



บริษัท ปตท. น้ำมันและการค้าปลีก จำกัด (มหาชน)

รายงานผลการปฏิบัติตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม
และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม

โครงการทำเทียบเรือและคลังน้ำมันภูเก็ต

ระหว่างเดือนมกราคม-มิถุนายน พ.ศ. 2569

ภาคผนวก จ

ใบรับรองการสอบเทียบเครื่องมือ



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Songkhla Lab	BOD	Incubator	SGK_CL0028	10-Jan-25	10-Jul-26	18
Songkhla Lab	BOD	DO Meter With Sensor	SGK_CL0101	24-Feb-26	24-Feb-27	12
Songkhla Lab	COD	COD Reactor	SGK_CL0085	12-Jan-26	12-Jan-27	12
Songkhla Lab	COD	Spectrophotometer	SGK_CL0100	12-Jan-26	12-Jan-27	12
Songkhla Lab	Cadmium	ICP-MS	SGK_CL0048	4-Feb-25	3-Aug-26	18
Songkhla Lab	Cadmium	Cold Room	SGK_CL0065	15-Dec-25	15-Jun-27	18
Songkhla Lab	Lead	ICP-MS	SGK_CL0048	4-Feb-25	3-Aug-26	18
Songkhla Lab	Lead	Cold Room	SGK_CL0065	15-Dec-25	15-Jun-27	18
Songkhla Lab	pH at 25 °C	pH meter	SGK_CL0030	31-Mar-26	1-Oct-27	18
Songkhla Lab	Oil & Grease	Electronic Top-Loading Balance	SGK_CL0045	15-Dec-25	15-Dec-26	12
Songkhla Lab	Oil & Grease	Oven	SGK_CL0024	31-Mar-26	1-Oct-27	18
Songkhla Lab	Oil & Grease	Water Bath	SGK_CL0035	16-Dec-25	16-Dec-26	12
Songkhla Lab	Total Dissolved Solids 180°C	Electronic Top-Loading Balance	SGK_CL0045	15-Dec-25	15-Dec-26	12
Songkhla Lab	Total Dissolved Solids 180°C	Oven	SGK_CL0024	31-Mar-26	1-Oct-27	18
Songkhla Lab	Total Solids	Electronic Top-Loading Balance	SGK_CL0045	15-Dec-25	15-Dec-26	12
Songkhla Lab	Total Solids	Oven	SGK_CL0024	31-Mar-26	1-Oct-27	18
Songkhla Lab	Total Suspended Solids	Electronic Top-Loading Balance	SGK_CL0045	15-Dec-25	15-Dec-26	12
Songkhla Lab	Total Suspended Solids	Oven	SGK_CL0024	31-Mar-26	1-Oct-27	18
Songkhla Lab	Total Coliform	Autoclave	SGK_ML0001	15-Dec-25	15-Jun-27	18
Songkhla Lab	Total Coliform	Incubator	SGK_ML0013	3-Jul-25	3-Jan-27	18
Songkhla Lab	Total Coliform	pH Meter	SGK_ML0045	17-Nov-25	17-Nov-26	12
Songkhla Lab	Total Coliform	Water Bath	SGK_ML0021	16-Dec-25	16-Jun-27	18
Songkhla Lab	Fecal Coliform	Autoclave	SGK_ML0001	15-Dec-25	15-Jun-27	18
Songkhla Lab	Fecal Coliform	Incubator	SGK_ML0013	3-Jul-25	3-Jan-27	18
Songkhla Lab	Fecal Coliform	pH Meter	SGK_ML0045	17-Nov-25	17-Nov-26	12
Songkhla Lab	Fecal Coliform	Water Bath	SGK_ML0021	16-Dec-25	16-Jun-27	18
Water Lab	Total Kjeldahl Nitrogen	Digestion Unit	BKK_EN0460	16-Feb-26	16-Feb-27	12
Water Lab	Total Kjeldahl Nitrogen	Discrete analyzer	BKK_EN0438	3-Sep-25	3-Sep-26	12
Sea Water	Temperature	Digital Thermometer With Sensor	PHK_FS0001	3-Feb-26	3-Feb-27	12
Sea Water	Total Alkalinity	pH meter	SGK_CL0030	31-Mar-26	1-Oct-27	18
Sea Water	Conductivity	Conductivity Meter	SGK_CL0032	2-May-25	2-May-26	12
Sea Water	pH at 25 °C	pH meter	SGK_CL0030	31-Mar-26	1-Oct-27	18
Sea Water	Salinity	Conductivity meter	SGK_CL0032	2-May-25	2-May-26	12
Sea Water	Total Dissolved Solids 180°C	Electronic Top-Loading Balance	SGK_CL0045	15-Dec-25	15-Dec-26	12
Sea Water	Total Dissolved Solids 180°C	Oven	SGK_CL0024	31-Mar-26	1-Oct-27	18
Sea Water	Total Suspended Solids	Electronic Top-Loading Balance	SGK_CL0045	15-Dec-25	15-Dec-26	12
Sea Water	Total Suspended Solids	Oven	SGK_CL0024	31-Mar-26	1-Oct-27	18
Sea Water	Turbidity	Turbidity Meter	PHK_FS0036	26-Nov-25	26-Nov-26	12
Sea Water	BOD	Incubator	SGK_CL0028	10-Jan-25	10-Jul-26	18
Sea Water	BOD	DO Meter With Sensor	SGK_CL0101	24-Feb-26	24-Feb-27	12
Sea Water	Total Coliform	Autoclave	SGK_ML0001	15-Dec-25	15-Jun-27	18
Sea Water	Total Coliform	Incubator	SGK_ML0013	3-Jul-25	3-Jan-27	18
Sea Water	Total Coliform	pH Meter	SGK_ML0045	17-Nov-25	17-Nov-26	12
Sea Water	Total Coliform	Water Bath	SGK_ML0021	16-Dec-25	16-Jun-27	18
Sea Water	Fecal Coliform	Autoclave	SGK_ML0001	15-Dec-25	15-Jun-27	18
Sea Water	Fecal Coliform	Incubator	SGK_ML0013	3-Jul-25	3-Jan-27	18
Sea Water	Fecal Coliform	pH Meter	SGK_ML0045	17-Nov-25	17-Nov-26	12
Sea Water	Fecal Coliform	Water Bath	SGK_ML0021	16-Dec-25	16-Jun-27	18
Sea Water	Nitrate	Ion Chromatography	BKK_EN0069	24-Jun-25	24-Jun-26	12
Sea Water	Phosphate	Ion Chromatography	BKK_EN0069	24-Jun-25	24-Jun-26	12
Sea Water	Oil & Grease	Electronic Top-Loading Balance	SGK_CL0045	15-Dec-25	15-Dec-26	12
Sea Water	Oil & Grease	Oven	SGK_CL0024	31-Mar-26	1-Oct-27	18
Sea Water	Oil & Grease	Water Bath	SGK_CL0035	16-Dec-25	16-Dec-26	12
Sea Water	Floatable Oil & Grease	Electronic Top-Loading Balance	BKK_EN0003	17-Jul-25	17-Jul-26	12
Sea Water	Floatable Oil & Grease	Water Bath	BKK_EN0439	9-Oct-25	9-Oct-26	12
Sea Water	Total Kjeldahl Nitrogen	Digestion Unit	BKK_EN0460	16-Feb-26	16-Feb-27	12
Sea Water	Total Kjeldahl Nitrogen	Discrete analyzer	BKK_EN0438	3-Sep-25	3-Sep-26	12



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Soil	Moisture	Electronic Top-Loading Balance	BKK_EN0003	17-Jul-25	17-Jul-26	12
Soil	Oil & Grease	Electronic Top-Loading Balance	BKK_EN0003	17-Jul-25	17-Jul-26	12
Soil	Oil & Grease	Water Bath	BKK_EN0439	9-Oct-25	9-Oct-26	12
Soil	Total Petroleum Hydrocarbon	Electronic Top-Loading Balance	BKK_EN0003	17-Jul-25	17-Jul-26	12
Soil	pH aqueous phase 50% (w/v)	pH meter	BKK_EN0342	9-Oct-25	9-Oct-26	12
Ambient	Total VOC	DRYCAL FLOWMETER	BKK_FS0614	10-Sep-25	9-Sep-26	12
Ambient	Total VOC	DRYCAL FLOWMETER	BKK_FS0619	10-Sep-25	9-Sep-26	12
Ambient	Total VOC	Air Sampling Pump	PHK_FS0038	2-Mar-26	2-Jun-26	3
Ambient	Total VOC	Air Sampling Pump	PHK_FS0039	2-Mar-26	2-Jun-26	3
Ambient	Total VOC	FID Analyzer	BKK_FS0750	24-Mar-26	24-Mar-27	12

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, Karnchanawanich Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 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	Ananta B.
APPROVED BY	Kanida H.
NEXT CAL. DATE	10/7/26

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 : Ibrorhim Saleemin

Approved by :

Imron Rattanaylum / Technical Manager



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	MY58009813	PSL-T0707-1/67	22-May-2025

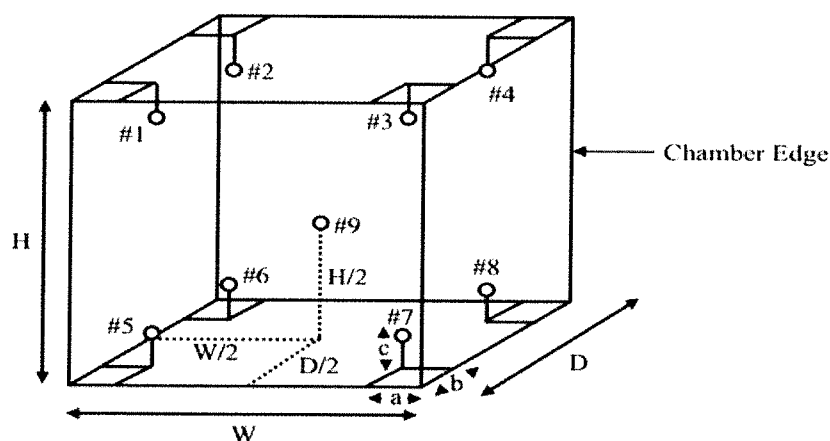
2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

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 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 ...



Southern Calibration Service Co., Ltd.

669/35 Karnjanavanit 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 : 27-Feb-2026

Certificate No. : 26CH0116

CSR No. : A240/11995

Page. : 1 of 2

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

Calibration Place : SCaL Laborator

Instrument Name : DO meter

Manufacturer : YSI

Model : 4010-1W

Serial No. : 24200618

ID No. : SGK_CL0101

Receipt Date : 20-Feb-2026

Calibration Date : 24-Feb-2026

Ambient Temperature : $(25 \pm 3) ^\circ\text{C}$

Relative Humidity : $(55 \pm 15) \%$

REVIEW BY	Chamkhan M.
APPROVED BY	Kanitta M.
NEXT CAL. DATE	24/2/27

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.062 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 :

- HANNA : Hanna Instruments.

Calibrated by : Alisara Ma

Approved by :



Sakeereen Heemhad / Laboratory Manager



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
Zero Oxygen Solution	HI7040L	C02374	S0032/21	12-Apr-2026

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

Sample Test Measurement

Serial Probe No. : 24F102419

Standard Buffer Solutions	UUC Reading	Correction	Uncertainty (±)
8.26 mg/L	8.26 mg/L	0.00 mg/L	0.16 mg/L

- 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 : 27-Feb-2026

Certificate No. : 26TH0817

CSR No. : A240/11995

Page. : 1 of 2

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

Calibration Place : SCaL Laboratory

Instrument Name : DO Meter with probe

Manufacturer : YSI

Model : 4010-1W

Serial No. : 24200618

ID No. : SGK_CL0101

Resolution : 0.1 °C

Received Date : 20-Feb-2026

Calibrated Date : 24-Feb-2026

Ambient Temperature : (25 ± 3) °C

Relative Humidity : (55 ± 15) %

REVIEW BY	Chandran M.
APPROVED BY	Kamthra H.
NEXT CAL. DATE	24/2/27

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.011 by comparison technique with standard thermometer

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 :

- Q Reborn : Quality Reborn Co.,Ltd.

Calibrated by : Ibrorhim Saleemin

Approved by :

Sakeereen Heemhad / Laboratory Manager

SCAL.FO.018/a010723



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
Digital Thermometer With Sensor (PRT)	1529	B4C223	QR25-2862	25-Sep-2026

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

Sensor Type : RTD **Channel :** OUT **Serial Probe No. :** 24F102419

Length : 6.8 cm. **Diameter :** 0.2 cm. **Immersion :** 6.8 cm.

Cal Point (°C)	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
20	20.007	20.2	-0.193	0.077

- 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 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484

Certificate of Calibration

Cert. No.: 26TM151

Page.: 1 of 3

Equipment : COD Reactor

Manufacturer : Hach

Model : DRB200

Serial No. : 21120C1313

ID No. : SGK_CL0085

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

Location : Chemistry Lab

Received Order : 12 January 2026

Calibration Date : 12 January 2026

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

AC Line Voltage : (220 ± 22) V

Calibrated by : Kunchit Promprat

Approved by :

Approved Signatory

() Chakrit Waewwanjua

() Ponpan Paipim

(✓) Suwit Imjai

Issue Date : 23 January 2026

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Calibration and Testing Equipment Services.

REVIEW BY	Oranoknan M.
APPROVED BY	Kanitta H.
NEXT CAL. DATE	12/01/27



Equipment : COD Reactor
Condition As-Received : Used Item
Reference : 2601-02100C-1
Procedure Used :-

Cert. No.: 26TM151
Page.: 2 of 3

As agreed with customer the calibration was performed using in-house calibration method according to directed measurement method with Data Acquisition which connected with Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

<u>Instrument</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due Date</u>
1) Data Acquisition	MY49023932	25LM121	TPA	27 Jul 2026

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

3. This measurement result is traceable to the International System of Unit maintained through :

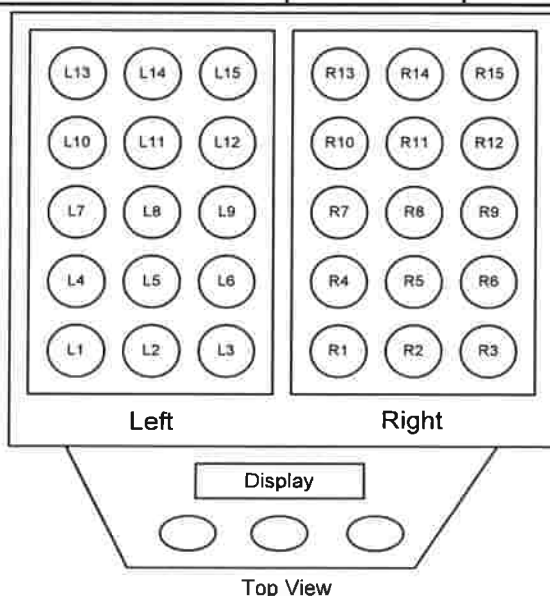
Remark : TPA : Technology Promotion Association (Thailand-Japan), NSC-ONSC Accredited No. Calibration 0008

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Alumina Calcined

Environment during calibration		
	Beginning	Finished
Temp.(°C)	25	24
REL.Humi.(%)	50	54
AC Supply (Volt)	223	224



Left		Right	
Position	ID No. of Sensor	Position	ID No. of Sensor
L1	25-16TC-03	R1	-
L2	25-16TC-02	R2	-
L3	25-16TC-03	R3	-
L4	25-16TC-04	R4	-
L5	25-16TC-04	R5	-
L6	25-16TC-06	R6	-
L7	25-16TC-07	R7	-
L8	25-16TC-08	R8	-
L9	25-16TC-09	R9	-
L10	25-16TC-06	R10	-
L11	25-16TC-03	R11	-
L12	25-16TC-04	R12	-
L13	25-16TC-06	R13	-
L14	25-16TC-07	R14	-
L15	25-16TC-09	R15	-



Equipment : COD Reactor
Condition As-Received : Used Item
Reference : 2601-0210OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Calibration Point : 150 °C

Cert. No.: 26TM151

Page.: 3 of 3

UUC* Setting (°C)	UUC* Reading (°C)	Measured Temperature (°C)						Temperature stability (± °C)	Uncertainty (± °C)	Coverage Factor <i>k</i>
		Position								
		Left			Right					
151	151	L13	L14	L15	R13	R14	R15	Left	1.1	2
		147.709	147.893	147.802	-	-	-			
		L10	L11	L12	R10	R11	R12			
		148.176	148.485	148.084	-	-	-			
-	-	L7	L8	L9	R7	R8	R9	Right		
		149.766	149.205	149.819	-	-	-			
		L4	L5	L6	R4	R5	R6			
		149.648	150.341	149.867	-	-	-			
		L1	L2	L3	R1	R2	R3			
		149.759	149.691	149.642	-	-	-			

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert.No.: 26CHO12

Page.: 1 of 3

Equipment : Spectrophotometer
Manufacturer : Hach
Model : DR 3900
Serial No. : 2403637
ID No. : SGK_CL0100
Condition As-Received: Used Item
Received Date : 12 January 2026
Calibration Date : 12 January 2026
Reference : 2601-0210OC-3
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
Songkhla Branch.
114/1 Moo 8, Kamchanawanich Rd., T.Ban Phru,
A.Hat Yai, Songkhla 90250, Thailand
Calibration Place : Chemistry Room
Ambient Temperature : (25.2 to 24.4) °C (On-Site)
Relative Humidity : (50.7 to 55.2) % (On-Site)
Calibration Procedure : In - house method :
CP-OCH4 based on ASTM E 275-08

Calibrated by : Kunchit Promprat

Approved by :

Approved Signatory

(✓) Chakrit Waewwanjua
() Ponpan Paipim
() Saithip Meangmai

Issue Date : 21 January 2026

REVIEW BY Chanoknan M.
APPROVED BY Kanitta H.
NEXT CAL DATE..... 12/01/27

The Uncertainties are for a confidence probability of approximately 95%

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



Cert. No. : 26CHO12

Page : 2 of 3

Condition of calibration result

1. Reference Standard Material :

<u>Material</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due date</u>
1. Absorbance Standard set	44487	122584	31 May 2026
2. Wavelength Standard set	36730	118120	15 Jan 2026
3. Wavelength Standard set	36730	118121	15 Jan 2026

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

3. This certificate is traceable to the International System of Unit maintained through :

- Starna Scientific Ltd.

4. Spectral BandWidth : 5 nm
Scan Speed : - nm/min

Calibration Results : without adjustment

Wavelength Accuracy

Certified Values of Reference Material (nm)	UUC Reading (nm)	Uncertainty of Measurement ($\pm$ nm)	Coverage Factor <i>k</i>
418.40	418	0.59	2.00
479.88	480	0.59	2.00
513.75	514	0.59	2.00
537.00	537	0.59	2.00
638.00	638	0.59	2.00
684.70	685	0.59	2.00
747.61	748	0.59	2.00
807.04	807	0.59	2.00



Cert. No. : 26CHO12

Page : 3 of 3

Calibration Results : without adjustment

Photometric Accuracy

Wavelength (nm)	Certified Values of Reference Material (Abs)	UUC Reading (Abs)	Uncertainty of Measurement ($\pm$ Abs)	Coverage Factor <i>k</i>
420.0	Zero	0.000	0.0028	2.00
	0.5750	0.573	0.0028	2.00
	0.7156	0.714	0.0028	2.00
	1.0176	1.016	0.0028	2.00
440.0	Zero	0.000	0.0028	2.00
	0.5598	0.557	0.0028	2.00
	0.7037	0.700	0.0028	2.00
	1.0013	0.997	0.0028	2.00
465.0	Zero	0.000	0.0028	2.00
	0.5222	0.521	0.0028	2.00
	0.6646	0.664	0.0028	2.00
	0.9444	0.944	0.0028	2.00
546.1	Zero	0.000	0.0028	2.00
	0.5234	0.522	0.0028	2.00
	0.7007	0.700	0.0028	2.00
	0.9992	0.999	0.0028	2.00
590.0	Zero	0.000	0.0028	2.00
	0.5573	0.554	0.0028	2.00
	0.7760	0.772	0.0028	2.00
	1.1104	1.105	0.0028	2.00
635.0	Zero	0.000	0.0028	2.00
	0.5648	0.563	0.0028	2.00
	0.7654	0.763	0.0028	2.00
	1.0961	1.094	0.0028	2.00

Remark

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer
- 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 %.



Agilent Technologies

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Email: ccc-smt@agilent.com
Website: www.agilent.com/chem

Customer Contact:

ALS Laboratory Group (Thailand) Co
Ltd Head Office

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Khwaeng Phatthanakan Khet Suan

TAX ID : 0105540004859

tanyatorn.mongkonjirawut@alsglobal.com
027603077

Invoice To:

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Ltd Head Office

104 Phatthanakan 40 Phatthanakan Rd
Khwaeng Phatthanakan Khet Suan

Payer:

ALS Laboratory Group (Thailand) Co
Ltd Branch Number 0002
114/1 Moo8 Banplu Subdistric Hat
Yai District

SONGKHLA 90250

Delivery Site:

ALS Laboratory Group (Thailand) Co
Ltd
Branch Number 0002
114/1 Moo8 Banplu Subdistric Hat
Yai District

Location:

Room
Bldg
Lab
Dept

SERVICE REPORT

Customer Purchase Order Number:	Customer Number: 70371013
Service Request:	Service Request Date:
Service Order: 6007493912	Service Confirmation: 6906126918

REVIEW BY	Kavinna J.
APPROVED BY	Kanitta H.
NEXT CAL. DATE	3/8/26

Direct Inquiries to:

Contact Name:	Customer Contact Center
Contact E-mail:	ccc-smt@agilent.com
Contact Telephone:	+662 637 6363
Contact Fax:	+662 632 4334

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Tax ID : 0105542068218

Citibank N.A. Bangkok Branch
399 Interchange 21 Building, Sukhumvit Road, Klongtoey Nau
Sub-district, Wattana District, Bangkok 10110 Thailand
Acc. No: 012-4452-007 ,
THB:Krung Thai Bank PCL
Siam Square Br.,416/1-2 Rama I Rd.,Pathumwan, BKK 10330
Thailand

ORIGINAL

Service Confirmation Number: 6906126918

Service Confirmation Date: 04.02.2025

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 PC)	USH3799575	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	JP16510379	ICP MS 7900	SYS-IM-7900

Service Items:

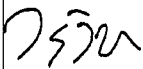
Item	Service/Part #	Description	Qty	Entitlement	Service Start	Service End
1000	EOQ	Enterprise Operational Qualification	1.00	Agreement Entitlement - 100 % covered	03.02.2025	04.02.2025
1010	5185-5850	ICP-MS Checkout Solutions	1.00	Agreement Entitlement - 100 % covered		

Additional Information:

Service Confirmation Number: 6906126918

Service Confirmation Date: 04.02.2025

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: Worawit Timakul	Customer Field Service Representative Signature: 	Date: 04 Feb 2025
Customer Name: TANYATORN MONGKONJIRAWUT	Customer Signature: 	Date: 04 Feb 2025
Additional Comments:		

CALIBRATION CERTIFICATE

Issued Date : 18-Dec-2025

Certificate No. : 25TH5497

CSR No. : A230/11460

Page. : 1 of 3

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

Calibration Place : Chemical Laboratory

Instrument Name : Cold Room

Manufacturer : N/A

Model : N/A

Serial No. : N/A

ID No. : SGK_CL0065

Resolution : 0.1 °C

Received Date : 15-Dec-2025

Calibrated Date : 15-Dec-2025

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %

REVIEW BY	Chandanan M.
APPROVED BY	Kanitha H.
NEXT CAL. DATE	15/06/2027

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 :

- Q Reborn : Quality Reborn Co.,Ltd.

Calibrated by : Ibrorhim Saleemin

Approved by :

Imron Rattanaylum / Technical Manager

SCAL.FO.018/a010723



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 with Sensor	DAQ970A	MY58036254	QR25-2036	1-Jul-2026

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

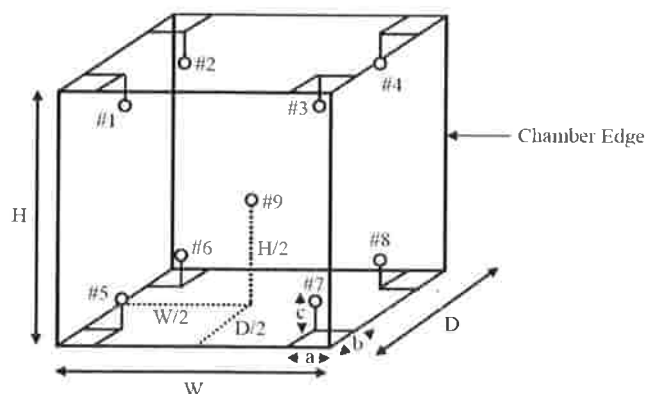
4. Condition of Item : normal condition , no indication for any damage or malfunction

Result of Calibration .:

☒ Without Adjustment

☐ After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

a = 5.0 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	3.95	4.10	4.10	4.02	4.10	3.95	3.90	3.99	3.95	0.38

3. Temperature Performance Result

The performance of the Cold Room are reported as shown below

UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
4.0	4.0	0.05	0.86	0.86

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 : 3-Apr-2026

Certificate No. : 26CH0181

CSR No. : A247/12304

Page. : 1 of 2

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

Calibration Place : Customer Laboratory

Instrument Name : pH meter

Manufacturer : Mettler Toledo

Model : S220

Serial No. : B62531849

ID No. : SGK_CL0030

Electrode No. : 30014096

Received Date : 31-Mar-2026

Calibrated Date : 31-Mar-2026

Ambient Temperature : (25 ± 3) °C

Relative Humidity : (55 ± 15) %

REVIEW BY *Onanoknan M.*
APPROVED BY *Ranitha H.*
NEXT CAL. DATE *1/10/27*

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.062 based on direct measurement with 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 :

- CPAchem : CPAchem Ltd
- WK : WK Electric Co., Ltd.

Calibrated by : Alisara Ma

Approved by :

Alisara Ma / Supervisor Manager

SCAL.FO.018/a010723



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
Standard Solution	4.000	61333215	1176852	24-Dec-2026
Standard Solution	6.999	C03337	S11M004	24-Dec-2026
Standard Solution	10.01	61325050	1176853	24-Dec-2026
Temperature/Electrical Calibrator	MC2-MF	23642	WK2502-402-32	5-Feb-2027

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 :

1. Electrical Measurement

Applied Voltage (mV)	pH meter Reading		Correction (mV)	Uncertainty (± mV)	Coverage factor <i>k</i>
	(mV)	(pH)			
177.48	177.5	4.00	-0.02	0.17	2.00
0.00	0.1	7.00	-0.10	0.13	2.00
-177.48	-177.4	10.00	-0.08	0.17	2.00

2. Before Sample Test Measurement

Standard Buffer Solutions (pH)	pH meter Reading		Correction (pH)	Uncertainty (± pH)	Coverage factor <i>k</i>
	(pH)	(mV)			
4.008	4.01	159.8	-0.002	0.0092	2.00
6.999	7.07	-14.0	-0.071	0.020	2.00
10.011	10.11	-187.4	-0.099	0.042	2.00

3. After Sample Test Measurement (Performing buffer standard curve by using buffer nominal pH4, 7, 10)

Standard Buffer Solutions (pH)	pH meter Reading		Correction (pH)	Uncertainty (± pH)	Coverage factor <i>k</i>
	(pH)	(mV)			
4.008	4.00	169.8	0.008	0.0092	2.00
6.999	7.00	-4.2	-0.001	0.019	2.00
10.011	10.01	-177.6	0.001	0.042	2.00

4. Temperature Measurement

Cal Point (°C)	Standard Temperature (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
25	25.024	25.1	-0.076	0.06

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 ...

CALIBRATION CERTIFICATE

Issued Date : 18-Dec-2025

Certificate No. : 25MA2641

CSR No. : A230/11462

Page. : 1 of 3

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

Calibration Place : Chemical Laboratory

Instrument Name : Electronic Balance

Manufacturer : Sartorius

Model : MSE224S-100-DU

Serial No. : 34705158

ID No. : SGK_CL0045

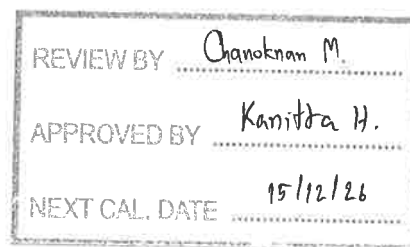
Resolution : 0.0001 g

Received Date : 15-Dec-2025

Calibrated Date : 15-Dec-2025

Ambient Temperature : (30 ±10) °C

Relative Humidity : (50 ±20) %



Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.001 based on UKAS LAB 14 : 2022

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 : Sounthern Calibration Service Co., Ltd.,

Calibrated by : Hadbordee Dettawee

Approved by :

Imron Rattanayium / Technical Manager

SCAL.FO.018/a010723



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
Standard Weight Set	2mg to 1kg	11119514/01	25SWS001	2-Jul-2026

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

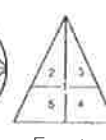
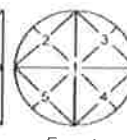
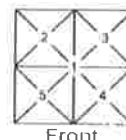
Nominal Value (g)	Standard Deviation (g)
20	0.00000
200	0.00000

2. Off-center loading

A mass approximately 100g was placed on a pan and moved to various position .

The balance reading obtained are given in the table.

Position					Maximum Error from Center (g)
1	2	3	4	5	
100.0000	100.0001	100.0000	100.0001	100.0000	0.0001



3. Effect of tare

Nominal Value (g)	Standard Value (g)	Balance Reading (g)	UUC Error (g)
20	19.9999	20.0000	0.0001
40	39.9999	40.0000	0.0001
60	60.0001	60.0000	-0.0001
80	80.0000	80.0001	0.0001
100	100.0000	100.0000	0.0000

Result of Calibration :. cont.

4. Departure from nominal value

Nominal Value (g)	Standard Value (g)	UUC Reading (g)	Correction (g)	Uncertainty (± g)	Coverage Factor (k)
0	0.0000	0.0000	0.0000	0.00008	2.0
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	19.9999	20.0000	-0.0001	0.00009	2.0
40	39.9999	40.0000	-0.0001	0.00012	2.0
60	60.0001	60.0000	0.0001	0.00013	2.0
80	80.0000	80.0000	0.0000	0.00017	2.0
100	100.0000	100.0000	0.0000	0.00016	2.0
120	119.9999	120.0000	-0.0001	0.00024	2.0
140	139.9999	140.0001	-0.0002	0.00024	2.0
160	160.0001	160.0001	0.0000	0.00026	2.0
180	180.0000	180.0001	-0.0001	0.00030	2.0
200	199.9998	200.0000	-0.0002	0.00029	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...

CALIBRATION CERTIFICATE

Issued Date : 3-Apr-2026

Certificate No. : 26TH1563

CSR No. : A247/12304

Page. : 1 of 3

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

Calibration Place : Customer Laboratory

Instrument Name : Hot Air Oven

Manufacturer : Memmert

Model : UF110

Serial No. : B416.3387

ID No. : SGK_CL0024

Resolution : 0.1 °C

Received Date : 31-Mar-2026

Calibrated Date : 31-Mar-2026

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %

REVIEW BY	Chanoknan M.
APPROVED BY	Kemitha H.
NEXT CAL. DATE	1/10/29

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 :

- Q Reborn : Quality Reborn Co.,Ltd.

Calibrated by : Ibrorhim Saleemin

Approved by :

Alisara Ma / Supervisor Manager

SCAL.FO.018/a010723



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 Acquisiton Switch Unit with Sensor	DAQ970A	MY58036254	QR25-2036	1-Jul-2026

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

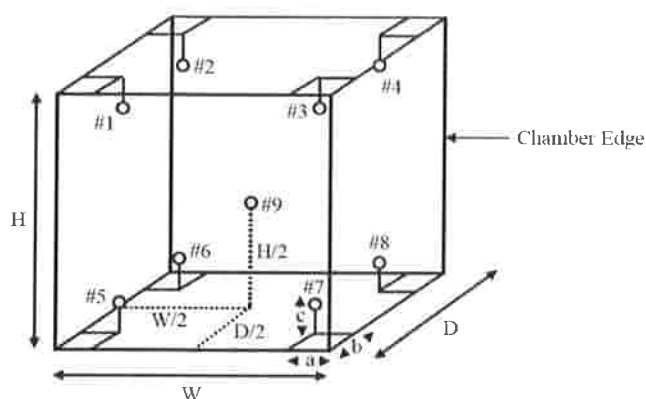
and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

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

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 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	40.52	40.44	40.53	40.53	40.53	40.46	40.59	40.54	40.44	0.38
70	70.81	70.87	71.26	70.87	70.18	70.96	70.24	70.47	70.09	0.44
103	103.36	103.37	103.49	103.42	102.74	103.02	103.47	102.92	102.96	0.39
104	104.06	104.09	104.50	104.14	103.50	104.15	104.47	103.84	103.84	0.42
105	105.20	105.22	105.54	105.41	105.36	105.22	105.31	105.01	105.09	0.38
180	180.78	180.86	180.98	180.98	179.46	179.33	179.32	179.41	179.42	0.55

3. Temperature Performance Result

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

UUC Setting (°C)	UUC Reading (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
40.0	40.0	0.10	0.33	0.33
70.0	70.0	0.05	1.17	1.17
103.0	103.0	0.10	0.72	0.94
104.0	104.0	0.15	0.95	1.27
105.0	105.0	0.10	0.63	0.77
180.0	180.0	0.25	1.73	1.85

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 : 19-Dec-2025

Certificate No. : 25TH5535

CSR No. : A230/11460

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 : Chemical Laboratory

Instrument Name : Liquid Bath

Manufacturer : Memmert

Model : WNE29

Serial No. : L616.0538

ID No. : SGK_CL0035

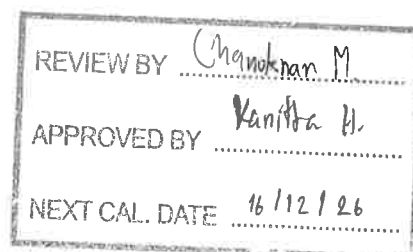
Resolution : 0.1 °C

Received Date : 16-Dec-2025

Calibrated Date : 16-Dec-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.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 /or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- Q Reborn : Quality Reborn Co.,Ltd.

Calibrated by : Ibrorhim Saleemin

Approved by :

Imron Rattanaylum / Technical Manager

SCAL.FO.018/a010723



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.

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	Ref.5	
63	62.92	62.94	63.06	63.05	63.02	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)
63	63.5	63.5	0.05	0.17	0.20

- 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 ...

Details of Calibration

1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Data Acquisiton/Switch Unit	DAQ970A	MY58036254	QR25-2036	1-Jul-2026

2. The resultes 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

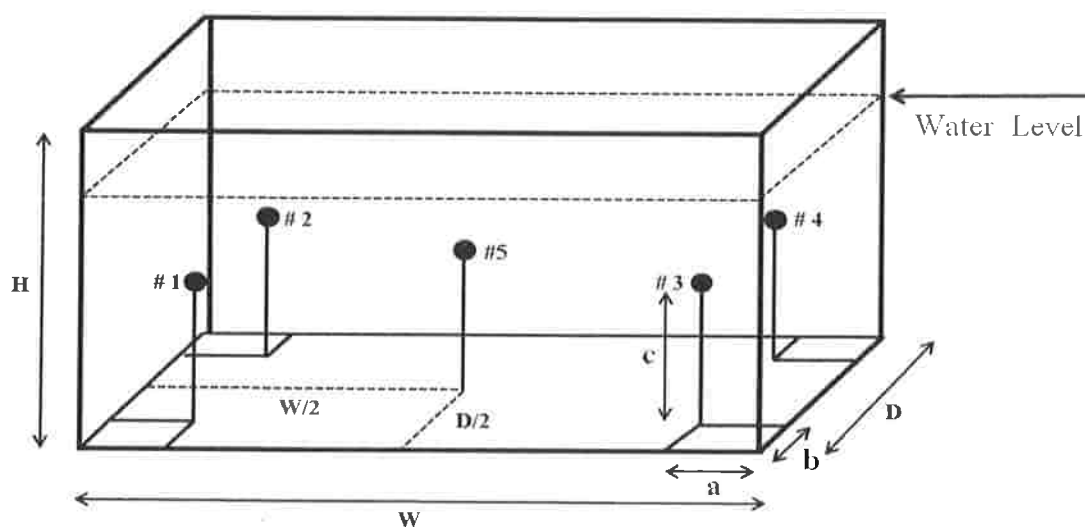
4. Condition of Item : normal condition , no indication for any damage or mulfunction

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

CALIBRATION CERTIFICATE

Issued Date : 18-Dec-2025

Certificate No. : 25TH5452

CSR No. : A230/11461

Page. : 1 of 3

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

Calibration Place : Microbiological Laboratory

Instrument Name : Autoclave

Manufacturer : TOMY

Model : SX-700

Serial No. : 52134079

ID No. : SGK_ML0001

Resolution : 1 °C

Received Date : 15-Dec-2025

Calibrated Date : 15-Dec-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.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 : Sounthern Calibration Service Co., Ltd.,

Calibrated by : Ibrorhim Saleemin

Approved by :

Imron Rattanaylum / Technical Manager

SCAL.FO.018/a010723



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	25SDAT005	16-Apr-2026

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

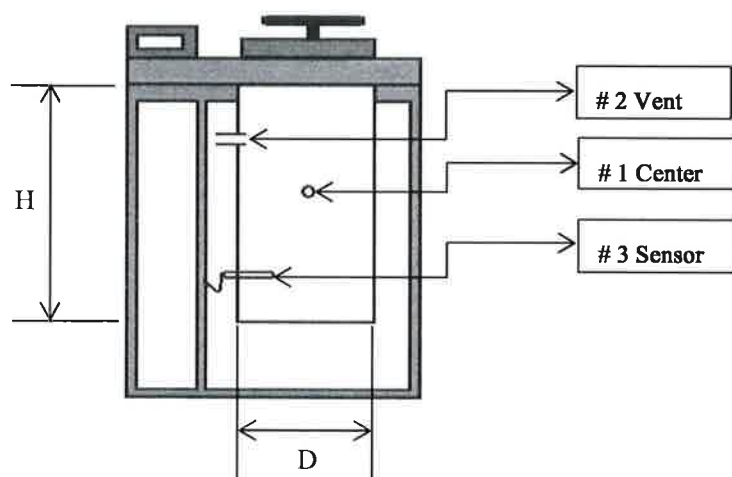
4. Condition of Item : normal condition , no indication for any damage or mulfunction

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	Uncertainty (± °C)
	Center #1	Vent #2	Sensor #3		
121	121.9	121.8	121.9	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)
121	121	121	0.50	0.69	0.83

- Operating Time = 1800.06 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 ...

CALIBRATION CERTIFICATE

Issued Date : 6-Jul-2025

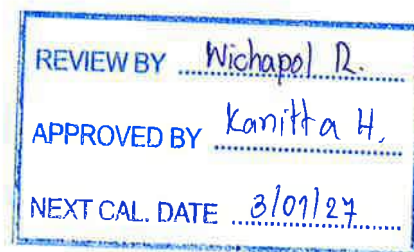
Certificate No. : 25TH3013

CSR No. : A202/10083

Page. : 1 of 3

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

Calibration Place : Customer Laboratory
Instrument Name : Incubator
Manufacturer : Memmert
Model : ICP750
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 /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 : Ibrorhim Saleemin

Approved by :

Imron Rattanaylum / Technical Manager

SCAL.FO.018/a010723



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-T0707-2/67	22-Nov-2025

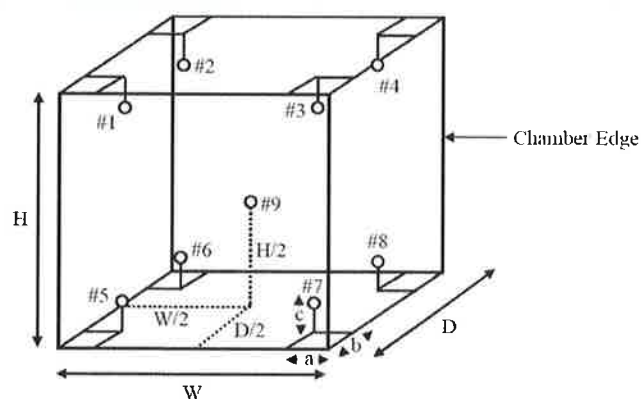
- The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.
- This certificate is not certified any commercial transaction
- Condition of Item : normal condition , no indication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

Result of Calibration ::

☒ 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

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	34.99	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 ...

CALIBRATION CERTIFICATE

Issued Date : 20-Nov-2025

Certificate No. : 25CH0552

CSR No. : A222/11083

Page. : 1 of 2

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

Calibration Place : Customer Laboratory

Instrument Name : pH meter

Manufacturer : Mettler Toledo

Model : Seven Direct SD20

Serial No. : C431515609

ID No. : SGK_ML0045

Electrode No. : 4253467

Received Date : 17-Nov-2025

Calibrated Date : 17-Nov-2025

Ambient Temperature : $(25 \pm 3) ^\circ\text{C}$

Relative Humidity : $(55 \pm 15) \%$

REVIEW BY Wichapol R.
APPROVED BY Karnittha H.
NEXT CAL. DATE 17/11/26

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 :

- CPAchem : CPAchem Ltd
- WK : WK Electric Co., Ltd.

Calibrated by : Alisara Ma

Approved by :

Imron Rattanaylum / Technical Manager

SCAL.FO.018/a010723



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
Standard Solution	4.000	61333215	1116005	15-Jun-2026
Standard Solution	7.000	61328150	1112965	8-Jun-2026
Standard Solution	10.01	61325050	1112967	8-Jun-2026
Temperature/Electrical Calibrator	MC2-TE	14987	WK2506-402-27	4-Jun-2027

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 :

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	-177.6	10.00	0.12	0.17

2. Before Sample Test Measurement

Standard Buffer Solutions (pH)	pH meter Reading		Correction (pH)	Uncertainty (± pH)
	(pH)	(mV)		
4.008	3.93	181.9	0.078	0.0092
6.988	6.87	7.9	0.118	0.019
10.011	9.71	-160.5	0.301	0.042

3. After Sample Test Measurement

Standard Buffer Solutions (pH)	pH meter Reading		Correction (pH)	Uncertainty (± pH)
	(pH)	(mV)		
4.008	4.01	183.1	-0.002	0.0092
6.988	7.00	8.0	-0.012	0.019
10.011	10.03	-161.8	-0.019	0.042

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 : 19-Dec-2025

Certificate No. : 25TH5450

CSR No. : A230/11461

Page. : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8, Karnchanawanich 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

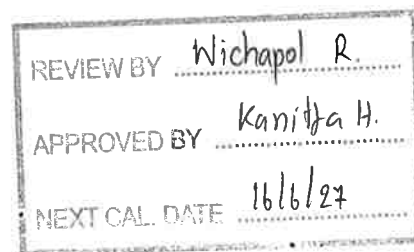
Resolution : 0.1 °C

Received Date : 16-Dec-2025

Calibrated Date : 16-Dec-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.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

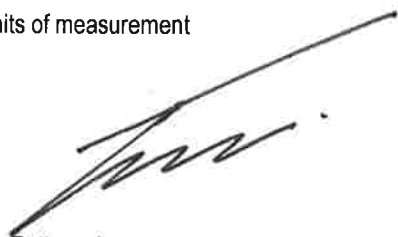
Traceability of measurement :

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

- Q Reborn : Quality Reborn Co.,Ltd.

Calibrated by : Ibrorhim Saleemin

Approved by :


Imron Rattanaylum / Technical Manager

SCAL.FO.018/a010723



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 Acquisiton/Switch Unit	DAQ970A	MY58036254	QR25-2036	1-Jul-2026

2. The resultes 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

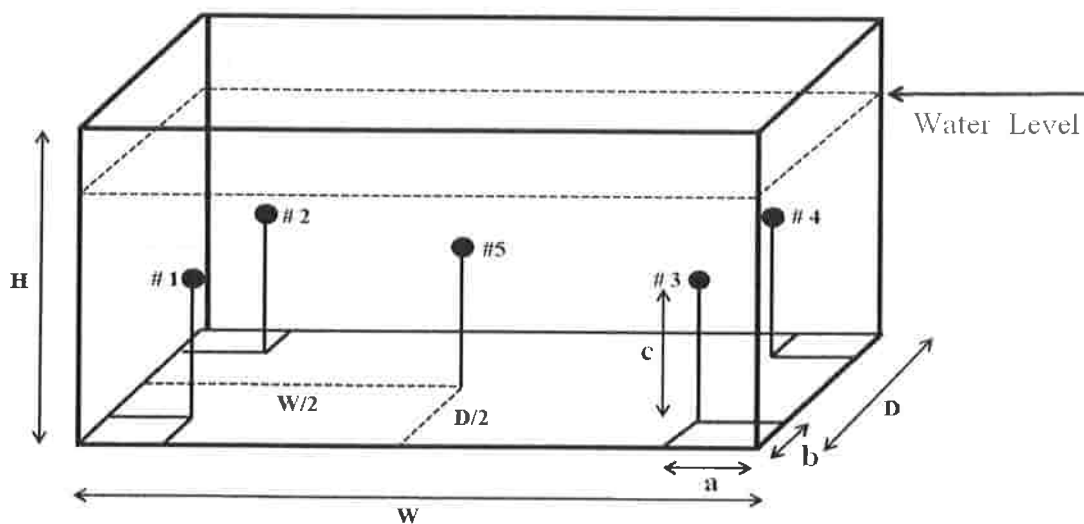
4. Condition of Item : normal condition , no indication for any damage or mulfunction

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

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	Ref.5	
44.5	44.48	44.45	44.49	44.47	44.48	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	0.25	0.36

- 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 ...



Metrology Center

SCI ECO Services Company Limited

51 Moo 8, Tubkwang, Kaeng Khoi, Saraburi, Thailand 18260

Bangkok Tel : +668 9205 6851 , +669 81924 0059

Saraburi Tel : +669 8247 2360

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T260247

Page 1 of 3

Certificate of Calibration

Equipment : DIGESTION UNIT

Manufacturer : Gerhardt

Model : KT-L20S

Serial No. : 5713250074

Customer Code : BKK_EN0460

ID No. : T7188A5

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

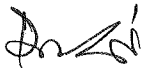
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : Wet Chemistry Lab 1

Date of Receipt : 11 February 2026

Calibrated By : Sujjar Naknakred (Site Calibration Manager)

Approved By :  / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 20 FEB 2026

REVIEW BY	
APPROVED BY	
NEXT CAL. DATE	16/02/27

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

Certificate No. T260247

Page 2 of 3

Calibration Report

Equipment : DIGESTION UNIT
Date of Calibration : 16 February 2026
Environment : Temperature : 24.4 - 24.9 °C
Line Voltage : 221.9 - 226.1 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert four standard thermocouples type S into its chamber , the other one thermocouple type T use for ambient temperature measurement . The calibration was done in according to WI-T10.

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	Type S	M20A1-(CH1-CH4)	T250750	14 May 2026
DATA LOGGER	34970A	T261	T250750	14 May 2026

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)

4. Condition of calibrated item : good

Equipment Description :

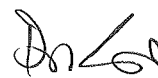
Time Constant 1 Hour 52 Minute At 380 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
 ☐ Close
 ☒ Not Available

5. Adjustment :

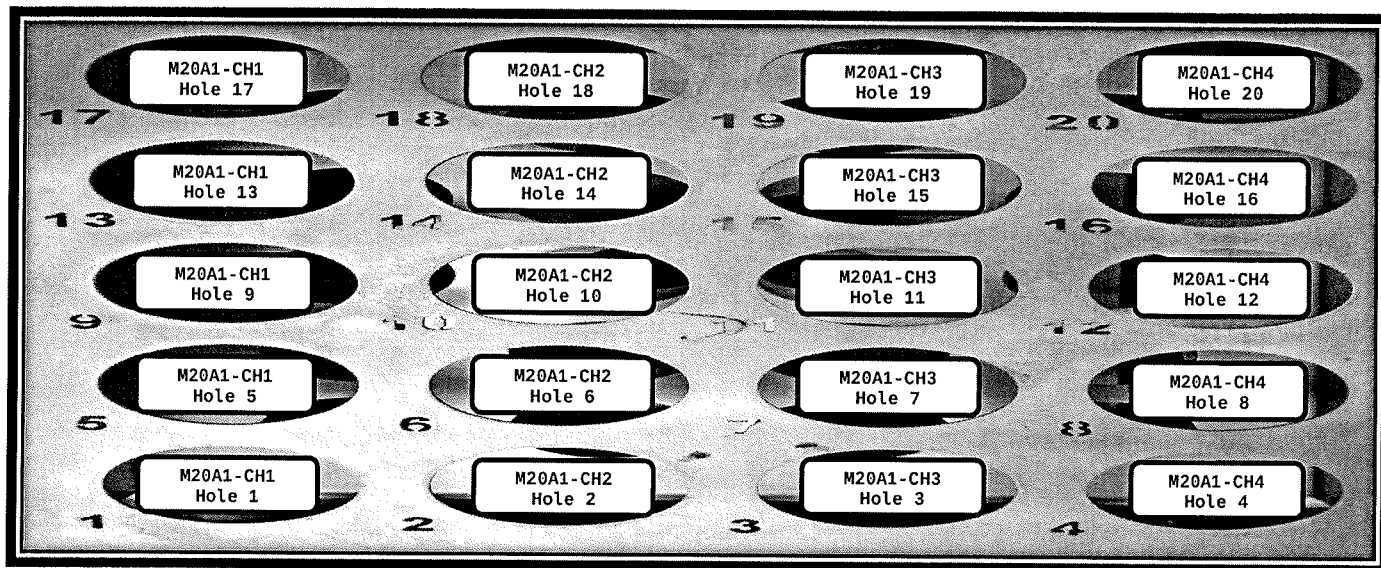
(X) without adjustment

() after adjustment

Approved By.



Calibration Report



DISPLAY CONTROL (FRONT)

Measurement Results

Cal.Point	Setting	Reading	STD.	Position of Standards at Block									
(°C)	(°C)	(°C)	Reading	M20A1-CH1 Hole 1	M20A1-CH2 Hole 2	M20A1-CH3 Hole 3	M20A1-CH4 Hole 4	M20A1-CH1 Hole 5	M20A1-CH2 Hole 6	M20A1-CH3 Hole 7	M20A1-CH4 Hole 8	M20A1-CH1 Hole 9	M20A1-CH2 Hole 10
380	380	380	Max °C	381.5	380.7	381.2	380.5	379.5	378.3	378.1	380.6	380.0	379.0
			Min °C	381.1	380.3	380.8	380.2	379.1	377.9	377.8	380.3	379.6	378.7
			Average °C	381.3	380.5	381.0	380.4	379.3	378.1	377.9	380.5	379.8	378.9
			Stability ±°C	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.2	0.2

Cal.Point	Setting	Reading	STD.	Position of Standards at Block									
(°C)	(°C)	(°C)	Reading	M20A1-CH3 Hole 11	M20A1-CH4 Hole 12	M20A1-CH1 Hole 13	M20A1-CH2 Hole 14	M20A1-CH3 Hole 15	M20A1-CH4 Hole 16	M20A1-CH1 Hole 17	M20A1-CH2 Hole 18	M20A1-CH3 Hole 19	M20A1-CH4 Hole 20
380	380	380	Max °C	381.8	381.1	378.4	377.4	380.8	382.9	378.3	377.2	380.9	379.1
			Min °C	381.5	380.8	378.0	377.0	380.3	382.4	377.9	376.8	380.7	378.8
			Average °C	381.7	380.9	378.2	377.2	380.6	382.7	378.1	377.0	380.8	378.9
			Stability ±°C	0.1	0.1	0.2	0.2	0.3	0.3	0.2	0.2	0.1	0.1

The expanded uncertainty of temperature measurement was ± 1.79 °C

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95 % .

Approved By. 



Calibration Instrument Report

Instrument: Automated Discrete Analyzer

Manufacturer: AMS

Model: SmartChem 600

Serial number: 2401055

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

Address: 104 Phatthanakan 40 Alley, Phatthanakan, Suan Luang, Bangkok 10250

Calibration date: 3 Sep 2025

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

REVIEW BY	 Arraya M.
APPROVED BY	 Siriluk P.
NEXT CAL. DATE	 3/9/2026

Check fluid to validate the correct functioning of the instrument

INTENDED USE

Check fluid to validate the correct functioning of the instrument.

Purpose

The purpose of this document is to aim at the correct execution of the method and the installation of the Check fluid to validate the correct functioning of the instrument.

COMPOSITION

Fluidic Test CHECK-01 20 x 4.5 mL (liquid) Lot number: 45751 Expiry date: 2027-04

PROCEDURE

The reagent is ready to use. Check fluid to validate the correct functioning of the instrument following method CHECK-01 and WORKPLAN CHECK01 DILUTION.

Results For the correct operation of the machine, the expected results are as follows:

1. Evaluation of calibration Results: R^2

	R^2
Result	1
Range	>0.995 - 1

2. Evaluation of Samples Results:

Dilution	Replicates	Results mg/L	Range	CV% calculated	CV%
1/1	x10	0.604	0.599 – 0.610	0.17	≤ 1
1/10	x10	0.611	0.590 – 0.625	1.37	≤ 2
1/20	x10	0.643	0.535 – 0.675	3.49	≤ 5
1/50	x10	0.689	0.510 – 0.750	7.70	≤ 10
1/75	x10	0.758	0.500 – 0.895	11.11	≤ 15

Validation by (..... )
Apirom Ekviriyakul



แบบฟอร์มการประเมินเครื่อง Discrete Analyzer หลังการสอบเทียบ

ชื่อเครื่องมือ :Discrete Analyzer

ID No. BKK_EN0438

S/N :2401055

Parameter	Range	Test Results	Pass	Fail	Remark
Evaluation of calibration	>0.995 -1	1.00	☒	☐	
CV% calculated Dilution1/1	≤ 1	0.17	☒	☐	
CV% calculated Dilution1/10	≤ 2	1.4	☒	☐	
CV% calculated Dilution1/20	≤ 5	3.5	☒	☐	
CV% calculated Dilution1/50	≤ 10	7.70	☒	☐	
CV% calculated Dilution1/75	≤ 15	11.11	☒	☐	

ผู้ตรวจสอบ *Arraya M.*
(Arraya Meechai)
(05/09/2025)

ผู้อนุมัติ: *Siriluk P.*
(Siriluk Bunnak)
(05/09/2025)



Certificate of Calibration

Certificate No. : 26T164

Page : 1 of 2

Equipment : Digital Thermometer With Sensor

Manufacturer: Testo

Model : 106

Serial No.: 51164834/812

ID No.: PHK_FS0001

Condition As-Received: Used Item

Received Date: 23 January 2026

Calibration Date: 03 February 2026
to 04 February 2026

Reference: 2601-0791DSC

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

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.

Submitted by: ALS Laboratory Group (Thailand) Co.,Ltd. Songkhla Branch.

114/1 Moo 8 Karnchanawanich Rd., T.Ban Phru, A.Hat Yai,
Songkhla 90250 Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-T01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into liquid bath temperature controller.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1.Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Black Stack Thermometer	1560	8C454	25I625	06 Jun 2026
2) PRT Scanner Module	2562	A01303	25I625	06 Jun 2026
3) Industrial Platinum Resistance Thermometer	5627-12	571971	25I625	06 Jun 2026

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

3.This measurement result is traceable to the International System of Unit maintained through:

-Technology Promotion Association (Thailand-Japan), NSC-ONSC Accredited No. Calibration 0008

REVIEW BY *Chayathorn P.*

APPROVED BY *Narakorn P.*

NEXT CAL DATE..... 03/02/27

Calibrated by : Sitthithon Poomai
Issue Date : 05 February 2026

Approved Signatory : _____

[] Phalinee Prabpaipal

[] Chatchawan Khunpiluek

[✓] Wanlop Larpkern



Cert. No.: 26T164

Page.: 2 of 2

Result of Calibration:-

Without Adjustment

Function:

Temperature measurement

Dimension of probe : Diameter 3 mm, Length 55 mm, Sheath material : Stainless Steel

<u>Immersion</u>	<u>Standard</u>	<u>UUC*</u>		<u>Uncertainty</u>
<u>Depth</u>	<u>Temperature</u>	<u>Reading</u>	<u>Error</u>	<u>of Measurement</u>
(mm)	(°C)	(°C)	(°C)	(±°C)
50	25.0035	25.0	-0.0035	0.12
50	45.0051	44.9	-0.1051	0.12

UUC* : Unit Under Calibration

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

-o0o-



Certificate of Calibration

Cert.No.: 25CH504

Page.: 1 of 2

Equipment :	Conductivity Meter
Manufacturer :	Mettler Toledo
Model :	SevenCompact S230
Serial No. :	B608134488
ID No. :	SGK_CL0032
Condition As-Received:	Used Item
Received Date :	25 April 2025
Calibration Date :	02 May 2025
Reference :	2504-0711DSC-1
Submitted by :	ALS Laboratory Group (Thailand) Co.,Ltd. Songkhla Branch. 114/1 Moo 8 Karnchanawanich Rd., T.Ban Phru, A.Hat Yai, Songkhla 90250 Thailand
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 15) %
Calibration Procedure:	In -house method : - CP-CH6 by direct measurement with reference material (RM)
Calibrated by :	Warakorn Lernagtrakul
Approved by :	 Approved Signatory
(✓) Chakrit Waewwanjua () Ponpan Paipim () Saithip Meangmai	
Issue Date :	05 May 2025

REVIEW BY	Chandknan M.
APPROVED BY	Kanitta H
NEXT CAL DATE	02/05/26

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 Calibration and Testing Equipment Services.



Cert.No.: 25CH504

Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instrument :-

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Certificate No.</u>	<u>Due date</u>
1) Thermometer	1963878	130RC095	24I995	09 Sep 2025

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials :-

- Conductivity calibration solution, Thermo Scientific (Traceable to NIST)

<u>Conductivity Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
84 $\mu\text{S/cm}$	Thermo Scientific	424/02	18 Oct 2025
1413 $\mu\text{S/cm}$	Thermo Scientific	174/03	26 Apr 2027
12.88 mS/cm	Thermo Scientific	422/01	21 Oct 2025

- Control Conductivity calibration solution temperature by Water bath (25 ± 0.1) $^{\circ}\text{C}$

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

Calibration results

Function : Conductivity Measurement

(*) Without Adjustment

Conductivity Electrode Serial No.: 5820120321

Standard Conductivity Solution	UUC* Reading	Uncertainty of Measurement ($\pm$)	Coverage factor k
84 $\mu\text{S/cm}$	84.3 $\mu\text{S/cm}$	4.3 $\mu\text{S/cm}$	2.00
1413 $\mu\text{S/cm}$	1426 $\mu\text{S/cm}$	15 $\mu\text{S/cm}$	2.00
12.88 mS/cm	12.88 mS/cm	0.14 mS/cm	2.00

Remark : - UUC* = Unit Under Calibration

- Cell constant = 0.574487 cm^{-1}

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 %.

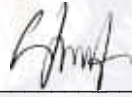
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Certificate of Calibration

Cert.No.: 25CH505

Page.: 1 of 2

Equipment : Conductivity Meter
Manufacturer : Mettler Toledo
Model : SevenCompact S230
Serial No. : B608134488
ID No. : SGK_CL0032
Condition As-Received: Used Item
Received Date : 25 April 2025
Calibration Date : 02 May 2025
Reference : 2504-0711DSC-2
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. Songkhla Branch.
114/1 Moo 8 Karnchanawanich Rd., T.Ban Phru,
A.Hat Yai, Songkhla 90250 Thailand
Ambient Temperature : $(25 \pm 2.5) ^\circ\text{C}$
Relative Humidity : $(50 \pm 15) \%$
Calibration Procedure: In -house method :
- CP-CH6 by direct measurement
with reference material (RM)
Calibrated by : Warakorn Lerngagtrakul
Approved by : 
Approved Signatory
(☒) Chakrit Waewwanjua
(☐) Ponpan Paipim
(☐) Saithip Meangmai
Issue Date : 05 May 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 Calibration and Testing Equipment Services.



Cert.No.: 25CH505

Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instrument :-

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Certificate No.</u>	<u>Due date</u>
1) Thermometer	9549224	130RC003	25I440	16 Apr 2026

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials :-

- Conductivity calibration solution, Thermo Scientific (Traceable to NIST)

<u>Conductivity Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
84 $\mu\text{S/cm}$	Thermo Scientific	424/02	18 Oct 2025

- Control Conductivity calibration solution temperature by Water bath (25 ± 0.1) $^{\circ}\text{C}$

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

Calibration results

Function : Conductivity Measurement

(*) After Adjustment at 84 $\mu\text{S/cm}$

Conductivity Electrode Serial No.: 5816340156

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement ($\pm$)	Coverage factor k
84 $\mu\text{S/cm}$	81.1 $\mu\text{S/cm}$	84.1 $\mu\text{S/cm}$	4.3 $\mu\text{S/cm}$	2.00

Remark : - UUC* = Unit Under Calibration

- Cell constant = 0.103477 cm^{-1}

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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534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250

TEL. 0-2717-3000 FAX. 0-2719-9484

Certificate of Testing

Cert.No.: 25TW242

Page.: 1 of 2

Equipment : DO Meter
Manufacturer : Mettler Toledo
Model : Seven2Go S9
Serial No. : C343002019
ID No. : PHK_FS0036
Received Date : 25 November 2025
Test Date : 26 November 2025
Reference : 2511-0730DSC-9
Submitted by :

ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Laboratory Condition :

Temperature (25 ± 5) °C
Humidity (50 ± 20) %

Test Procedure :

In - house method : CP-CH9
by Comparison Technique with Azide Modification Method

Tested by :

Walalak Sirithean

Approved by :

Approved Signatory

- () Chakrit Waewwanjua
() Ponpan Paipim
(✓) Saithip Meangmai

Issue Date :

28 November 2025

REVIEW BY	
APPROVED BY	
NEXT CAL DATE	26/11/26



Cert.No.: 25TW242

Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

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

<u>Instruments</u>	<u>ID No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1. Burette	130BU10	25CG1126	18 Mar 2027
2. Balance	110RC001	25MM316	02 July 2026

2. Standard Material :-

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

Result : **Dissolved Oxygen Meter Adjustment With Air 100 %**

Dissolved Oxygen Probe No.: 1069301

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.22	8.23	0.0055

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

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Certificate of Calibration

Cert. No.: 26LM7

Page.: 1 of 2

Equipment : Do Meter with Sensor

Manufacturer : Mettler Toledo

Model : Seven2Go S9

Serial No. : C343002019

ID No. : PHK_FS0036

Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Location : TPA On Site Calibration Laboratory

Received Order : 06 January 2026

Calibrated Date : 08 January 2026

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

AC Line Voltage : (220 ± 22) V

Calibrated by : Warakorn Lerngagtrakul

Approved by :

Approved Signatory

() Chakrit Waewwanjua

() Suwit Imjai

(✓) Kunchit Promprat

Issue Date : 09 January 2026

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 : 2601-0087DSC-1

Cert. No.: 26LM7
Page.: 2 of 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:-

<u>Instrument</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due Date</u>
1) Digital Thermometer	2188080	25I953	TPA	05 Sep 2026

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

3. This measurement result is traceable to the International System of Unit maintained through :

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

Result of Calibration :- (*) Without Adjustment

Function : Temperature measurement.

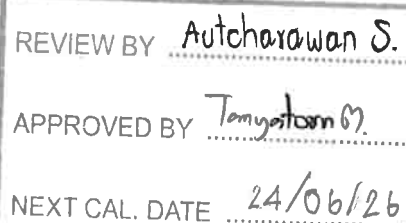
This instrument was connected with temperature sensor, S/N.: 1069301

<u>Calibration Point</u> (°C)	<u>Immersion Depth</u> (mm)	<u>Standard Temperature</u> (°C)	<u>UUC* Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty</u> (± °C)	<u>Coverage Factor</u> <i>k</i>
20.0	80	20.003	20.1	0.097	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 %.

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Application Chemist

Accredited by

NSC-TISI-TIS 17025

Calibration 0426



Calibration certificate

Calibration Certificate No. 25BCI0265

Object	Electronic non-automatic weighing instrument	This calibration certificate documents the traceability to national standards.
Manufacturer	Sartorius	Uncertainties of measurements are taken into account when only statements of compliance are made.
Type	MSE224S-100-DU	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.
Serial QM Ident. no.	27405555 BKK_EN0003	This certificate relate and apply this equipment only.
Customer	ALS Laboratory Group (Thailand)Co., Ltd. 104 Phatthanakarn 40,Phattanakarn Rd.,Khwaeng Phatthanakarn ,Khet Suan Luang,Bangkok 10250	REVIEW BY <i>finda K</i> APPROVED BY <i>Siriluk P</i> NEXT CAL DATE <u>17/07/26</u>
Order no.	265054	
Number of pages	4	
Date of calibration	17 Jul 2025	

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.

Date of issue	17 Jul 2025	Approval of the Calibration Certificate	Person in charge
			
		Mr. Chonchai Inthana	Chonchai Inthana

Calibration object

Single range instrument

Model	MSE224S-100-DU
Serial Number	27405555
QM Ident. no Inventory no.	BKK_EN0003 ---

Maximum capacity (Max. load)	220.0000 g
Measured up to	220.0000 g
Scale interval	0.0001 g

Place of calibration

Address	According to page 1
Department Cost center	ENVI Department ---
Building Floor	--- 1st Floor.
Room	Laboratory Room.
Maximum temperature variation at place of calibration	5 K

Calibration procedure

EURAMET Calibration Guide No. 18, Version 4.0 (11/2015) - 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

Adjustment Status

The measuring device was internally adjusted before the calibration.

Environmental and measuring conditions

Date of calibration	17 Jul 2025
Temperature at place of calibration Temp. diff. <i>T</i> _{weights} - <i>T</i> _{place}	22.5 °C 0.7 K
Measuring conditions	The installation site is suitable. The device is level. Balance was loaded up to Max before test.
Comments	Humidity 58.0 %RH.

Measurement results | Measurement uncertainties

Repeatability

Test load (nominal): 10 g 200 g		
	10 g	200 g
1	10.0000 g	200.0000 g
2	10.0000 g	199.9999 g
3	10.0000 g	200.0000 g
4	10.0000 g	200.0000 g
5	10.0001 g	199.9999 g
6	10.0000 g	200.0000 g
7	10.0000 g	200.0000 g
8	10.0001 g	200.0000 g
9	10.0000 g	200.0000 g
10	10.0000 g	199.9999 g
	<i>s</i> = 0.00004 g	<i>s</i> = 0.00005 g

Eccentricity

Test load (nominal): 100 g	
Center	100.0000 g
Front left	100.0001 g
Back left	100.0000 g
Back right	100.0001 g
Front right	100.0001 g
Maximum deviation from centric loading indication $ \Delta_{ecc} _{max} = 0.0001\text{ g}$	

Error of indication

Testload	Indication	Error	Expansion factor	Uncertainty	Uncertainty relative
<i>L</i>	<i>I</i>	<i>E</i>	<i>k</i>	<i>U</i> (<i>E</i>)	<i>U</i> _{rel} (<i>E</i>)
0.0100 g	0.0100 g	0.0000 g	2.00	0.00012 g	1.2 %
0.1000 g	0.1000 g	0.0000 g	2.00	0.00013 g	0.13 %
1.0000 g	1.0000 g	0.0000 g	2.00	0.00013 g	0.013 %
2.0000 g	2.0000 g	0.0000 g	2.00	0.00013 g	0.0065 %
5.0000 g	5.0000 g	0.0000 g	2.00	0.00013 g	0.0026 %
10.0000 g	10.0000 g	0.0000 g	2.00	0.00013 g	0.0013 %
20.0000 g	20.0000 g	0.0000 g	2.00	0.00014 g	0.00068 %
50.0000 g	50.0000 g	0.0000 g	2.00	0.00015 g	0.00029 %
100.0000 g	100.0000 g	0.0000 g	2.00	0.00018 g	0.00018 %
200.0000 g	200.0000 g	0.0000 g	2.00	0.00028 g	0.00014 %
220.0000 g	220.0001 g	0.0001 g	2.00	0.00032 g	0.00015 %
Maximum error of indication		$ E _{max} = 0.0001\text{ 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.
Reference note: The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the documented Expansion factor, determined in accordance with the European Calibration Guideline EURAMET cg-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

Device adjusted before measurement	Yes
Temperature deviation considered	1.5 K (isoCAL active)
Temperature coefficient considered	$1 \cdot 10^{-6}/\text{K}$

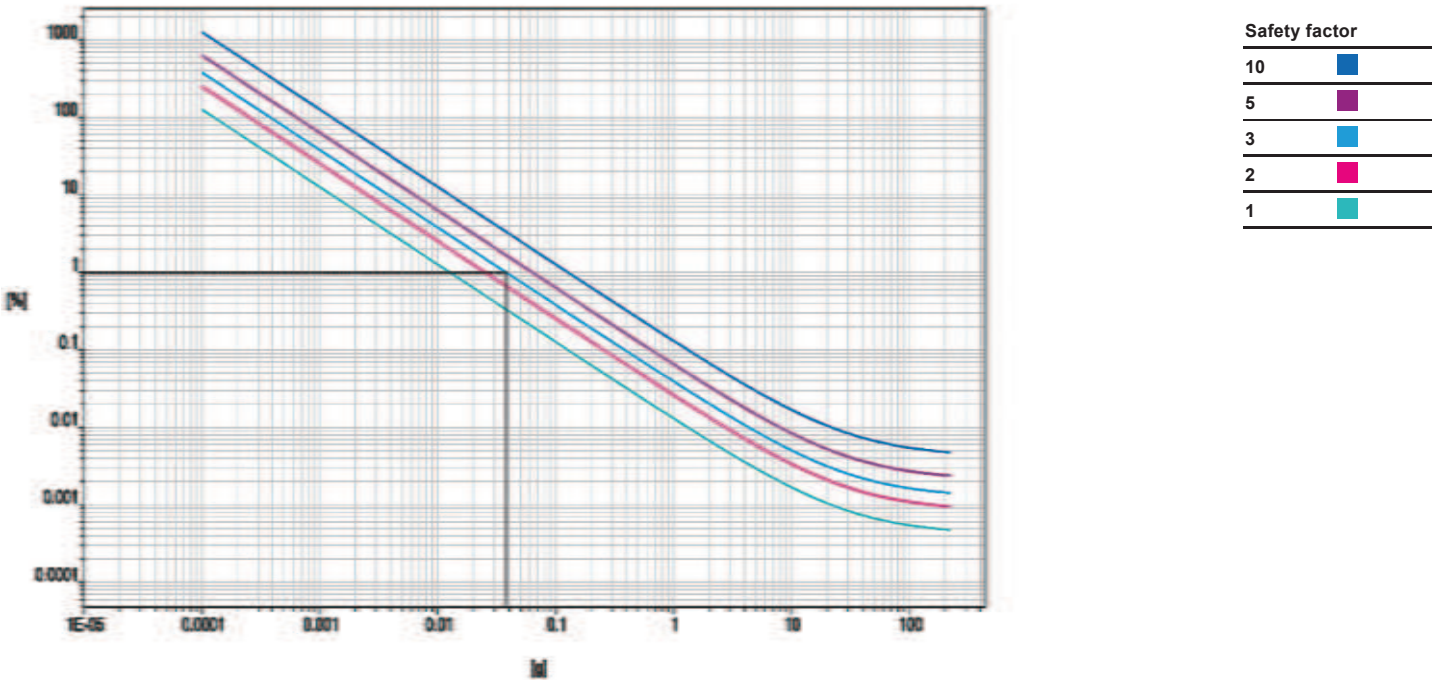
Uncertainty of the weighing result $U_{gl}(W)$

$U_{gl}(W) = 0.00013 \text{ g} + 4.19 \cdot 10^{-6} \cdot R$

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-18, 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 $U_{gl}(W)$	Uncertainty relative $U_{gl}(W)_{rel}$
1 %	2.2000 g	0.00014 g	0.0063 %
25 %	55.0000 g	0.00036 g	0.00066 %
50 %	110.0000 g	0.00059 g	0.00054 %
75 %	165.0000 g	0.00082 g	0.00050 %
100 %	220.0000 g	0.0011 g	0.00048 %

Graphic realization of the relative uncertainty of measurement | process accuracy



Displayed example

Process accuracy	1.00 %
Safety factor	3
Minimum sample weight	0.0380 g



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TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert. No.: 25TM528

Page : 1 of 3

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 29
Serial No. : L622.0282
ID No. : BKK_EN0439

REVIEW BY

Jinda K

APPROVED BY

Siriluk P

NEXT CAL DATE

09/10/26

Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Location : Organic Preparation Lab

Received Order : 08 October 2025

Calibration Date : 09 October 2025

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

AC Line Voltage : (220 ± 22) V

Calibrated by : Kunchit Promprat

Kunchit Promprat

Approved by :

Approved Signatory

() Chakrit Waewwanjua

() Ponpan Paipim

(✓) Suwit Imjai

Issue Date : 28 October 2025

The Uncertainties are for a confidence probability of approximately 95%

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



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2510-0042OC-13

Cert. No.: 25TM528
Page : 2 of 3

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT04 Based on ASTM E715 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

<u>Instrument</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due Date</u>
1) Data Acquisition	MY58041391	25LM20	TPA	08 Feb 2026

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

3. This measurement result is traceable to the International System of Unit maintained through :

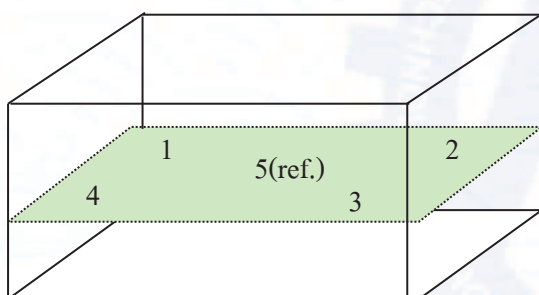
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

	<u>Environmental</u>		<u>AC Voltage Supply</u> (Volt)
	(°C)	(%R.H.)	
Beginning of Calibration	24	63	224
Finished of Calibration	24	58	224



Front

<u>Position :</u>	<u>Ref. Std. ID No.:</u>
1	70RC143
2	70RC144
3	70RC145
4	70RC146
5(ref.)	70RC147



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2510-0042OC-13
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 25TM528
Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)					Uncertainty (± °C)
			Position					
			1	2	3	4	5 (ref.)	
85.0	85.0	85.0	84.863	84.748	84.869	84.990	84.966	0.21

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor <i>k</i>
85.0	0.33	0.12	2

Average* : The average of 30 values in each position.

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.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

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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Certificate of Calibration

Cert.No.: 25CH1162

Page.: 1 of 3

Equipment : pH Meter
Manufacturer : Hach
Model : HQ411d
Serial No. : 200100031163
ID No. : BKK_EN0342
Condition As-Received: Used Item
Received Date : 08 October 2025
Calibration Date : 09 October 2025
Reference : 2510-0271DSC-1
Submitted by :

ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

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

Calibrated by : Walalak Sirithean

Approved by :

Approved Signatory

- () Chakrit Waewwanjua
() Ponpan Paipim
(✓) Saithip Meangmai

Issue Date : 10 October 2025

REVIEW BY *finda K*
APPROVED BY *Siriluk P*
NEXT CAL DATE.....09/10/26

The Uncertainties are for a confidence probability of approximately 95%

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



Cert.No.: 25CH1162

Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Ref. Standard Thermometer	4982054	110RC044	25I708	03 July 2026

- This measurement result is traceable to SI through Technology Promotion Association (Thailand - Japan)

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

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.007	CPA chem	1114384	12 June 2027
pH 6.965	CPA chem	1066667	18 Jan 2026
pH 10.010	CPA chem	1135355	16 Aug 2026

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

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 (±)	Coverage factor <i>k</i>
pH Electrode S/N.: 252063043080	4.007	3.996	176.6	0.0046	2.00
	6.965	6.974	1.1	0.0084	2.00
	10.010	9.996	-176.9	0.0070	2.00

Remark - Can not connect the BNC because the plug does not match with the socket.



Cert.No.: 25CH1162

Page.: 3 of 3

Calibration Results

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : PHC281

- Serial No. : 252063043080

Dimension of probe

- Length : 103 mm.

- Diameter : 12 mm.

- Immersion Depth : 90 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor <i>k</i>
25.0	25.001	25.0	-0.001	0.13	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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Certificate of Calibration

Customer

Name : ALS Laboratory Group Thailand Co., Ltd.
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang, Bangkok
10250

Certificate No : 25-AFM-208

Request No : Req-2025-1986

Unit Under Calibration Details

Measurement Item : Air Flow Meter
Manufacturer : Mesa Labs
Model : 200-510M
Serial Number : 151114
ID : BKK_FS0614
Location of Calibration : LAB 4 AIR VELOCITY METER

Sensor Model : -
Sensor Serial Number : -
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 3 °C
Humidity : 55 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 3 September 2025
Calibration Date : 10 September 2025
Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

REVIEW BY	<i>Wanlan P.</i>
APPROVED BY	<i>[Signature]</i>
NEXT CAL DATE	09/09/26

Reference Standard	Model	Serial Number	Traceble	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	5 May 2026
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	6 May 2026
Temperature meter	GT 11	08000057	Qreborn	15 October 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	21 October 2025

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01 and MIT NSC-TISI-TIS Accreditation No. 0052

Note :

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %.

Calibration By :

[Signature]

Mr. Noppadon Luangart
Service Calibration Engineer

Approved By :

[Signature]

Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date :

10 September 2025



Certificate No : 25-AFM-208

Request No : Req-2025-1986

Result of Calibration : Without Adjustment

STD Reading			UUC Readingg			Error (cc/min)	Uncertainty		
Temperature (°C)	Pressure (kPa)	Flow (cc/min)	Temperature (°C)	Pressure (kPa)	Flow (cc/min)		(cc/min)	(°C)	(kPa)
25.5	100.98	100	-	-	100.02	0.0	3.6	1.0	0.50
25.7	100.97	503	-	-	500.81	-2.2	9.5	1.0	0.50
25.8	100.89	1003	-	-	1000.4	-3	19	1.0	0.50
26.1	100.88	2000	-	-	2001.9	2	38	1.0	0.50
26.5	100.85	3014	-	-	3002.2	-12	57	1.0	0.50
26.7	100.81	4027	-	-	4000.9	-26	76	1.0	0.50
27.0	100.74	5048	-	-	5001.8	-46	95	1.0	0.50

Note

STD : Standard UUC : Unit Under Calibration

- UUC Reference Condition : At atmospheric pressure and room temperature condition, Air ☐

- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{meas}} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature

meas = Measurement Condition ref = Standard Condition

* Indicates non accredited

End of Certificate



Certificate of Calibration

Customer

Name : ALS Laboratory Group Thailand Co., Ltd.
Address : 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang, Bangkok
10250

Certificate No : 25-AFM-207

Request No : Req-2025-1987

Unit Under Calibration Details

Measurement Item : Air Flow Meter
Manufacturer : Mesa Labs
Model : 200-510L
Serial Number : 130026
ID : BKK_FS0619
Location of Calibration : LAB 4 AIR VELOCITY METER

Sensor Model : -

Sensor Serial Number : -

Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 3 °C
Humidity : 55 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 3 September 2025
Calibration Date : 10 September 2025
Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

REVIEW BY *Nopadon P.*

APPROVED BY *[Signature]*

NEXT CAL DATE.....09/09/26.....

Reference Standard	Model	Serial Number	Traceble	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	5 May 2026
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	6 May 2026
Temperature meter	GT 11	08000057	Qreborn	15 October 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	21 October 2025

Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01 and MIT NSC-TISI-TIS Accreditation No. 0052

Note :

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %.

Calibration By : *[Signature]*
Mr. Nopadon Luangart
Service Calibration Engineer

Approved By : *[Signature]*
Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 10 September 2025

Certificate No : 25-AFM-207

Request No : Req-2025-1987

Result of Calibration : Without Adjustment

STD Reading			UUC Readingg			Error (cc/min)	Uncertainty		
Temperature (°C)	Pressure (kPa)	Flow (cc/min)	Temperature (°C)	Pressure (kPa)	Flow (cc/min)		(cc/min)	(°C)	(kPa)
25.5	100.98	20	-	-	20.042	0.0	1.6	1.0	0.50
25.5	100.90	50	-	-	49.921	-0.1	4.0	1.0	0.50
25.5	100.91	100	-	-	100.09	0.1	3.6	1.0	0.50
25.4	100.86	150	-	-	150.34	0.3	5.4	1.0	0.50
25.6	100.93	199	-	-	200.17	1.2	7.2	1.0	0.50
25.6	100.95	301	-	-	300.05	-1	11	1.0	0.50
25.7	100.96	402	-	-	401.03	-1	14	1.0	0.50
25.7	100.95	503	-	-	500.26	-3	10	1.0	0.50

Note

STD : Standard UUC : Unit Under Calibration

- UUC Reference Condition : At atmospheric pressure and room temperature condition, Air ☐

- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{meas}} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature
 meas = Measurement Condition ref = Standard Condition

* Indicates non accredited

End of Certificate



Certificate of Calibration

Certificate No. C-020326-PHK_FS0038

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump	Equipment ID : PHK_FS0038
Brand : Gilian	Serial No. : 20210910023
Model/Type : GilAir Plus	Calibration Date : 02-Mar-26
	Next calibration date : 02-Jun-26

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter	Equipment ID : BKK_FS0619
Brand : MesaLabs	Serial No. : 130026
Model/Type : Defender 510-L	Calibration Date : 10-Sep-25
	Due Date : 09-Sep-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter	Equipment ID : BKK_FS0614
Brand : MesaLabs	Serial No. : 151114
Model/Type : Defender 510-M	Calibration Date : 10-Sep-25
	Due Date : 09-Sep-26

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)	Evaluation (Pass/ Fail)
	1	2	3				
Low Flow							
20	19.7	19.8	20.0	19.8	5%	19 - 21	Passed
50	49.2	50.4	51.4	50.3	5%	48 - 53	Passed
100	99.7	100.7	99.9	100.1	5%	95 - 105	Passed
200	200.4	200.3	199.6	200.1	5%	190 - 210	Passed
High Flow							
500	499.8	501.1	499.7	500.2	3%	485 - 515	Passed
1000	1001.4	1000.3	1002.0	1001.2	3%	970 - 1030	Passed
2000	1999.7	2001.3	2002.1	2001.0	3%	1940 - 2060	Passed
2500	2499.7	2501.3	2502.6	2501.2	3%	2425 - 2575	Passed

----- END OF REPORT -----

Calibrated By: 

(Mr. Apiwat Chanta)

SGK Field Services Scientist (2)

Issue date : 03-Mar-26

Approved By: 

(Mr. Supot Salamteh)

Field Services Section Head



Certificate of Calibration

Certificate No. C-020326-PHK_FS0039

Air Sampling Pump Detail

Equipment name : Personal Air Sampling Pump
Brand : Gilian
Model/Type : GilAir Plus

Equipment ID : PHK_FS0039
Serial No. : 20210910022
Calibration Date : 02-Mar-26
Next calibration date : 02-Jun-26

Reference Standard Low Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-L

Equipment ID : BKK_FS0619
Serial No. : 130026
Calibration Date : 10-Sep-25
Due Date : 09-Sep-26

Reference Standard High Flow Meter

Equipment name : Air Flow Meter
Brand : MesaLabs
Model/Type : Defender 510-M

Equipment ID : BKK_FS0614
Serial No. : 151114
Calibration Date : 10-Sep-25
Due Date : 09-Sep-26

Calibration Data

Air Sampling Pump setting (cc/min)	Reference Std. Flow Reading (cc/min)			Avg. (cc/min)	%Error acceptance	Acceptable range (cc/min)		Evaluation (Pass/ Fail)	
	1	2	3						
Low Flow									
20	20.1	20.3	20.0	20.1	5%	19	-	21	Passed
50	50.1	50.6	51.4	50.7	5%	48	-	53	Passed
100	100.2	100.7	99.9	100.3	5%	95	-	105	Passed
200	199.7	201.1	199.6	200.1	5%	190	-	210	Passed
High Flow									
500	500.4	501.3	499.7	500.5	3%	485	-	515	Passed
1000	999.8	1000.3	1002.0	1000.7	3%	970	-	1030	Passed
2000	2000.1	2001.3	2002.1	2001.2	3%	1940	-	2060	Passed
2500	2501.4	2501.3	2500.3	2501.0	3%	2425	-	2575	Passed

----- END OF REPORT -----

Calibrated By: 

(Mr. Apiwat Chanta)

SGK Field Services Scientist (2)

Issue date : 03-Mar-26

Approved By: 

(Mr. Supot Salamteh)

Field Services Section Head

CALIBRATION REPORT

CUSTOMER NAME : ALS Laboratory Group (Thailand) Co., Ltd.			
EQUIPMENT NAME : Total Hydrocarbon Analyzer			
MANUFACTURER : Baseline	MODEL : 9000 HTHA	SERIAL NO : 0412EF0022	
STANDARD GAS CONCENTRATION (PPM) : 506.1 PPM (Methane)		CYLINDER NO : CC734373	
CYLINDER PRESSURE (psig) : 1,000 PSI		CERTIFIED DATE : 12/05/2020	
CERTIFIED BY : AIRGAS		EXPIRED DATE : 12/05/2028	

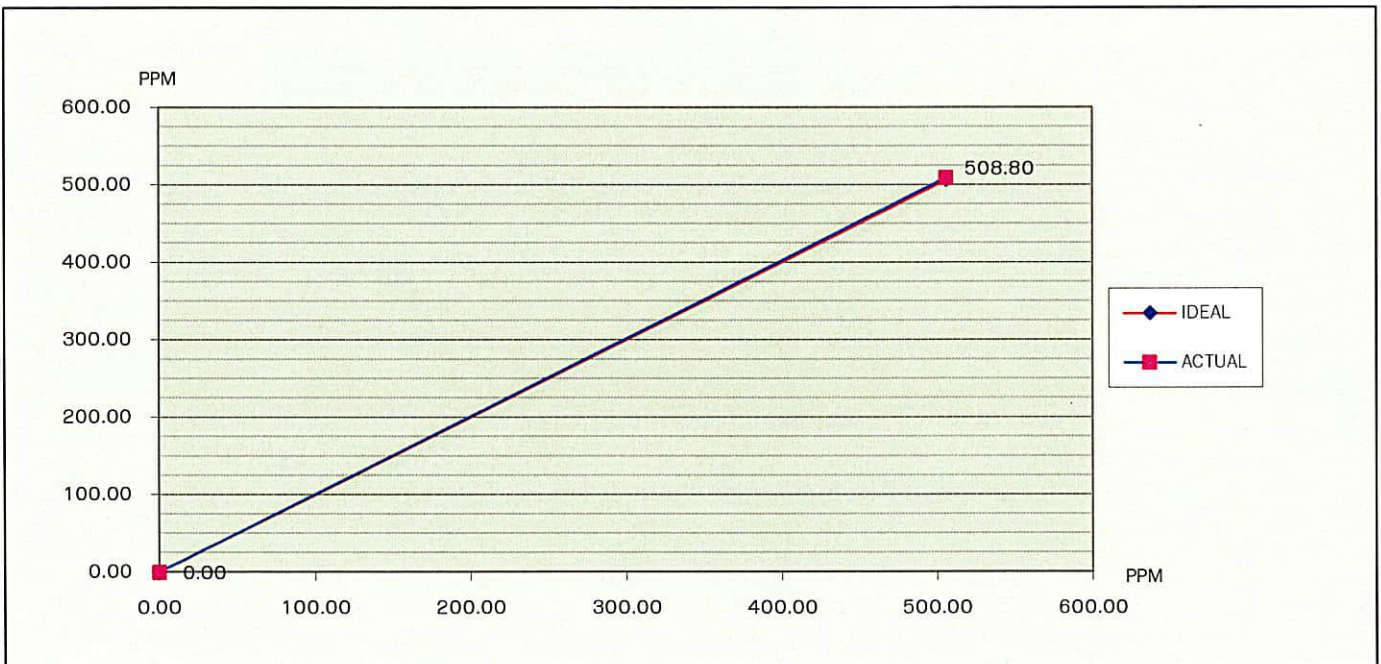
CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL	ACTUAL	ERROR	%ERROR
ZERO	0.00	0.00	0.00	-
1	506.10	508.80	2.7	0.53
AVERAGE (%)				0.13

REVIEW BY *Manon P.*

APPROVED BY *[Signature]*

NEXT CAL DATE 24/03/27



CALIBRATED BY : *สมพงษ์ ทรัพย์แท้* DATE : 24/3/69

CHECKED BY : *สมชัย วัฒนา* DATE : 24/3/69



ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 31 , E-Mail : Engineer@jiranatee.com

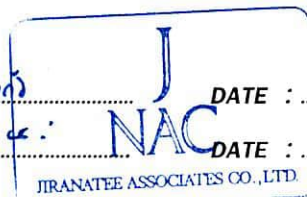
เลขที่ 63/14-15,67/35-36 ถนน เพชรเกษม 7,7/1 แขวง วัดท่าพระ เขต บางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02868-1889

FLOW CALIBRATE

CUSTOMER NAME : ALS Laboratory Group (Thailand) Co., Ltd.			
EQRIPMENT NAME : Flow Calibrator			
MANUFACTURER : Bios		MODEL : 510 L	SERIAL NO : 129549

Flow Parameter	Step	Set	Display	Flow Meter
Sample	Before	35	34	36.52 cc/min
	After	35	35	36.12 cc/min
Air	Before	175	172	180.70 cc/min
	After	175	175	175.10 cc/min
Fuel	Before	35	40	45.20 cc/min
	After	35	34	35.37 cc/min

CALIBRATED BY : ณัฏพรณ์ กรทุณกร **DATE :** 24/3/69
CHECKED BY : สันติ วัฒนะ **DATE :** 24/3/69



ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 15-16 , E-Mail : Engineer@jiranatee.com
 เลขที่ 63/14-15,67/35-36 ถนน เพชรเกษม 7,7/1 แขวง วัดท่าพระ เขต บางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02868-1889