00	0.00017 g	0.00017 %
115.00006 g	114.99966 g	-0.00040 g	2.00	0.00028 g	0.00024 %
Maximum error of indication		E _{max} = 0.00043 g			

$U_{rel}(E)$ is the quotient of $U(E)$ and test load L . The uncertainty of measurement $U(E)$ is valid only if error E is considered. You will find reference notes on the uncertainty of measurement in use under: Appendix to the calibration certificate | Interpretation of measurement results.
The uncertainty of measurement is also the expanded uncertainty U_{exp} if the measurement result is multiplied by the documented expansion factor, determined in accordance with the European Calibration Guideline EURAMET-19-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

Range 2

Adjustment Status

The measuring device was internally adjusted before the calibration.

Environmental and measuring conditions

Date of calibration
30 May 2025
Temperature at place of calibration | Temp. diff.
21.7 °C | 0.5 K
 $T_{\text{weights}} - T_{\text{place}}$
Measuring conditions
The installation site is suitable. The device was levelled. Balance was loaded up to Max before test.
Comments
Humidity 60.0 %RH.

Measurement results | Measurement uncertainties

Repeatability		Eccentricity	
Test load (nominal): 200 g		Test load (nominal): 100 g	
200 g	Center	99.9984 g	100 g
199.9988 g	Front left	99.9990 g	
199.9988 g	Back left	99.9993 g	
199.9988 g	Back right	99.9979 g	
200.0000 g	Front right	99.9979 g	
199.9988 g	Maximum deviation from centric loading indication		
199.9989 g	Δ _{load} max = 0.00006 g		
199.9989 g			
200.0000 g			
199.9988 g			
199.9999 g			
s = 0.00008 g			

Error of indication

Testload	Indication	Error	Expansion factor	Uncertainty	Uncertainty relative
L	I	E	k	U(E)	U _{rel} (E)
0.00000 g	0.00000 g	0.00000 g	2.00	0.000030 g	---
20.00002 g	19.99885 g	-0.00016 g	2.00	0.000069 g	0.00034 %
50.00002 g	49.99978 g	-0.00024 g	2.00	0.000091 g	0.00018 %
70.00004 g	69.99981 g	-0.00023 g	2.00	0.00017 g	0.00024 %
90.00007 g	89.99976 g	-0.00031 g	2.00	0.00018 g	0.00020 %
110.00003 g	109.99986 g	-0.00017 g	2.00	0.00028 g	0.00025 %
130.0001 g	129.9999 g	-0.0002 g	2.00	0.00028 g	0.00022 %
150.0000 g	149.9999 g	-0.0001 g	2.00	0.00028 g	0.00019 %
170.0000 g	170.0000 g	0.0000 g	2.00	0.00028 g	0.00016 %
200.0000 g	199.9998 g	-0.0002 g	2.00	0.00028 g	0.00014 %
220.0000 g	219.9999 g	-0.0001 g	2.00	0.00029 g	0.00013 %
Maximum error of indication		E _{max} = 0.0003 g			

$U_{rel}(E)$ is the quotient of $U(E)$ and test load L . The uncertainty of measurement $U(E)$ is valid only if error E is considered. You will find reference notes on the uncertainty of measurement in use under: Appendix to the calibration certificate | Interpretation of measurement results.
The uncertainty of measurement is also the expanded uncertainty U_{exp} if the measurement result is multiplied by the documented expansion factor, determined in accordance with the European Calibration Guideline EURAMET-19-18, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

End of calibration certificate

Uncertainty of measurement in use

Range 1

Device adjusted before measurement Yes
Temperature deviation considered 5 K
Temperature coefficient considered $2 \cdot 10^{-5}/\text{K}$

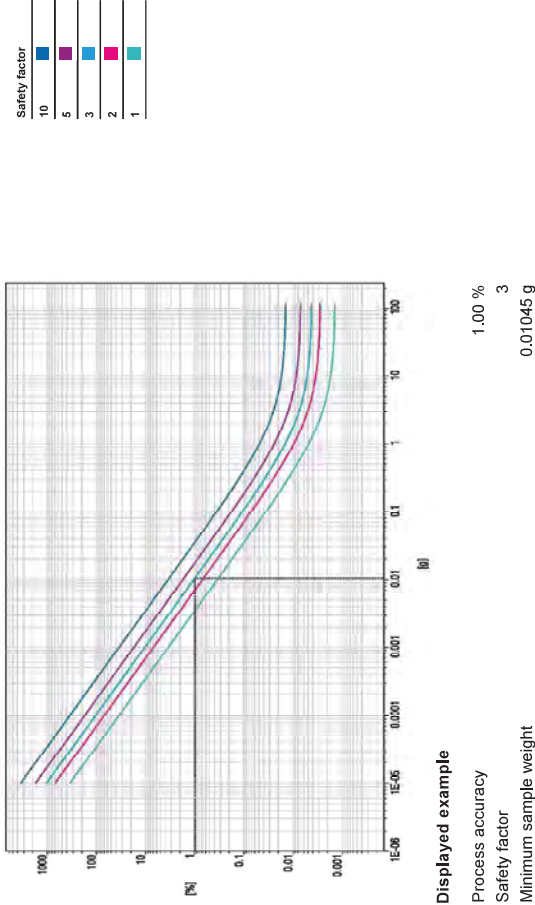
Uncertainty of the weighing result $U_{g_l}(W)$

$$U_{g_l}(W) = 0.000035 \text{ g} + 1.38 \cdot 10^{-5} \cdot R$$

Reference note: The current uncertainty of measurement is calculated by entering of the reading R into this formula. In relation to this, there is no need for a correction of the indication error. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied with an expansion factor of 2, determined in accordance with the European Calibration Guideline EURAMET cg-16, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

Indication in % from max load	Net indication R	Uncertainty $U_{g_l}(W)$	Uncertainty relative $U_{g_l}(W)_{\text{rel}}$
1 %	1.20000 g	0.000052 g	0.0043 %
25 %	30.00000 g	0.00045 g	0.0015 %
50 %	60.00000 g	0.00086 g	0.0014 %
75 %	90.00000 g	0.0013 g	0.0014 %
100 %	120.00000 g	0.0017 g	0.0014 %

Graphic realization of the relative uncertainty of measurement | process accuracy



Displayed example

Process accuracy 1.00 %
Safety factor 3
Minimum sample weight 0.01045 g

Uncertainty of measurement in use

Range 2

Device adjusted before measurement Yes
Temperature deviation considered 5 K
Temperature coefficient considered $2 \cdot 10^{-7}/\text{K}$

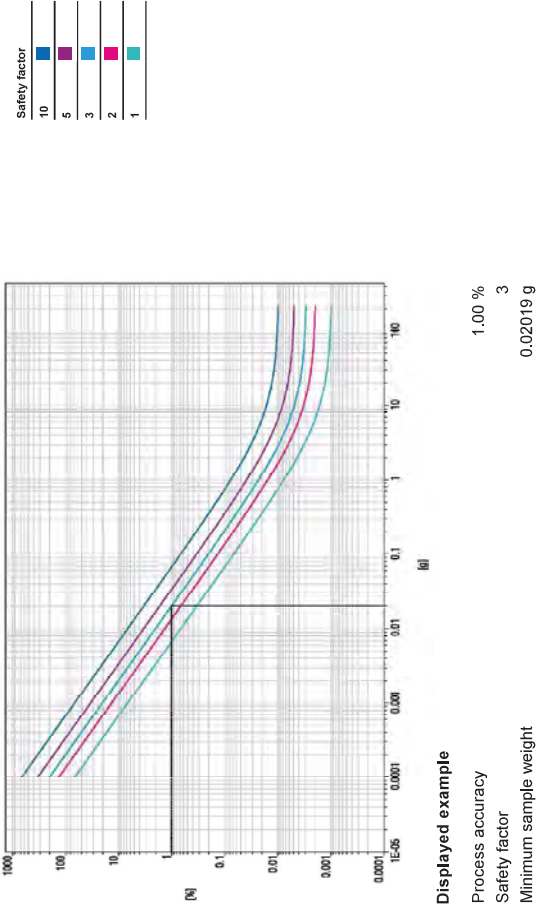
Uncertainty of the weighing result $U_{g_l}(W)$

$$U_{g_l}(W) = 0.000067 \text{ g} + 9.52 \cdot 10^{-6} \cdot R$$

Reference note: The current uncertainty of measurement is calculated by entering of the reading R into this formula. In relation to this, there is no need for a correction of the indication error. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied with an expansion factor of 2, determined in accordance with the European Calibration Guideline EURAMET cg-16, V4.0. There is a 95 % probability that the value of the measurand will be in the assigned value range.

Indication in % from max load	Net indication R	Uncertainty $U_{g_l}(W)$	Uncertainty relative $U_{g_l}(W)_{\text{rel}}$
1 %	2.20000 g	0.000088 g	0.0040 %
25 %	55.00000 g	0.00059 g	0.0011 %
50 %	110.00000 g	0.0011 g	0.0010 %
75 %	165.00000 g	0.0016 g	0.00099 %
100 %	220.00000 g	0.0022 g	0.00098 %

Graphic realization of the relative uncertainty of measurement | process accuracy



Displayed example

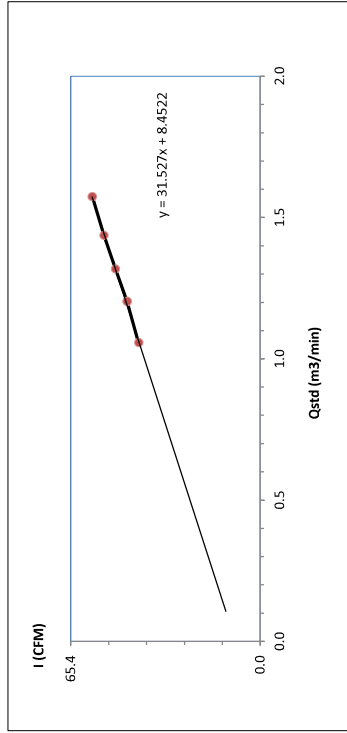
Process accuracy 1.00 %
Safety factor 3
Minimum sample weight 0.02019 g



High Volume Air Sampler Calibration Worksheet

Project Site :	Southern Star Hotel Co., Ltd.	Barometric Pressure (mm Hg) :	758.0
Calibrate Location :	พื้นที่โครงการ	Temperature (°C) :	29.0
Calibrate Date :	8-Sep-25	High Volume ID :	SGK_FS0059
Calibration Sheet No.:	C-080925-SGK_FS0059	High Volume Model :	TE-5170D
Calibrator ID:	SGK_FS0034	High Volume S/N :	5585
Calibrator Model :	TE-5028A	Calibrator Slope :	1.56856
Calibrator S/N :	3449	Calibrator Intercept :	-0.03727

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.6	1.0571	42	Slope : 31.5273
2	3.4	1.2035	46	Intercept : 8.4522
3	4.1	1.3179	50	Correlation Coefficient : 0.9992
4	4.9	1.4373	54	
5	5.9	1.5735	58	



Calibrated by :  (Mr. Apwat Chanta)
SGK Field Services Scientist (2)

Approved by :  (Mr. Supot Salanteh)
Field Services Section Head

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Agilent Technologies

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027803077

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Thailand

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REVIEW BY : Kavinong J.
APPROVED BY : Kavinong H.
NEXT CAL. DATE : 3/1/26

SERVICE REPORT

Customer Purchase Order Number:	70371013	Customer Number:	70371013
Service Request:		Service Request Date:	
Service Order:	6007493912	Service Confirmation:	6916126918

Service Instrument:

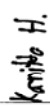
Model Number	Model Description	Serial Number	System Handle	Parent Asset
SYS-IM-7900	ICPMS 7900 System			
G7201C	ICP-MS MassHunter SW only (excludes FC)	US43799575	ICP MS 7900	SYS-IM-7900
G8403A	Agilent 7900 ICP MS	JP16511669	ICP MS 7900	SYS-IM-7900
G8411A	ISIS 3 for Agilent 7850/7900/8900	JP18510379	ICP MS 7900	SYS-IM-7900

Service Items:

Item	Service/Part #	Description	Qty	Entitlement	Service Start	Service End
1000	EQQ	Enterprise Operational Qualification	1.00	Agreement - Entitlement - 100 % covered	03.02.2025	04.02.2025
1010	5185-5650	ICP-MS Checkrout Solutions	1.00	Agreement - Entitlement - 100 % covered		

Additional Information:

Service Information:

Problem Description: *PR-OQ-ICP MS 7900-5001391286	
Service Provided: OQ SGK CL0048 Perform oq test . Sensitivity, resolution background both He and H2 mode. Stability test all pass. Sent oq report to customer. Let s customer test run sample.	
Service Overview Code: Reason Code: Scheduled Service Diagnosis Code: Scheduled Service Resolution Code: Scheduled Service	
Reported Hours: 7.0	Travel Hours: 2.0
Customer Field Service Representative Name: Warawit Timakul	Customer Field Service Representative Signature: 
Customer Name: TANYATORN MONGKONJIRAWUT	Customer Signature: 
Additional Comments:	



Southern Calibration Service Co., Ltd.
669/35 Karmjanavanit Rd., Banpru, Hatyai, Songkla 90250 Thailand
Tel: 08 1599 0417 Fax: 0 7480 3133 Email: s.calibration@gmail.com www.scal-lab.com

CALIBRATION CERTIFICATE

Issued Date : 4-Jul-2024

Certificate No. : 24T-12757
CSR No. : A150/07473
Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd

114/1 Moo 8, Kanchanavanich Rd. Tambon, Ban Phu,

Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Chemical Laboratory

Instrument Name : Cold Room

Manufacturer : Danfoss

Model : N/A

Serial No. : N/A

ID No. : SGK_CL0065

Resolution : 0.1 °C

Received Date : 1-Jul-2024

Calibrated Date : 1-Jul-2024

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %

REVIEW BY	Ananta B.
APPROVED BY	Kan-Ita B.
NEXT CAL DATE	1/01/26

Calibration Method Used :

This instrument was calibrated using the Calibration In-house method : SCAL.WI.012 based on GLA - 20

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and/or national standards which realize the units of measurement

according to the International System of Unit (SI) through :

- TISTR : Thailand Institute of Scientific and Technological Research

Calibrated by : Ibrorim Saleem

Approved by :

Imron Rattanayum / Technical Manager



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 Southern Calibration Service Co., Ltd.



Certificate No. : 24TH2757
CSR No. : A150/07473
Page : 2 of 3

Details of Calibration

1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Data Acquisition/Switch Unit	34970A	MY58009813	PSL-T0707-1/67	22-May-2025

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration

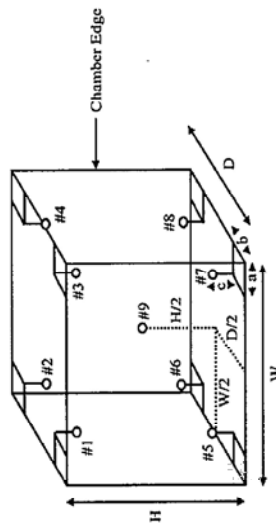
and carry no implication regarding the long-term stability of instrument.

3. This certificate is not certified any commercial transaction

4. Condition of item : normal condition, no indication for any damage or malfunction

Result of Calibration : (✓) Without Adjustment () After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm

Dimension of the chamber

W = 40.0 cm
H = 40.0 cm
D = 33.0 cm



Result of Calibration :-

2. Temperature Measurement Accuracy Test

The measurement results of the Cold Room and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)										Uncertainty (±°C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref. 9		
4	3.90	4.04	3.72	3.78	3.69	3.76	3.55	3.43	3.34		0.39

3. Performance Result

The performance of the Cold Room are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
4	4.0	4.0	0.10	0.75	0.75

- UUC = Unit Under Calibration

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

... End ...



CALIBRATION CERTIFICATE

Issued Date : 22-Oct-2024

Certificate No. : 24CH0526

CSR No. : A163/08133

Page. : 1 of 2

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8, Kamranawanich Rd. Tambon, Ban Pru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Chemical Laboratory
Instrument Name : pH meter
Manufacturer : Mettler Toledo
Model : S220
Serial No. : B625631849
ID No. : SGK_CL0030
Electrode No. : 2281592
Received Date : 19-Oct-2024
Calibrated Date : 19-Oct-2024
Ambient Temperature : (25 ± 3) °C
Relative Humidity : (55 ± 15) %

REVIEW BY : Ananda B.
APPROVED BY : Kamila H.
NEXT CAL. DATE : 19/11/24

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.008 based on direct measurement by using certified reference Material (CRM)

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and for national standards which realize the units of measurement according to the International System of Unit (SI) through :

- CP-Achem : CP-Achem Ltd
- WK : WK Electric Co., Ltd.
- SCAL : Southern Calibration Service Co., Ltd.

Calibrated by : Alisara Ma

Approved by :

Innon Rattianayum / Technical Manager



The uncertainties are for a confidence probability of approximately 95%
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Southern Calibration Service Co., Ltd.
669/35 Karmjanavut Rd., Banpru, Hatyai, Songkla 90250 Thailand
Tel : 08 1599 0417 Fax : 0 7480 5133 Email : s.calibration@gmail.com www.scal-lab.com

SCAL

SCAL

Certificate No. : 24CH-0526
CSR No. : A163/08133
Page : 2 of 2

Details of Calibration

1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Standard Solution	4.000	61310674	1042701	28-Oct-2025
Standard Solution	7.000	61314184	1042700	28-Oct-2025
Standard Solution	10.01	61313804	1042702	28-Oct-2025
Temperature/Electrical Calibrator	MC2-TE	14987	WK2106-299-223	31-May-2025
Digital Thermometer With Sensor	DP-77	3160896	24SDTH005	7-Aug-2025

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of assignment.

3. This certificate is not certified any commercial transaction

4. Condition of item : normal condition , no indication for any damage or malfunction

Result of Calibration :

1. Electrical Measurement

Applied Voltage (mV)	pH meter Reading		Correction (mV)	Uncertainty (± mV)
	(mV)	(pH)		
177.48	177.5	4.00	-0.02	0.17
0.00	0.0	7.00	0.00	0.13
-177.48	-177.5	10.00	0.02	0.17

2. Before Sample Test Measurement

Standard Buffer Solutions (pH)	pH meter Reading		Correction (pH)	Uncertainty (± pH)
	(pH)	(mV)		
4.007	3.99	178.1	0.017	0.0082
6.376	7.02	1.7	-0.044	0.019
10.009	9.96	-169.6	0.049	0.038

3. After Sample Test Measurement

Standard Buffer Solutions (pH)	pH meter Reading		Correction (pH)	Uncertainty (± pH)
	(pH)	(mV)		
4.007	3.99	177.7	0.017	0.0082
6.376	7.01	3.7	-0.034	0.019
10.009	10.00	-169.0	0.009	0.038

4. Temperature Measurement

Cal Point (°C)	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (±°C)
25	25.021	25.0	0.02	0.030

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

... End ...



CALIBRATION CERTIFICATE

Issued Date : 13-Jan-2025

Certificate No. : 25MA0125

CSR No. : A101/05028

Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8, Kamchanwanich Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Customer Laboratory
Instrument Name : Analytical Balance
Manufacturer : Sartorius
Model : MSE22AS-100-DU
Serial No. : 34705159
ID No. : SGK_CL0045
Resolution : 0.0001 g
Received Date : 10-Jan-2025
Calibrated Date : 10-Jan-2025
Ambient Temperature : (30 ± 10) °C
Relative Humidity : (50 ± 20) %

REVIEW BY : Ananta B
APPROVED BY : Kampha V
NEXT CAL. DATE : 10/1/26

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.001 based on UKAS LAB 14 : 2015
The Southern Calibration Service Co., Ltd calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and for national standards which realize the units of measurement

according to the International System of Unit (SI) through :

- SCAL : Southern Calibration Service Co., Ltd.,

Calibrated by : Hadbordee Dattavee

Approved by :

Imron Rattanaylum / Technical Manager



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 Southern Calibration Service Co., Ltd.



Certificate No. : 25MA0125
CSR No. : A101/05028
Page. : 2 of 3

Details of Calibration

1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Standard Weight Set	2 mg - 1 kg	11179514/01	24SWS001	3-Jul-2025

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

4. Condition of item : normal condition , no indication for any damage or malfunction

Result of Calibration : (✓) Without Adjustment () After Adjustment

1. Repeatability

Nominal Value (g)	Standard Deviation (g)
10	0.00000
20	0.00000
200	0.00000

2. Effect of tare

Nominal Value (g)	Standard Value (g)	Balance Reading (g)	Correction (g)
20	20.0000	20.0000	0.0000
40	40.0001	40.0000	0.0001
60	60.0000	60.0000	0.0000
80	80.0001	80.0000	0.0001
100	100.0000	100.0000	0.0000



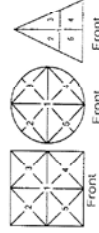
Certificate No. : 25MA0125
CSR No. : A101/05028
Page. : 3 of 3

Result of Calibration :

3. Off-centre loading

A mass approximately 100g was placed on a pan and moved to various position .
The balance reading obtained are given in the table.

1	Position					Maximum Difference (g)
	2	3	4	5		
100.0000	100.0000	100.0000	100.0000	100.0000	100.0001	0.0001



4. Departure from nominal value

Nominal Value (g)	Standard Value (g)	UUC Reading (g)	Correction (g)	Uncertainty ($\pm$ g)	Coverage Factor (k)
0.01	0.0100	0.0100	0.0000	0.00008	2.0
0.1	0.1000	0.1000	0.0000	0.00008	2.0
0.5	0.5000	0.5000	0.0000	0.00008	2.0
1	1.0000	1.0000	0.0000	0.00008	2.0
2	2.0000	2.0000	0.0000	0.00008	2.0
5	5.0000	5.0000	0.0000	0.00009	2.0
10	10.0000	10.0000	0.0000	0.00009	2.0
20	20.0000	20.0000	0.0000	0.00009	2.0
40	40.0001	40.0000	0.0001	0.00011	2.0
50	50.0000	50.0000	0.0000	0.00013	2.0
60	60.0000	60.0000	0.0000	0.00013	2.0
80	80.0000	80.0000	0.0000	0.00016	2.0
100	100.0000	100.0001	-0.0001	0.00017	2.0
120	120.0000	120.0001	-0.0001	0.00024	2.0
140	140.0001	140.0000	0.0001	0.00024	2.0
160	160.0000	160.0000	0.0000	0.00026	2.0
180	180.0000	180.0000	0.0000	0.00029	2.0
200	200.0000	200.0000	0.0000	0.00030	2.0

- UUC = Unit Under Calibration

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

...End...



Southern Calibration Service Co., Ltd.
669/35 Karnjanavanit Rd., Banpru, Hetyai, Songkla 90250 Thailand
Tel : 08 1599 0417 Fax : 0 7460 5133 Email : s.calibration@gmail.com www.scal-lab.com

CALIBRATION CERTIFICATE

Issued Date : 22-Oct-2024

Certificate No. : 24TH4295
CSR No. : A163J08133
Page. : 1 of 3

Customer : A/S Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8, Kamcharawanich Rd. Tambon, Ban Phru,
Amphoe Hat Yai Sonckhia, 90250

Calibration Place : Chemical Laboratory

Instrument Name : Hot Air Oven

Manufacturer : Memmert

Model : UF110

Serial No. : F416.3387

IND No. **SGK C10024**

Resolution . 01 %

Received Date • 19-Oct-2024

Calibrated Date : 19-Oct-2024

Ambient Temperature : (30 + 10) °C

Relative Humidity : (50 ± 30) %

Calibration Method Used :

This instrument was calibrated using the Calibration In-house method: SCAL-WI.012 based on GLA-20

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and /or national standards which realize the units of measurement

according to the International System of Unit (SI) through :

- TISTR : Thailand Institute of Scientific and Technological Research

Calibrated by : librorhim Saleemin

Approved by :

Imron Rattanaylum / Technical Manager



 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 Southern Calibration Service Co., Ltd.



Certificate No. : 24TH4295
CSR No. : A163/08133
Page. : 2 of 3

Details of Calibration

1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Data Acquisition/Switch Unit	34970A	MY58009813	PSL-T0707-1/67	22-May-2025

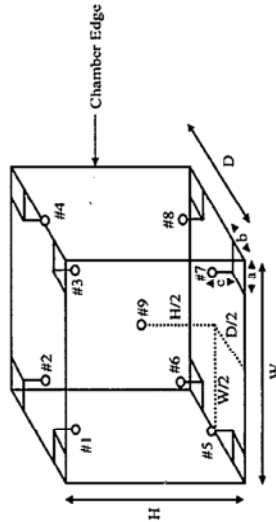
2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.
3. This certificate is not certified any commercial transaction
4. Condition of Item : normal condition , no indication for any damage or malfunction

Result of Calibration :.

(✓) Without Adjustment

() After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

 $a = 5.0 \text{ cm}$
$$b = 5.0 \text{ cm}$$
$$c = 5.0 \text{ cm}$$

Dimension of the chamber

 $W = 55.0 \text{ cm}$ $H = 48.0 \text{ cm}$

$D = 40.0 \text{ cm}$



Certificate No. : 24TH4295
CSR No. : A163/08133
Page : 3 of 3

Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Hot Air Oven and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)									Uncertainty (±°C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref. 9	
40	40.36	40.40	40.51	40.43	40.05	40.24	40.09	40.14	39.75	0.38
70	70.27	70.30	70.45	70.24	70.24	70.43	70.29	70.30	69.95	0.36
103	102.94	102.90	103.55	102.96	103.22	103.14	103.10	103.01	102.88	0.36
104	104.15	103.99	104.27	104.06	104.09	104.23	104.26	104.15	103.90	0.36
105	105.04	104.90	105.05	104.87	104.91	104.80	104.82	104.98	104.70	0.36
180	179.19	178.93	179.82	179.10	179.27	179.68	179.12	179.73	179.12	0.41

3. Performance Result

The performance of the Hot Air Oven are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
40	40.0	40.0	0.20	0.84	0.84
70	70.0	70.0	0.10	0.59	0.59
103	103.0	103.0	0.20	0.73	0.74
104	104.0	104.0	0.20	0.47	0.56
105	105.0	105.0	0.20	0.44	0.46
180	180.0	180.0	0.50	0.86	1.11

- UUC = Unit Under Calibration

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

... End ...



Internal Calibration

REVIEW BY : Somsak J.
APPROVED BY : Kanitha H.
NEXT CAL. DATE : 30 May 26

Equipment : Turbidity Meter
ID No. : SGK FS0346
Calibrate Date : May 30, 2025

Manufacture : HACH
Model : 2100Q/QIS
Serial No. : 19030C074494

Calibration Point	1st (NTU)	2nd (NTU)	3rd (NTU)	AVG (NTU)	Specifications	Evaluate
Standard 20 NTU	20.1	20.0	20.0	20.0	19 to 21 NTU	Pass
Standard 100 NTU	100.0	101.0	101.0	100.7	96 to 106 NTU	Pass
Standard 800 NTU	799.0	799.0	800.0	799.3	760 to 840 NTU	Pass

Calibrated by : Somsak J.
(Scientist 2)

Approved by : Kanitha H.
(Section Head)

Loveland, CO 80539
(970) 669-3050



An ISO 9001 Certified Company

Certificate of Analysis

This is a Component of 2659405-TH / LOT A4243

PRODUCT: STABLCAL® FORMAZIN STANDARD 100 NTU

PRODUCT NUMBER: 2684501 LOT NUMBER: A4242

MANUFACTURE DATE: 08/28/2024 DATE OF ANALYSIS: 09/03/2024

TEST	SPECIFICATIONS	RESULTS
Turbidity	98 to 105 NTU	103.0 NTU

The expiration date is Nov 2025

Formazin and StabiCal® solutions provided by Hach are not NIST traceable because the NIST does not carry turbidity standards. However, the use of Formazin and StabiCal® as used in Hach method 8195 are accepted by the EPA as a primary standard to be used in the calibration of turbidity instruments.

Certified by: *Scott Ala*

Analytical Services Chemist

Loveland, CO 80539
(970) 669-3050



An ISO 9001 Certified Company

Certificate of Analysis

This is a Component of 2659405-TH / LOT A4243

PRODUCT: STABLCAL® FORMAZIN STANDARD 800 NTU

PRODUCT NUMBER: 2660501 LOT NUMBER: A4233

MANUFACTURE DATE: 08/26/2024 DATE OF ANALYSIS: 08/30/2024

TEST	SPECIFICATIONS	RESULTS
Turbidity	760 to 840 NTU	814.3 NTU

The expiration date is Nov 2025

Formazin and StabiCal® solutions provided by Hach are not NIST traceable because the NIST does not carry turbidity standards. However, the use of Formazin and StabiCal® as used in Hach method 8195 are accepted by the EPA as a primary standard to be used in the calibration of turbidity instruments.

Certified by: *Scott Ala*

Analytical Services Chemist



Loveland, CO 80539
(970) 669-3050

An ISO 9001 Certified Company

Certificate of Analysis

This is a Component of 2659405-TH / LOT A4243

PRODUCT: STABCAL[®] FORMAZIN STANDARD 20 NTU

PRODUCT NUMBER: 2684801

LOT NUMBER: A4240

MANUFACTURE DATE: 08/28/2024

DATE OF ANALYSIS: 09/03/2024

TEST	SPECIFICATIONS	RESULTS
Turbidity	19 to 21 NTU	20.4 NTU

The expiration date is Nov 2025

Formazin and StabCal[®] solutions provided by Hach are not NIST traceable because the NIST does not carry turbidity standards. However, the use of Formazin and StabCal[®] as used in Hach method 8195 are accepted by the EPA as a primary standard to be used in the calibration of turbidity instruments.

Certified by:

Scott Allen

Analytical Services Chemist



CALIBRATION CERTIFICATE

Issued Date : 13-Jan-2025

Certificate No. : 25TH0226

CSR No. : A101/05028

Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8, Kamcharanwanich Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkila. 90250

Calibration Place : Customer Laboratory

Instrument Name : Incubator

Manufacturer : Memmert

Model : ICP750

Serial No. : F816.0063

ID No. : SGK_CL0028

Resolution : 0.1 °C

Received Date : 10-Jan-2025

Calibrated Date : 10-Jan-2025

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %

REVIEW BY *Anganta B.*
APPROVED BY *Kanida H.*
NEXT CAL. DATE *10/1/26*

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.012 based on GLA - 20

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and/or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- TSTR : Thailand Institute of Scientific and Technological Research

Calibrated by : Ibrohim Saleemin

Approved by :

Imron Rattanayum / Technical Manager



The uncertainties are for a confidence probability of approximately 95%
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Certificate No. : 25TH0226
CSR No. : A101/05028
Page : 2 of 3

Details of Calibration

1. Reference Standard Equipment Used:

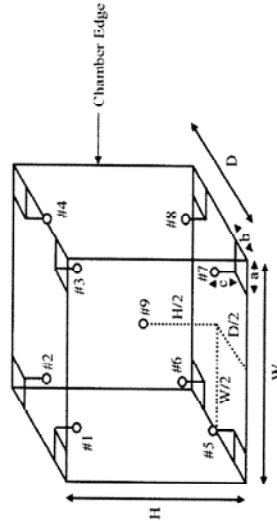
Equipment	Model	Serial No.	Cert. no.	Due Date
Data Acquisition/Switch Unit	34570A	MY58009813	PSL-T0707-1167	22-May-2025

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of instrument.
3. This certificate is not certified any commercial transaction
4. Condition of item : normal condition , no indication for any damage or malfunction

Result of Calibration :

(✓) Without Adjustment () After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm

Dimension of the chamber

W = 104.0 cm
H = 120.0 cm
D = 60.0 cm



Certificate No. : 25TH0226
CSR No. : A101/05028
Page : 3 of 3

Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the incubator and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)									Uncertainty (± °C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref.9	
20	20.03	20.23	20.37	20.34	20.32	20.03	20.19	20.31	20.06	0.38

3. Performance Result

The performance of the incubator are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (± °C)	Temperature Uniformity (°C)	Overall Variation (°C)
20	20.0	20.0	0.10	0.31	0.40

- UUC = Unit Under Calibration

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

... End ...



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL 0-2717-3000-28 FAX 0-2719-9484



Certificate of Calibration

Cert. No.: 25LM26
Page: 1 of 2

Equipment: DO Meter with Sensor
Manufacturer: YSI
Model: 4010-1W
Serial No.: 24200618
ID No.:
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. Songkhla Branch,
114/1 Moo 8 Kamchananwarich Rd.,
T. Ban Phru, A. Hat Yai,
Songkhla 90250 Thailand

Location: TPA Calibration Laboratory

Received Order: 21 February 2025
Calibrated Date: 24 February 2025
Ambient Temperature: $(26 \pm 10) ^\circ\text{C}$
Relative Humidity: $(50 \pm 30) \%$
AC Line Voltage: $(220 \pm 22) \text{ V}$

Calibrated by: Warakorn Lemgagitrakul

Approved by:

() Chakrit Waewwanilua
() Suwit Injal
(✓) Kunchit Promprat

Issue Date:

25 February 2025

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



Equipment: DO Meter with Sensor
Condition As-Received: Used Item
Reference: 2502-0715WC-2
Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument: Digital Thermometer
Serial No.: 2188080
Cert. No.: 2411022
Traceable: TPA
Due Date: 17 Sep 2025

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

3. This certification is traceable to the International System of Unit.

Remark: TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :-

(*) Without Adjustment

Function :

Temperature measurement

This instrument was connected with temperature sensor, S/N.: 24F102419

Calibration Point ($^{\circ}\text{C}$)	Immersion Depth (mm)	Standard Temperature ($^{\circ}\text{C}$)	UUC* Reading ($^{\circ}\text{C}$)	Error ($^{\circ}\text{C}$)	Uncertainty ($\pm ^{\circ}\text{C}$)	Coverage Factor k
20.0	60	20.003	20.0	-0.003	0.16	2.00

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 %

-000-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOT 18, SIUANLUANG, SIUANLUANG BANGKOK 10250
TEL. 0-2717-3060 FAX. 0-2719-0484

Certificate of Testing

Cert.No.: 25TW32
Page.: 1 of 2

Equipment :
Manufacturer :
Model :
Serial No. :
ID No. :
Received Date :
Test Date :
Reference :
Submitted by :

DO Meter
YSI
4013-1W
24200618
21 February 2025
24 February 2025
2502-0715WC-1

ALS Laboratory Group (Thailand) Co.,Ltd.
Songkhla Branch,
114/1 Moo 8 Kamchanawanich Rd., T.Ban Phru,
A.Hat Yai, Songkhla 90250 Thailand

Temperature (25 ± 5) °C
Humidity (50 ± 20) %
In - house method : CP-CH9
by Comparison Technique with Azide Modification Method

Tested by :

Watajak Sirithuan

Approved by :

Approved Signatory

() Chakrit Waewwanjua
() Ponpan Paipim
(✓) Sathip Meangmal

Issue Date :

25 February 2025



Cert.No.: 25TW32
Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	14233821	1110RC001	24MM1131	04 July 2025

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate 5-Hydrate AR	KEMAUS	2203162447	99.6%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: 24F102419

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.22	8.28	0.0089

This report was certified only for the instrument we tested. It is allowable to use for study
Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced
other in full, without written approval of the laboratory

-ada-

CALIBRATION CERTIFICATE

Issued Date : 13-Jan-2025

Certificate No. : 25TH0227

CSR No. : A101/05028

Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
 114/1 Moo 8, Karnchanawanich Rd. Tambon, Ban Phru,
 Amploe Hat Yai, Songkhla, 90250

Calibration Place : Customer Laboratory
Instrument Name : Liquid Bath
Manufacturer : Memmert
Model : WNE29
Serial No. : L616.0538
ID No. : SGK_CL0035
Resolution : 0.1 °C
Received Date : 10-Jan-2025
Calibrated Date : 10-Jan-2025
Ambient Temperature : (30 ± 10) °C
Relative Humidity : (50 ± 30) %

REVIEW BY : Ananta B.
 APPROVED BY : Kanthas H.
 NEXT CAL DATE : 10/7/24

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL WL 014 based on ASTM E 715 : 1980 (reapproved 2001)

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and for national standards which realize the units of measurement according to the International System of Unit (SI) through :

- TISTR : Thailand Institute of Scientific and Technological Research

Calibrated by : Ibrohim Saleer'in

Approved by :

Imron Rattanyum / Technical Manager



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 Southern Calibration Service Co., Ltd.

Details of Calibration

1. Reference Standard Equipment Used:

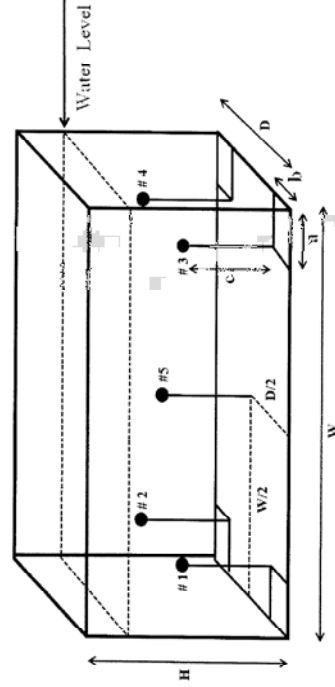
Equipment	Model	Serial No.	Cert. no.	Due Date
Data Acquisition/Switch Unit	34970A	MY58009813	PSL-T0707-167	22-May-2025

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.
 3. This certificate is not certified any commercial transaction
 4. Condition of item : normal condition , no indication for any damage or malfunction

Result of Calibration :

(✓) Without Adjustment () After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

a = 5 cm
 b = 5 cm
 c = 5 cm

Dimension of the chamber

W = 59.0 cm
 H = 14.0 cm
 D = 35.0 cm



Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Liquid Bath and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)				Uncertainty (±°C)
	#1	#2	#3	#4	
80	80.05	80.07	79.98	80.05	0.17

3. Performance Result

The performance of the Liquid Bath are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
80	80.0	80.0	0.20	0.17	0.26

- UUC = Unit Under Calibration

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

... End ...

CALIBRATION CERTIFICATE

Issued Date : 28-Feb-2025

Certificate No. : 25TH1073

CSR No. : A18509219

Page. : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
 114/1 Moo 8, Kamchanawich Rd. Tambon, Ban Pnu,
 Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Customer Laboratory

Instrument Name : Digester Block

Manufacturer : Genhardt

Model : KT-L205BS

Serial No. : 5770230038

ID No. : SGK_CL0092

Receipt Date : 25-Feb-2025

Calibration Date : 25-Feb-2025

Ambient Temperature : (30 ± 10) °C*

Relative Humidity : (50 ± 30) %

REVIEW BY	
APPROVED BY	
NEXT CAL. DATE	

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SC.WI.12.018 based on G-20
 The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and/or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- SCAL : Southern Calibration Service Co., Ltd.,

Calibrated by : Ibromin Salemin

Approved by :

Imron Radanayum / Technical Manager



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 Southern Calibration Service Co., Ltd.



Details of Calibration

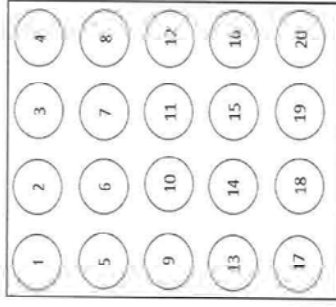
1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Dus Date
Data Acquisition/Switch Unit	34870A	MY58009813	PSL-10707-1/67	22-May-2025

- The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.
- This certificate is not certified any commercial transaction
- Condition of item : normal condition , no indication for any damage or malfunction

Result of Calibration :

Sensor Installation Diagram



Measurement for Heating Block

Position	UUC Reading (°C)	Standard Temperature (°C)	Correction (°C)	Uncertainty (± °C)
No.1	383	380.24	-2.76	0.32
No.2	383	379.87	-3.13	0.32
No.3	383	379.92	-3.08	0.32
No.4	383	379.94	-3.06	0.32
No.5	383	379.89	-3.12	0.32



Result of Calibration : (Cont.)
Measurement for Heating Block

Position	UUC Reading (°C)	Standard Temperature (°C)	Correction (°C)	Uncertainty (± °C)
No.6	383	379.97	-3.03	0.32
No.7	383	380.42	-2.58	0.32
No.8	383	380.47	-2.53	0.32
No.9	383	380.21	-2.79	0.32
No.10	383	380.44	-2.56	0.32
No.11	383	379.24	-3.76	0.32
No.12	383	380.27	-2.73	0.32
No.13	383	380.28	-2.72	0.32
No.14	383	379.93	-3.07	0.32
No.15	383	379.92	-3.08	0.32
No.16	383	379.98	-3.02	0.32
No.17	383	379.84	-3.16	0.32
No.18	383	379.82	-3.18	0.32
No.19	383	379.81	-3.19	0.32
No.20	383	380.21	-2.79	0.32

Remark : Calibration Points 380 °C
 UUC Setting 383 °C

- UUC = Unit Under Calibration

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

...End...



CALIBRATION CERTIFICATE

Issued Date : 4-Jul-2024

Certificate No. : 24TH2760
CSR No. : A150/07473
Page. : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8, Kamchanawanich Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla. 90250

Calibration Place : Microbiological Laboratory

Instrument Name : Autoclave

Manufacturer : TOMY

Model : SX-700

Serial No. : 5213407

ID No. : SGK ML0001

Resolution : 1 °C

Received Date : 1-Jul-2024

Calibrated Date : 1-Jul-2024

Ambient Temperature : (30 + 10) °C

Relative Humidity : $(50 \pm 30) \%$

Calibration Method Used :

This instrument was calibrated using the Calibration In-house method: SCAL.WI.013 based on BS 2646: 1993 (part 5)
The Southern Calibration Service Co. Ltd calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and/or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- SCAL : Southern Calibration Service Co., Ltd.,

Calibrated by : Ibiorhim Saleemin

Approved by :

Imron Rattanyum / Technical Manager



The uncertainties at for a confidence probability of approximately 95%



Certificate No. : 24TH2760
CSR No. : A150/07473
Page. : 2 of 3

Details of Calibration

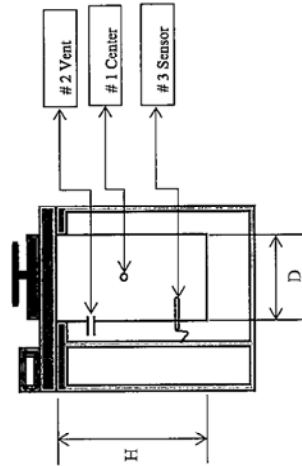
1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Exp. Date
Data logger With Sensor	GL240	C90432223	24SDAT005	2-May-2025

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.
3. This certificate is not certified any commercial transaction
4. Condition of item : normal condition, no indication for any damage or multifunction

	(✓) Without Adjustment	() After Adjustment
Result of Calibration :		

1. Sensor Installation Diagram



Chamber Diameter (D) : 30 cm

Chamber Height (H): 70 cm



Result of Calibration:

2. Temperature Measurement Accuracy Test

The measurement results of the Autoclave and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)			Pressure Reading	Uncertainty (± °C)
	Center #1	Vent #2	Sensor #3		
115	116.3	116.4	116.3	0.07 MPa	0.76
118	119.2	119.2	119.2	0.09 MPa	0.76
121	121.8	121.5	121.6	0.11 MPa	0.76

3. Performance Result

The performance of the Autoclave are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (± °C)	Temperature Uniformity (°C)	Overall Variation (°C)
115	115	115	0.10	0.17	0.17
118	118	118	0.10	0.10	0.10
121	121	121	0.70	0.50	0.84

- UUC = Unit Under Calibration

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

... End ...



CALIBRATION CERTIFICATE

Issued Date : 5-Jul-2025

Certificate No. : 25TH3013
CSR No. : A202/10083
Page. : 1 of 3

Customer : A.S. Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8, Karichanawaroh Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Customer Laboratory

Instrument Name : Incubator

Manufacturer : Memmert

Model : CP750

Serial No. : F816.0061

ID No. : SGK_ML0013

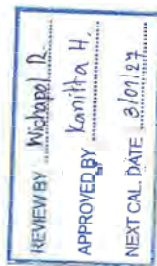
Resolution : 0.1 °C

Received Date : 3-Jul-2025

Calibrated Date : 3-Jul-2025

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %



Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL-WI 012 based on GLA - 20

The Southern Calibration Service Co. Ltd calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the international and for national standards which realize the units of measurement according to the International System of Unit (SI) through :

- ISTR : Thailand Institute of Scientific and Technological Research

Calibrated by : ISTR-THM Saleemir

Approved by :

Innon Rattanasylum / Technical Manager

SCAL-THM-001023



The uncertainties are for a confidence probability of approximately 95%
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Details of Calibration

1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Data Acquisition/Switch Unit	34970A	MY58004913	PSL-T0707-2/67	22-Nov-2025

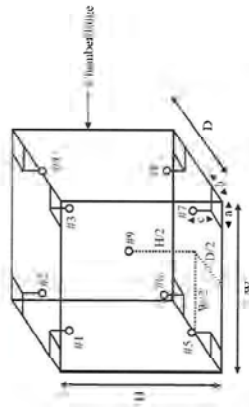
2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long term stability of instrument.
3. This certificate is not certified any commercial transaction
4. Condition of item : normal condition , no indication for any damage or malfunction

Result of Calibration :

[✓] Without Adjustment

[] Alter Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm

Dimension of the chamber

W = 104.0 cm
H = 120.0 cm
D = 60.0 cm



Result of Calibration

2. Temperature Measurement Accuracy Test

The measurement results of the incubator and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)									Uncertainty (±°C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref. 9	
35	34.97	35.05	35.09	35.04	35.02	34.91	34.89	35.01	34.98	0.38

3. Temperature Performance Result

The performance of the incubator are reported as shown below

UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	35.0	0.10	0.24	0.31

- UUC = Unit Under Calibration

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

... End ...

Southern Calibration Service Co., Ltd.
669/35 Karrijanavanit Rd., Banpru, Hatyai, Songkla 90250 Thailand
Tel : 08 1599 0417 Fax : 0 7480 5133 Email : s.calibration@gmail.com www.scal-lab.com

CALIBRATION CERTIFICATE

Issued Date : 5-Jul-2024

Certificate No. : 24CH0342
CSR No. : A150/07473
Page. : 1 of 2

Customer: ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8, Kamchanawanich Rd. Tambon, Ban Phru,
Amphoe Wat Yai, Songkhla, 90250

Calibration Place : Microbiological Laboratory

Instrument Name : pH meter^{xs}

Manufacturer : Sartorius

Model : PB-10

Serial No. : C07160635

: SGK ML-00

Electrode No. P20067003

Received Date: 2-Jul-2024

Calibrated Date: 2-11-2024

Ambient Temperature : 105 ± 01 °C

9 (31 + 33)

Calibration Method Used :

This instrument was calibrated using the Calibration In-house method: SCAL.WI.008 based on direct measurement by using certified reference Material (CRM)

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and/or national standards which realize the units of measurement

according to the International System of Unit (SI) through:

- CP Achem : CP Achem Ltd

- WK : WK Electric Co., Ltd.

Calibrated by : Alisara Ma

Approved by: _____

—
Ratnavan / Technical Manager



The uncertainties are for a confidence probability of approximately 95%



Certificate No. : 24CH0342
CSR No. : A150/07473
Page. : 2 of 2

Details of Calibration

1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Standard Solution	4.000	61278485	966239	10-May-2025
Standard Solution	7.000	61281486	966241	10-May-2025
Standard Solution	10.01	61287532	966240	10-May-2025
Temperature/Electrical Calibrator	MC2-TE	14987	WK2106-2996-223	31-May-2025

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

4. Condition of Item : normal condition , no indication for any damage or multifunction

Result of Calibration :.

1. Electrical Measurement

Applied Voltage (mV)	pH meter Reading		Correction (mV)	Uncertainty ($\pm$ mV)
	(mV)	(pH)		
177.48	177.5	3.80	-0.02	0.17
0.00	0.0	6.90	0.00	0.13
-177.48	-177.5	10.00	0.02	0.17

2. Before Sample Test Measurement

Standard Buffer Solutions (pH)	pH meter Reading		Correction (pH)	Uncertainty ($\pm$ pH)
	(pH)	(mV)		
4.008	4.07	164.0	-0.062	0.011
6.865	7.02	-7.1	-0.035	0.020
10.010	10.03	-182.1	-0.020	0.037

3. After Sample Test Measurement

Standard Buffer Solutions	pH meter Reading		Correction (pH)	Uncertainty ($\pm$ pH)
	(pH)	(mV)		
4.008	4.02	164.2	-0.012	0.011
6.985	7.00	-0.9	-0.015	0.020
10.010	10.01	-170.7	0.000	0.037

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

... End ...



Southern Calibration Service Co., Ltd.
669/35 Karmjanavanit Rd., Bangpu, Bangyue, Songkhro 90250 Thailand
Tel: 08 1599 0417 Fax: 07460 5133 Email: s.calibration@gmail.com www.scal-lab.com

CALIBRATION CERTIFICATE

Issued Date : 4-Jul-2024

Certificate No. : 24TH2782
CSR No. : A150/07474
Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8, Kamcharawanch Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Microbiological Laboratory
Instrument Name : Liquid Bath
Manufacturer : Memmert
Model : WPE45
Serial No. : L716.0558
ID No. : SGK_ML0021
Resolution : 0.1 °C
Received Date : 1-Jul-2024
Calibrated Date : 1-Jul-2024
Ambient Temperature : (30 ± 10) °C
Relative Humidity : (50 ± 30) %

REVIEW BY : Wichaporn R.
APPROVED BY : Kampha B.
NEXT CAL. DATE : 1/01/26

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL WL014 based on ASTM E 715 : 1980 (reapproved 2001)

The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and/or national standards which realize the units of measurement

according to the International System of Unit (SI) through :

• TISTR : Thailand Institute of Scientific and Technological Research

Calibrated by : Ibrahim Saleem

Approved by :

Imron Rattanayum / Technical Manager



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 Southern Calibration Service Co., Ltd.



Certificate No. : 24TH2782
CSR No. : A150/07474
Page : 2 of 3

Details of Calibration

1. Reference Standard Equipment Used

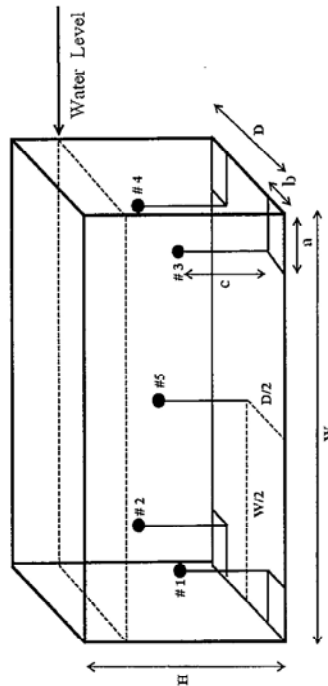
Equipment	Model	Serial No.	Cert. no.	Due Date
Data Acquisition/Switch Unit	34970A	MY68009813	PSL-T0707-1/67	22-May-2025

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of instrument.
3. This certificate is not certified any commercial transaction
4. Condition of item : normal condition , no indication for any damage or malfunction

Result of Calibration :

(✓) Without Adjustment () After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

a = 5 cm
b = 5 cm
c = 5 cm

Dimension of the chamber

W = 45 cm
H = 30 cm
D = 35 cm

Certificate No. : 24TH2782
CSR No. : A150/07474
Page : 3 of 3



Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Liquid Bath and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)				Uncertainty (±°C)
	#1	#2	#3	#4	
44.5	44.48	44.46	44.51	44.49	0.14

3. Performance Result

The performance of the Liquid Bath are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
44.5	44.5	44.5	0.10	0.14	0.25

- UUC = Unit Under Calibration

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

... End ...

Southern Calibration Service Co., Ltd.

669/35 Karnjanavanit Rd., Bangpru, Hatyai, Songkla 90250 Thailand
Tel : (08 1599 0417 Fax : 07480 5133 Email : s.calibration@gmail.com www.scal-lab.com



CALIBRATION CERTIFICATE

Issued Date : 4-Jul-2024

Certificate No. : 24TH2781

CSR No. : A150/07473

Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8, Kamchanawanich Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Microbiological Laboratory

Instrument Name : Autoclave

Manufacturer : TOMY

Model : SX-700

Serial No. : 52134080

ID No. : SGK ML0002

Resolution : 1 °C

Received Date : 1-Jul-2024

Calibrated Date : 1-Jul-2024

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %

REVIEW BY : *Michael P.*
APPROVED BY : *Manita H.*
NEXT CAL. DATE : 1/01/25

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL WL013 based on BS 2846 : 1993 (part 5)
The Southern Calibration Service Co., Ltd. calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and for national standards which realize the units of measurement according to the International System of Unit (SI) through :
- SCAL : Southern Calibration Service Co., Ltd.,

Calibrated by : Ibrohim Saleem

Approved by :

Imron Rattanaylum / Technical Manager



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 Southern Calibration Service Co., Ltd.



Details of Calibration

1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Data logger With Sensor	GL240	C90432223	24SDAT005	2-May-2025

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

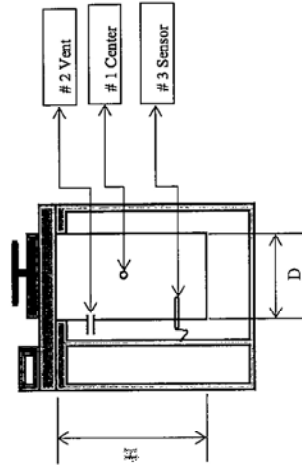
3. This certificate is not certified any commercial transaction

4. Condition of Item : normal condition, no indication for any damage or malfunction

Result of Calibration :

(✓) Without Adjustment () After Adjustment

1. Sensor Installation Diagram



Chamber Diameter (D): 30 cm

Chamber Height (H): 70 cm



Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Autoclave and associates are reported in the manner as shown below

Cal point (°C)	Measured Standard Temperature At Spread Locations (°C)			Pressure Reading (MPa)	Uncertainty (±°C)
	Center #1	Vent #2	Sensor #3		
115	118.3	115.9	116.2	0.07 MPa	0.76
118	119.6	119.4	119.2	0.09 MPa	0.76
121	122.0	122.0	122.1	0.11 MPa	0.76

3. Performance Result

The performance of the Autoclave are reported as shown below

Cal point (°C)	UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
115	115	115	0.10	0.33	0.43
118	118	118	0.30	0.50	0.50
121	121	121	0.20	0.14	0.34

- Operating Time = 900.00 sec

- UUC = Unit Under Calibration

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

... End ...

REVIEW BY Autcharawan S.
APPROVED BY Thongnoph
NEXT CAL. DATE 24/06/26



Certificate of Calibration

ICS-2100: Anion (ID#659)

This certificate is to verify that instrument below are calibrated

by Archemica Lab Co., Ltd.

ICS-2100 S/N: 11080010

AS-HV S/N: 5450A36659

For

ALS Laboratory Group (Thailand) Co., Ltd.



Date: June 17-24, 2025

Operator Signature: _____

(Mr. Soranat Thongnop)

Application Chemist