

## ภาคผนวก ฉ

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ใบรับรองการสอบเทียบเครื่องมือ

รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Songkhla Lab	BOD	Incubator	SGK_CL0028	13-Jul-23	13-Jan-25	18
Songkhla Lab	BOD	DO/BOD Analyser	SGK_CL0073	21-May-24	21-Nov-25	18
Songkhla Lab	COD	COD Reactor	SGK_CL0085	24-Jan-24	24-Jan-25	12
Songkhla Lab	COD	Spectrophotometer	SGK_CL0038	24-Jan-24	24-Jan-25	12
Songkhla Lab	pH at 25 °C	pH meter	SGK_CL0030	28-Apr-23	28-Oct-24	18
Songkhla Lab	Oil & Grease	Electronic Top-Loading Balance	SGK_CL0045	15-Jan-24	15-Jan-25	12
Songkhla Lab	Oil & Grease	Oven	SGK_CL0024	28-Apr-23	28-Oct-24	18
Songkhla Lab	Oil & Grease	Water Bath	SGK_CL0035	13-Jul-23	13-Jan-25	18
Songkhla Lab	Total Dissolved Solids 180°C	Electronic Top-Loading Balance	SGK_CL0045	15-Jan-24	15-Jan-25	12
Songkhla Lab	Total Dissolved Solids 180°C	Oven	SGK_CL0024	28-Apr-23	28-Oct-24	18
Songkhla Lab	Total Suspended Solids	Electronic Top-Loading Balance	SGK_CL0045	15-Jan-24	15-Jan-25	12
Songkhla Lab	Total Suspended Solids	Oven	SGK_CL0024	28-Apr-23	28-Oct-24	18
Ambient	Benzene	GC-MSD	RYG_EN0136	5-Jan-24	4-Jul-25	18
Ambient	Total Hydrocarbon	DRYCAL FLOWMETER	BKK_FS0619	25-Sep-23	25-Sep-24	12
Ambient	Total Hydrocarbon	Total Hydrocarbon Analyzer	BKK_EN0409	18-May-23	18-May-24	12



**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 : 16-Jul-2023

Certificate No. : 23TH3096

CSR No. : A095/04743

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 : Incubator  
Manufacturer : Memmert  
Model : ICP750  
Serial No. : F816.0063  
ID No. : SGK\_CL0028  
Resolution : 0.1 °C  
Received Date : 13-Jul-2023  
Calibrated Date : 13-Jul-2023  
Ambient Temperature : (30 ± 10) °C  
Relative Humidity : (50 ± 30) %

REVIEW BY .....

APPROVED BY

NEXT CAL. DATE 13/01/25

### 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 :

- ScaL : Sounthern Calibration Service Co., Ltd.,

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	23SDAT004	23-May-2024

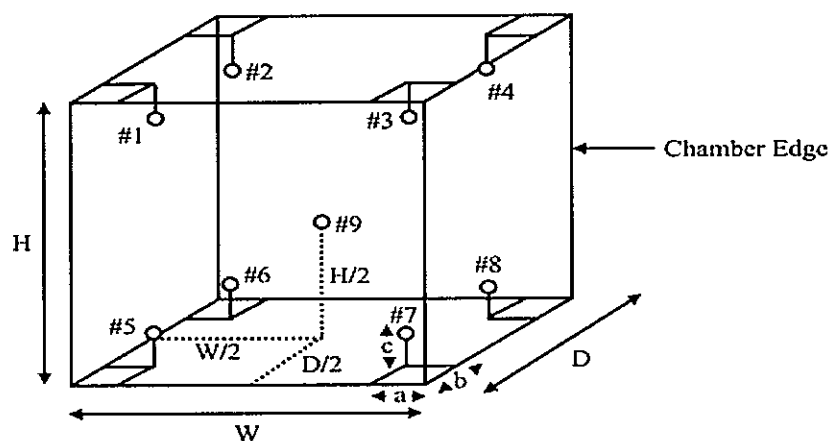
2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

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



Certificate No. : 23TH3096

CSR No. : A095/04743

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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	20.10	20.04	20.03	19.97	20.08	20.23	20.10	19.94	20.07	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	0.14	0.17	0.32

- 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. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 22LM162

Page.: 1 of 2

## Certificate of Calibration

**Equipment :** DO Meter with Sensor

**Manufacturer :** YSI

**Model :** 5000

**Serial No. :** 17B101473

**ID No. :** SGK\_CL0073

**Submitted by :** ALS Laboratory Group (Thailand) Co.,Ltd.  
Songkhla Branch.  
114/1 Moo 8, Kanjanavanij Rd., Banphru,

**Location :** TPA Chemistry Calibration Lab.2

**Received Order :** 18 November 2022

**Calibrated Date :** 21 November 2022

**Ambient Temperature :** (  $26 \pm 10$  ) °C

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

**AC Line Voltage :** (  $220 \pm 22$  ) V

**Calibrated by :** Warakorn Lerngagtrakul

REVIEW BY .....	
APPROVED BY	
NEXT CAL. DATE	21 Nov 24.

**Approved by :**

Approved Signatory

- ( ) Pornthippa Tameyakul  
(✓) Malee Butkruea  
( ) Suwit Imjai

**Issue Date :**

22 November 2022

**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.

A 0047729



Equipment : DO Meter with Sensor  
Condition As-Received : Used Item  
Reference : 2111-0663DSC-2

Cert. No.: 22LM162

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>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Digital Thermometer	1523	3240076	221249	02 Mar 2023

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

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

**Result of Calibration :-** ( \* ) Without Adjustment

Function : Temperature measurement.

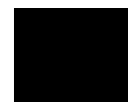
This instrument was connected with temperature sensor, S/N.: 17B100103

<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>
20.00	60	20.001	19.88	-0.121	0.15	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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**Cert.No.: 22TW259**

**Page.: 1 of 2**

## **Certificate of Testing**

<b>Equipment :</b>	DO Meter
<b>Manufacturer :</b>	YSI
<b>Model :</b>	5000
<b>Serial No. :</b>	17B101473
<b>ID No. :</b>	SGK_CL0073
<b>Received Date :</b>	18 November 2022
<b>Test Date :</b>	21 November 2022
<b>Reference :</b>	2211-0663DSC-1
<b>Submitted by :</b>	ALS Laboratory Group (Thailand) Co.,Ltd. Songkhla Branch. 114/1 Moo 8, Kanjanavanij Rd., Banphru, Hatyai, Songkhla 90250, Thailand
<b>Laboratory Condition :</b>	Temperature ( $25 \pm 5$ ) °C Humidity ( $50 \pm 20$ ) %
<b>Test Procedure :</b>	In - house method : CP-CH9 by Comparison Technique with Azide Modification Method
<b>Tested by :</b>	Walalak Sirithean
<b>Approved by :</b>	<div style="text-align: center;"> Approved Signatory</div>
( <input checked="" type="checkbox"/> ) Malee Butkruea	
( <input type="checkbox"/> ) Saithip Meangmai	
( <input type="checkbox"/> ) Warakorn Lerngagtrakul	
<b>Issue Date :</b>	22 November 2022





Cert.No.: 22TW259

Page.: 2 of 2

**Condition of this result of calibration**

1. Reference Standard Instruments :

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

<u>Instruments</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Burette	-	130BU10	21CG1389	25 Mar 2023
2) Balance	1126143764	140RC004	22MM50	20 Sep 2023

2. Standard Material :-

<u>Material</u>	<u>Manufacturer</u>	<u>Lot.No.</u>	<u>Assay</u>
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

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

Dissolved Oxygen Probe No.: 17B100103

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.12	8.12	0.0045

This report was certified only for the instrument we tested. It is allowable to use for study the system efficiency, The environmental impact control and present to organization it may concerned. 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 Testing

**Cert.No.:** 24TW96

**Page.:** 1 of 2

<b>Equipment :</b>	DO Meter
<b>Manufacturer :</b>	YSI
<b>Model :</b>	5000
<b>Serial No. :</b>	17B101473
<b>ID No. :</b>	SGK_CL0073
<b>Received Date :</b>	17 May 2024
<b>Test Date :</b>	21 May 2024
<b>Reference :</b>	2405-0608DSC-1
<b>Submitted by :</b>	ALS Laboratory Group (Thailand) Co.,Ltd. Songkhla Branch. 114/1 Moo 8 Karnchanawanich Rd., T.Ban Phru, A.Hat Yai, Songkhla 90250 Thailand
<b>Laboratory Condition :</b>	Temperature ( 25 ± 5 ) °C Humidity ( 50 ± 20 ) %
<b>Test Procedure :</b>	In - house method : CP-CH9 by Comparison Technique with Azide Modification Method
<b>Tested by :</b>	Walalak Sirithean 
<b>Approved by :</b>	 Approved Signatory
( ) Unnopphol Harachai ( ) Ponpan Paipim (✓) Saithip Meangmai	

**Issue Date :** 21 May 2024

REVIEW BY .....

APPROVED BY .....

NEXT CAL DATE..... 21/11/25



**Cert.No.:** 24TW96

**Page.:** 2 of 2

**Condition of this result of calibration**

**1. Reference Standard Instruments :**

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

<b><u>Instruments</u></b>	<b><u>Serial No.</u></b>	<b><u>ID No.</u></b>	<b><u>Certificate No.</u></b>	<b><u>Due Date</u></b>
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	14233821	110RC001	23MM405	16 July 2024

**2. Standard Material :-**

<b><u>Material</u></b>	<b><u>Manufacturer</u></b>	<b><u>Lot.No.</u></b>	<b><u>Assay</u></b>
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

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

**Dissolved Oxygen Probe No.:**      17B100103

<b>Titration Method (Azide Modification Method) (mg/L)</b>	<b>DO Meter Reading (mg/L)</b>	<b>Standard Deviation (mg/L)</b>
8.18	8.18	0.0071

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.: 24LM77

Page.: 1 of 2

**Equipment :** DO Meter with Sensor

**Manufacturer :** YSI

**Model :** 5000-115


**Serial No. :** 17B101473


**ID No. :** SGK\_CL0073

**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 :** TPA On Site Calibration Laboratory

**Received Order :** 17 May 2024  
**Calibrated Date :** 27 May 2024  
**Ambient Temperature :** ( 26 ± 10 ) °C  
**Relative Humidity :** ( 50 ± 30 ) %  
**AC Line Voltage :** ( 220 ± 22 ) V

**Calibrated by :** Khit Ruttanapornachai  


**Approved by :**   
Approved Signatory

( ) Ponpan Paipim  
( ) Suwit Imjai  
(✓) Kunchit Promprat

**Issue Date :** 28 May 2024

**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 :** DO Meter with Sensor  
**Condition As-Received :** Used Item  
**Reference :** 2405-0608DSC-2

**Cert. No.:** 24LM77

**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	231216	TPA	11 Oct 2024
2. This certificate is valid only to the item calibrated on date and place of calibration.				
3. This certification is traceable to the International System of Unit.				

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

**Result of Calibration :-** ( \* ) Without Adjustment

**Function :** Temperature measurement.

This instrument was connected with temperature sensor, S/N.: 17B100103

<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>
20.00	60	20.005	19.79	-0.215	0.15	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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**TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**  
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534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250

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

**Cert. No.:** 24TM152

**Page.:** 1 of 3

## Certificate of Calibration

**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 Kanjanavanij Rd., Banphru,  
Hatyai, Songkhla 90250 Thailand

**Location :** Chemistry Room

**Received Order :** 24 January 2024  
**Calibration Date :** 24 - 25 January 2024  
**Ambient Temperature :** ( 26 ± 10 ) °C  
**Relative Humidity :** ( 50 ± 30 ) %

REVIEW BY	
APPROVED BY	
NEXT CAL. DATE	24/01/25

**Calibrated by :** Kunchit Promprat

**Approved by :**

Approved Signatory

- ( ) Pornthippa Tameyakul  
( ) Ponpan Paipim  
(✓) Suwit Imjai

**Issue Date :** 29 January 2024

**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.

A 0012840



**Equipment :** COD Reactor  
**Condition As-Received :** Used Item  
**Reference :** 2401-0645OC-3  
**Procedure Used :-**

**Cert. No.:** 24TM152

**Page.:** 2 of 3

As agreed with customer the calibration was perform 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	MY44073381	23LM95	TPA	19 Jun 2024

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

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

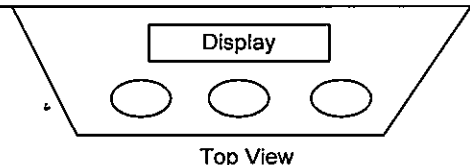
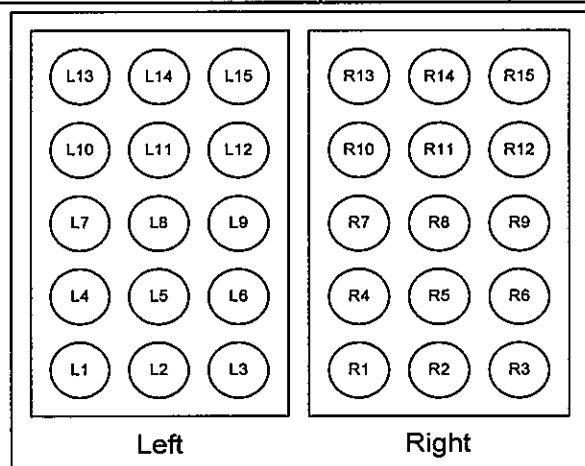
**Remark :** TPA : Technology Promotion Association ( Thailand - Japan )

**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

**Heat transfer medium used :** Alumina Calcined

<b>Environment during calibration</b>		
	<b>Beginning</b>	<b>Finished</b>
Temp.(°C)	26	27
REL.Humi.(%)	54	61
AC Supply (Volt)	226	227



<b>Left</b>		<b>Right</b>	
<b>Position</b>	<b>ID No. of Sensor</b>	<b>Position</b>	<b>ID No. of Sensor</b>
L1	23-01TC-01	R1	23-01TC-01
L2	23-01TC-02	R2	23-01TC-02
L3	23-01TC-03	R3	23-01TC-03
L4	23-01TC-04	R4	23-01TC-04
L5	23-01TC-05	R5	23-01TC-05
L6	23-01TC-06	R6	23-01TC-06
L7	23-01TC-07	R7	23-01TC-07
L8	23-01TC-08	R8	23-01TC-08
L9	23-01TC-09	R9	23-01TC-09
L10	23-01TC-10	R10	23-01TC-10
L11	23-01TC-01	R11	23-01TC-01
L12	23-01TC-02	R12	23-01TC-02
L13	23-01TC-03	R13	23-01TC-03
L14	23-01TC-04	R14	23-01TC-04
L15	23-01TC-05	R15	23-01TC-05



**Equipment :** COD Reactor  
**Condition As-Received :** Used Item  
**Reference :** 2401-0645OC-3  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source  
**Calibration Point :** 150 °C

**Cert. No.:** 24TM152

**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						
150	150	L13	L14	L15	R13	R14	R15	Left	0.12	1.1	2
		148.341	148.341	148.230	148.998	149.015	149.078				
		L10	L11	L12	R10	R11	R12				
		149.185	148.528	148.840	149.456	148.501	148.504				
		L7	L8	L9	R7	R8	R9				
151	151	149.460	149.692	150.210	149.845	150.020	150.266	Right	0.10		
		L4	L5	L6	R4	R5	R6				
		149.759	149.784	149.899	150.332	149.962	150.233				
		L1	L2	L3	R1	R2	R3				
		149.241	149.588	149.525	149.776	149.847	149.313				

**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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**a 1199639**





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



Cert.No.: 23CHO30  
Page.: 1 of 3

## Certificate of Calibration

Equipment : Spectrophotometer  
Manufacturer : HACH  
Model : DR 3900  
Serial No. : 1687645  
ID No. : SGK\_CL0038  
Condition As-Received: Used Item  
Received Date : 23 January 2023  
Calibration Date : 24 January 2023  
Reference : 2301-0661OC-1  
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. Songkhla Branch.  
114/1 Moo 8 , Kanjanavanij Rd.,  
Banphru , Hatyai ,  
Songkhla 90250 , Thailand

REVIEW BY .....	
APPROVED BY .....	
NEXT CAL. DATE	24/01/24

Calibration Place : Chemistry Room  
Ambient Temperature : ( 28.3 - 27.3 ) °C (On-Site)  
Relative Humidity : ( 49.6 - 49.9 ) % (On-Site)  
Calibration Procedure : In - house method :  
CP-OCH4 based on ASTM E 275-01

Calibrated by : Kunchit Promprat

Approved by :

(✓) Malee Butkruea  
( ) Saithip Meangmai  
( ) Warakorn Lernagatrakul

Approved Signatory

Issue Date : 7 February 2023

The Uncertainties are for a confidence probability of approximately 95%

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A 0050506



Cert. No. : 23CHO30

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	32593	100581	30 Mar 2024
2. Wavelength Standard set	29829	94776	02 Sep 2023
3. Wavelength Standard set	29829	94777	02 Sep 2023

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 at :

- National Physical Laboratory (NPL), The United Kingdom of Great Britain and Northern Ireland
- National Institute of Standards and Technology (NIST), The United States of America

4. Spectral BandWidth : 5 nm

Scan Speed : - nm/min

**Calibration Results : without adjustment**

**Wavelength Accuracy**

<b>Certified Values of Reference Material ( nm )</b>	<b>UUC Reading ( nm )</b>	<b>Uncertainty of Measurement ( <math>\pm</math> nm )</b>	<b>Coverage Factor <i>k</i></b>
418.40	418	0.59	2.00
479.88	480	0.59	2.00
513.75	514	0.59	2.00
537.00	536	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

**a 1146846**



Cert. No. : 23CHO30

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
	0.5701	0.568	0.0029	2.00
	0.7147	0.712	0.0030	2.00
	1.0031	0.999	0.0030	2.00
440.0	Zero	0.000	0.0028	2.00
	0.5552	0.553	0.0029	2.00
	0.7031	0.700	0.0030	2.00
	0.9867	0.981	0.0029	2.00
465.0	Zero	0.000	0.0028	2.00
	0.5178	0.517	0.0030	2.00
	0.6642	0.663	0.0029	2.00
	0.9312	0.930	0.0030	2.00
546.1	Zero	0.000	0.0028	2.00
	0.5195	0.517	0.0030	2.00
	0.7007	0.698	0.0029	2.00
	0.9833	0.979	0.0028	2.00
590.0	Zero	0.000	0.0028	2.00
	0.5537	0.550	0.0030	2.00
	0.7763	0.771	0.0029	2.00
	1.0912	1.083	0.0028	2.00
635.0	Zero	0.000	0.0028	2.00
	0.5615	0.558	0.0029	2.00
	0.7659	0.762	0.0030	2.00
	1.0763	1.070	0.0028	2.00

**Remark**

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

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 %.

-o0o-

  
a 1146845



**Southern Calibration Service Co., Ltd.**

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## CALIBRATION CERTIFICATE

Issued Date : 1-May-2023

Certificate No. : 23CH0203

CSR No. : A088/04367

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** : Chemical Laboratory

**Instrument Name** : pH meter

**Manufacturer** : Mettler Toledo

**Model** : S220

**Serial No.** : B625631849

**ID No.** : SGK\_CL0030

**Electrode No.** : 1204613

**Received Date** : 28-Apr-2023

**Calibrated Date** : 28-Apr-2023

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

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

REVIEW BY .....	
APPROVED BY .....	
NEXT CAL. DATE	28 / 10 / 2024

### 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 :

- HACH : HACH LANGE GmbH  
- WK : WK Electric Co., Ltd.

- SCaL : Sounthern Calibration Service Co., Ltd.,

Calibrated by : Alisara Ma

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
Standard Solution	4.005	C02994	1777	5-Sep-2024
Standard Solution	7.000	C03007	1787	17-Oct-2024
Standard Solution	10.012	C02953	1735	29-Apr-2024
Temperature/Electrical Calibrator	MC2-TE	14987	WK2106-299-223	5-Jun-2024
Digital Thermometer With Sensor	DP-77	I.360896	22SDTH005	8-Aug-2023

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	3.70	-0.02	0.17
0.00	0.0	6.70	0.00	0.13
-177.48	-177.4	9.80	-0.08	0.17

##### 2. Before Sample Test Measurement

Standard Buffer Solutions ( pH )	pH meter Reading		Correction ( pH )	Uncertainty ( ± pH )
	( pH )	( mV )		
4.005	3.97	159.2	0.035	0.0090
6.999	6.98	-15.4	0.019	0.013
10.012	9.95	-188.0	0.062	0.036

##### 3. After Sample Test Measurement

Standard Buffer Solutions ( pH )	pH meter Reading		Correction ( pH )	Uncertainty ( ± pH )
	( pH )	( mV )		
4.005	3.97	158.9	0.035	0.0090
6.999	7.01	-17.5	-0.011	0.013
10.012	9.98	-187.6	0.032	0.036

##### 4. Temperature Measurement

Cal Point ( °C )	Standard Temperature ( °C )	UUC Reading ( °C )	Correction ( °C )	Uncertainty ( ± °C )
25	25.032	25.1	-0.068	0.11

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.

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Tel : 08 1599 0417 Fax : 0 7480 5133 Email : s.calibration@gmail.com www.scal-lab.com



## CALIBRATION CERTIFICATE

Issued Date : 18-Jan-2024

Certificate No. : 24MA0199

CSR No. : A123/06123

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-Jan-2024  
Calibrated Date : 15-Jan-2024  
Ambient Temperature :  $(30 \pm 10) ^\circ\text{C}$   
Relative Humidity :  $(50 \pm 20) \%$

REVIEW BY .....  
APPROVED BY ..  
NEXT CAL. DATE 15/1/25

### Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.001 based on UKAS LAB 14 : 2015

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

### Traceability of measurement :

This Certificate is traceable to the International and /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 Rattanaylum / Technical Manager



The uncertainties are for a confidence probability of approximately 95%

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Certificate No. : 24MA0199

CSR No. : A123/06123

Page. : 2 of 3

### Details of Calibration

#### 1. Reference Standard Equipment Used:

Equipment	Model	Serial No.	Cert. no.	Due Date
Standard Weight Set	2 mg - 1 kg	11119514/01	23SWS001	4-Jul-2024

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. Effect of tare

Nominal Value ( g )	Standard Value ( g )	Balance Reading ( g )	Correction ( g )
20	20.0000	20.0000	0.0000
40	40.0001	40.0000	0.0001
60	60.0000	60.0001	-0.0001
80	80.0001	80.0001	-0.0001
100	100.0000	100.0000	0.0000

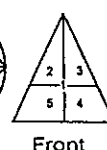
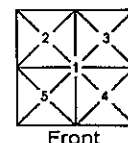
## Result of Calibration :

### 3. Off-centre loading

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

The balance reading obtained are given in the table.

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



### 4. Departure from nominal value

Nominal Value ( g )	Standard Value ( g )	UUC Reading ( g )	Correction ( g )	Uncertainty ( $\pm$ g )	Coverage Factor ( k )
0	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	20.0000	20.0000	0.0000	0.00009	2.0
50	50.0000	50.0000	0.0000	0.00011	2.0
100	100.0000	100.0000	0.0000	0.00016	2.0
120	120.0000	120.0000	0.0000	0.00024	2.0
140	140.0001	140.0000	0.0001	0.00024	2.0
160	160.0000	160.0000	0.0000	0.00026	2.0
180	180.0000	180.0000	0.0000	0.00029	2.0
200	200.0000	200.0000	0.0000	0.00030	2.0

- UUC = Unit Under Calibration

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

...End...





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## CALIBRATION CERTIFICATE

Issued Date : 1-May-2023

Certificate No. : 23TH1728

CSR No. : A088/04367

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 : Hot Air Oven

Manufacturer : Memmert

Model : UF110

Serial No. : B416.3387

ID No. : SGK\_CL0024

Resolution : 0.1 °C

Received Date : 28-Apr-2023

Calibrated Date : 28-Apr-2023

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %

REVIEW BY ....

APPROVED BY ....

NEXT CAL. DATE

28/11/2024

### 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 :

- SCaL : Sounthern Calibration Service Co., Ltd.,

Calibrated by : Ibrorhim Saleemin

Approved by :

Imron Rattana

**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	22SDAT004	24-May-2023

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

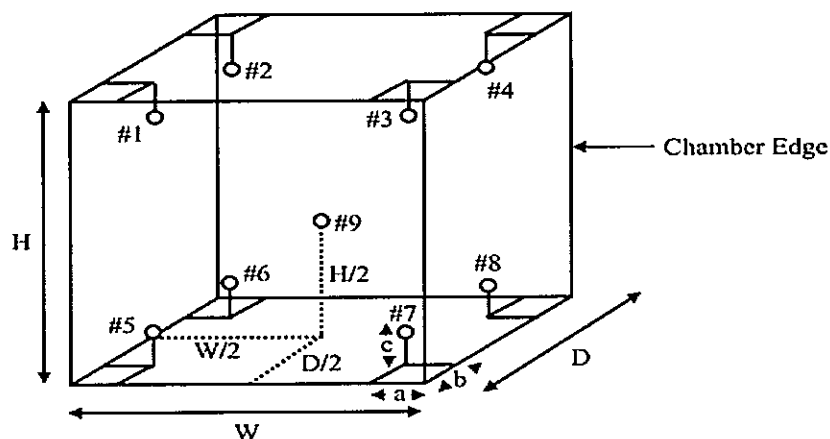
4. Condition of Item : normal condition , no indication for any damage or malfunction

#### 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 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	40.48	40.28	40.28	39.91	40.17	40.09	39.93	40.27	39.89	0.36
70	70.36	70.23	70.58	69.74	69.99	69.92	69.86	70.13	70.04	0.36
103	103.19	103.12	103.46	103.37	103.10	103.54	103.43	103.06	103.40	0.36
104	104.31	104.23	104.62	103.77	104.12	104.06	103.90	104.20	104.56	0.36
105	105.07	105.03	105.48	105.27	105.12	105.01	105.01	105.00	104.96	0.36
180	180.31	180.00	180.00	180.07	180.18	180.05	180.01	180.10	180.24	0.41

### 3. Performance Result

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

Cal point ( °C )	UUC Setting ( °C )	UUC Reading ( °C )	Temperature Stability ( ± °C )	Temperature Uniformity ( °C )	Overall Variation ( °C )
40	40.0	40.0	0.20	0.70	0.72
70	70.0	70.0	0.20	0.60	0.94
103	103.0	103.0	0.20	0.43	0.54
104	104.0	104.0	0.10	0.79	0.88
105	105.0	105.0	0.10	0.59	0.69
180	180.0	180.0	0.10	0.38	0.38

- 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 ...



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## CALIBRATION CERTIFICATE

Issued Date : 16-Jul-2023

Certificate No. : 23TH3097

CSR No. : A095/04743

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 : Water Bath

Manufacturer : Memmert

Model : WNE29

Serial No. : L616.0538

ID No. : SGK\_CL0035

Resolution : 0.1 °C

Received Date : 13-Jul-2023

Calibrated Date : 13-Jul-2023

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %

REVIEW BY

APPROVED BY

NEXT CAL. DATE

13/01/25

### 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 :

- ScaL : Sounthern Calibration Service Co., Ltd.,

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	23SDAT004	23-May-2024

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

and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

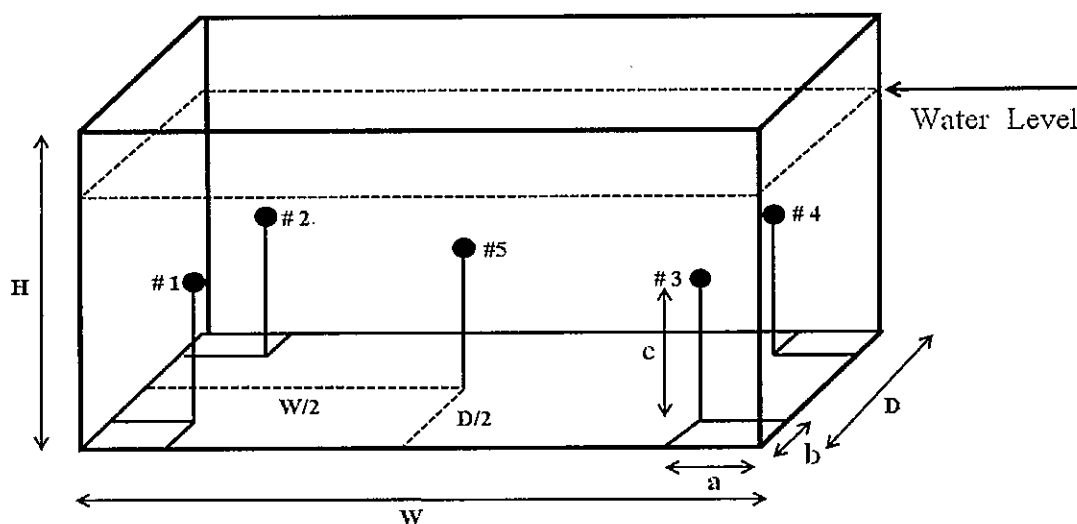
4. Condition of Item : normal condition , no indication for any damage or malfunction

#### Result of Calibration .:

( ✓ ) Without Adjustment

( ) After Adjustment

#### 1. Sensor Installation Diagram



#### Sensor Installation Details

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

#### Dimension of the chamber

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



Certificate No. : 23TH3097

CSR No. : A095/04743

Page. : 3 of 3

**Result of Calibration :**

**2. Temperature Measurement Accuracy Test**

The measurement results of the Water 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	
80	79.17	79.47	79.43	79.25	79.38	0.14

**3. Performance Result**

The performance of the Water Bath are reported as shown below

Cal point ( °C )	UUC Setting ( °C )	UUC Reading ( °C )	Temperature Stability ( ± °C )	Temperature Uniformity ( °C )	Overall Variation ( °C )
80	80.0	80.0	0.24	0.38	0.38

- 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 ...

# Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: RYG\_EN0136  
Organization Name: ALS Laboratory Group (Thailand) Co.Ltd.  
Organization Location: 616/10, Moo 5, Tambol Mae Nam Khu, Pluak Daeng, Rayong, 21140, Thailand  
Date: January 5, 2024 10:53:24 AM  
EQP Name: AgilentRecommended , AgilentRecommended  
EQP Revision: GC.02.54, GCMS.02.54  
Overall Qualification Status: Pass

REVIEW BY ...

APPROVED BY ...

NEXT CAL. DATE

1/07/2025

## CDS Logon Verification - GC

Logon: chonticha.khunkaew

## Overall CDS Logon Verification - GC Test Status

Pass

## System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

## Overall System Inspection and Basic Safety and Operation Test Status

Pass

## Inlet Pressure Accuracy

Name: 7890

Front SSL

Setpoint Status: Pass

	Setpoint		Actual	
Inlet Pressure:	25.0	psi	25	psi
Accuracy:			0.0	psi
Agilent Recommended:			<= 1.2	

Date: January 5, 2024 10:53:24 AM  
System ID: RYG\_EN0136

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name:	7890				
Setpoint Status:	Pass				
Zone:	Oven				
	Setpoint/Actual				
Temperature:	230.0	229	°C		
Accuracy:		-1.0	°C		
Agilent Recommended:	>=	-1.0	% setpoint in K	( -5.0	°C )
	<=	1.0	% setpoint in K	( 5.0	°C )
Setpoint Status:	Pass				
Zone:	Oven				
	Setpoint/Actual				
Temperature:	100.0	100.8	°C		
Accuracy:		0.8	°C		
Agilent Recommended:	>=	-1.0	% setpoint in K	( -3.7	°C )
	<=	1.0	% setpoint in K	( 3.7	°C )

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name:	7890				
Setpoint Status:	Pass				
	Setpoint/Average				
Temperature:	100.0	100.8167	°C		
Stability:		0.1	°C		
Agilent Recommended:	<=	0.5			

Overall GC Oven Temperature Stability Test Status

Pass



## Log Amp

Tested Combination1 Front SSL / External SQ

Name: 5977B

Setpoint Status: Pass

## Overall Log Amp Test Status

Pass

## RFPA

Tested Combination1 Front SSL / External SQ

Name: 5977B

Setpoint Status: Pass

Amu: 1050 m/z

Drift After Five Minutes:

6 mV

RFPA Voltage:

509 mV

Agilent Recommended:

&gt;= -100

and

&lt;= 100

&lt;= 1100

## Overall RFPA Test Status

Pass

## Tune EI

Tested Combination1 Front SSL / External SQ

Name: 5977B

Setpoint Status: Pass

Filament: 1

Setpoint Status: Pass

Filament: 2

## Overall Tune EI Test Status

Pass

## Scouting Run

Date: January 5, 2024 10:53:24 AM

System ID: RYG\_EN0136

Tested Combination1	Front	SSL	/ External	SQ
	Manual Injection			
Name:	Not applicable			
Source:	EI - Extractor			
Setpoint Status:	Completed			
Injection Volume on Column:	1.0 uL			
Overall Scouting Run Status				
Completed				

Signal to Noise EI

Tested Combination1	Front	SSL	/ External	SQ
Name:	5977B			
Source:	EI - Extractor	Filament:	1	
Setpoint Status:	Pass			
Signal to Noise:	5113			
Agilent Recommended:	>= 1200			
Source:	EI - Extractor	Filament:	2	
Setpoint Status:	Pass			
Signal to Noise:	4456			
Agilent Recommended:	>= 1200			

Overall Signal to Noise EI Test Status

Pass

NOTE: This test's 2 comment(s) and 3 deviation(s) are available in the Attachments section.

## Instrument Details

### Purpose

This section describes the as found system configuration.

### Details

#### System

System ID	RYG_EN0136
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

#### Tested Combination1

Injection Technique	Manual Injection
Inlet	Front
Detector	External
LTM Included?	No

#### Sampler 1

Manufacturer	Agilent Technologies
Type	Manual Injection
Usage	Sample Injection
Syringe Volume (µL)	10

#### Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3442B
Serial Number	CN16463238
Firmware Revision	B.02.04.3
Component ID/Asset No.	081117000236
Oven Type	Standard

## Inlet 1

Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

## Detector 1

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

## Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5977B
Model Number	G7077B
Serial Number	US1701M008
Firmware Revision	5977 6.00.34
High Vacuum System	Turbo Pump
Scouting Run Standard	OFN Std
Component ID/Asset No.	081117000236

## MS EI Source 1

Manufacturer	Agilent Technologies
Source Type	EI - Extractor
Number of filaments	2

## Electronic Signature

### Purpose

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### Details

Full Name of Signer:	Eaknarin Puangsopa
Logged On User Name:	eaknarin_puangsopa@agilent.com
Signature Creation Date:	January 5, 2024
Reason for Signature:	Executed protocol and published this original version of document

### Regulatory Disclaimer

This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

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User Name: eaknarin\_puangsoa  
Report Generated by Hostname: ASRYGWX074

System Id: RYG\_EN0136  
Print Date: January 5, 2024 10:53:25 AM

## ALS\_OQ\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 4, 2024 10:37:31 AM	Audit	SessionCreated	Session	None
January 4, 2024 10:37:31 AM	Start	Configuration	Session	None
January 4, 2024 10:37:31 AM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
January 4, 2024 10:39:29 AM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.54/Gc.02.54.eqp], EQP File Name: [Gc.02.54.eqp], EQP Name: [AgilentRecommended], Protocol Revision :[Gc.02.54] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.54/GcMs.02.54.eqp], EQP File Name: [GcMs.02.54.eqp], EQP Name: [AgilentRecommended]
January 4, 2024 10:39:40 AM	End	Configuration	Session	None
January 4, 2024 10:39:44 AM	Start	Qualification	Session	OQ
January 4, 2024 10:39:44 AM	Start	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	None
January 4, 2024 10:46:00 AM	End	Execution	CDS Logon Verification - GC - 7890: - Qualitative test	Run Count : 1

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## ALS\_OQ\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 4, 2024 10:46:05 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
January 4, 2024 10:46:18 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
January 4, 2024 10:46:22 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
January 4, 2024 10:48:52 AM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
January 4, 2024 10:48:54 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
January 4, 2024 10:51:05 AM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
January 4, 2024 10:51:08 AM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
January 4, 2024 10:51:43 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
January 4, 2024 10:58:45 AM	Audit	Data	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry

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User Name: eaknarin\_puangsoa  
Report Generated by Hostname: ASRYGWX074

System Id: RYG\_EN0136  
Print Date: January 5, 2024 10:53:25 AM

## ALS\_OQ\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 4, 2024 10:58:46 AM	End	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
January 4, 2024 10:58:59 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
January 4, 2024 11:23:26 AM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
January 4, 2024 11:23:29 AM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
January 4, 2024 11:23:35 AM	Start	Execution	Log Amp - 5977B SQ: - Source: EI - Extractor	None
January 4, 2024 11:43:23 AM	End	Execution	Log Amp - 5977B SQ: - Source: EI - Extractor	Run Count : 1
January 4, 2024 11:43:26 AM	Start	Execution	RFPA - 5977B SQ: - Source: EI - Extractor	None
January 4, 2024 11:53:23 AM	End	Execution	RFPA - 5977B SQ: - Source: EI - Extractor	Run Count : 1
January 4, 2024 11:53:28 AM	Start	Execution	Tune EI - 5977B SQ: - Source: - EI - Extractor Filament 1 (Qualitative - No setpoints associated)	None
January 4, 2024 1:37:26 PM	End	Execution	Tune EI - 5977B SQ: - Source: - EI - Extractor Filament 1 (Qualitative - No setpoints associated)	Run Count : 1
January 4, 2024 1:37:29 PM	Start	Execution	Tune EI - 5977B SQ: - Source: - EI - Extractor Filament 2 (Qualitative - No setpoints associated)	None

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User Name: eaknarin\_puangsoa  
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Print Date: January 5, 2024 10:53:25 AM

## ALS\_OQ\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 4, 2024 1:48:59 PM	End	Execution	Tune EI - 5977B SQ: - Source: - Run Count : 1 EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
January 4, 2024 1:49:02 PM	Start	Execution	Scouting Run - Manual Injection, Front SSL, SQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None
January 4, 2024 2:20:35 PM	Audit	AceClosed	Session	None
January 5, 2024 8:28:16 AM	Audit	AceRestarted	Session	None
January 5, 2024 8:28:18 AM	Audit	SessionReloaded	Session	None
January 5, 2024 8:28:29 AM	Start	Qualification	Session	OQ
January 5, 2024 8:28:29 AM	Start	Execution	Scouting Run - Manual Injection, Front SSL, SQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None
January 5, 2024 9:21:29 AM	Audit	Data	Scouting Run - Manual Injection, Front SSL, SQ: - Source: - EI - Extractor- Part of GCMS System Preparation	Data files Path : D:\OQ2024\scout1.D
January 5, 2024 9:21:53 AM	End	Execution	Scouting Run - Manual Injection, Front SSL, SQ: - Source: - EI - Extractor- Part of GCMS System Preparation	Run Count : 1
January 5, 2024 9:21:58 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None

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User Name: eaknarin\_puangsoa  
Report Generated by Hostname: ASRYGWX074

System Id: RYG\_EN0136  
Print Date: January 5, 2024 10:53:25 AM

## ALS\_OQ\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 5, 2024 9:25:39 AM	End	Qualification	Session	OQ
January 5, 2024 9:25:39 AM	Start	Reporting	Session	None
January 5, 2024 9:27:46 AM	End	Reporting	Session	None
January 5, 2024 9:27:46 AM	Start	Qualification	Session	OQ
January 5, 2024 9:27:46 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
January 5, 2024 9:33:18 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2024\SN_F1.D
January 5, 2024 9:45:22 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 1
January 5, 2024 9:45:32 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
January 5, 2024 9:56:15 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : D:\OQ2024\SN_F2.D
January 5, 2024 10:00:19 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 1

User Name: eaknarin\_puangsoa

System Id: RYG\_EN0136

Report Generated by Hostname: ASRYGWX074

Print Date: January 5, 2024 10:53:25 AM

## ALS\_OQ\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 5, 2024 10:03:53 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Deviation filed for Run Count : 1
January 5, 2024 10:03:53 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
January 5, 2024 10:13:48 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : D:\OQ2024\SN_F02.D
January 5, 2024 10:17:58 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 2
January 5, 2024 10:22:04 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Deviation filed for Run Count : 2
January 5, 2024 10:22:04 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
January 5, 2024 10:22:15 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : D:\OQ2024\SN_F02.D
January 5, 2024 10:25:37 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 3

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User Name: eaknarin\_puangsoa

System Id: RYG\_EN0136

Report Generated by Hostname: ASRYGWX074

Print Date: January 5, 2024 10:53:25 AM

## ALS\_OQ\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 5, 2024 10:29:11 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Deviation filed for Run Count : 3
January 5, 2024 10:29:11 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
January 5, 2024 10:42:05 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : D:\OQ2024\SN_F002.D
January 5, 2024 10:46:34 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 4
January 5, 2024 10:46:41 AM	End	Qualification	Session	OQ
January 5, 2024 10:46:41 AM	Start	Reporting	Session	None
January 5, 2024 10:50:27 AM	Audit	Reporting	Session	Report Generated : Certificate
January 5, 2024 10:51:07 AM	Audit	Reporting	Session	Report Generated : Report
January 5, 2024 10:51:29 AM	Audit	Reporting	Session	Report Generated : Certificate
January 5, 2024 10:52:00 AM	Audit	Reporting	Session	Report Generated : Report

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## Calibration Certificate

**Certificate No.** 561587  
**Product** 200-510L Defender 510 Low Flow  
**Serial No.** 130026  
**Cal. Date** 25-Sep-2023

**Sold To:**


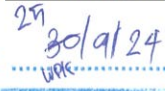
All calibrations are performed in accordance with ISO 17025 at Mesa Laboratories, Inc., 12100 W. 6th Ave, Lakewood, CO 80228, an ISO 17025:2017 accredited laboratory through NVLAP. This report shall not be reproduced except in full without the written approval of the laboratory. Results only relate to the items calibrated. This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

### As Received Calibration Data

Technician		Aaron Schwartz		Lab. Pressure	616.1 mmHg
				Lab. Temperature	24 °C
Instrument Reading	Lab Standard Reading	Deviation		Allowable Deviation	As Received
0 ccm	456.41 ccm	-100.0%		1.00%	Out of Tolerance
0 ccm	101.19 ccm	-100.0%		1.00%	Out of Tolerance
0 ccm	30.36 ccm	-100.0%		1.00%	Out of Tolerance

### Mesa Laboratories Standards Used

Description	Standard Serial Number	Calibration Date	Calibration Due Date
ML_800_10	103743	25-Jan-2023	25-Jan-2024

REVIEW BY .....	
APPROVED BY .....	
NEXT CAL. DATE .....	27 30/9/24 WKC 57400

## As Shipped Calibration Data

<b>Certificate No</b>	561587	<b>Lab. Pressure</b>	622.2 mmHg
<b>Technician</b>	Aaron Schwartz	<b>Lab. Temperature</b>	23.6 °C

Instrument Reading	Lab Standard Reading	Deviation	Allowable Deviation	As Shipped
449.75 ccm	450.46 ccm	-0.16%	1.00%	In Tolerance
100.96 ccm	100.82 ccm	0.14%	1.00%	In Tolerance
30.63 ccm	30.38 ccm	0.82%	1.00%	In Tolerance

## Mesa Laboratories Standards Used

<b>Description</b>	<b>Standard Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
ML_800_10	103743	25-Jan-2023	25-Jan-2024

### Calibration Notes

The expanded uncertainty of flow has a coverage factor of  $k = 2$  for a confidence interval of approximately 95%.

Flow testing is in accordance with our test number MP-00672 with an expanded uncertainty of 0.27% using high-purity nitrogen or filtered laboratory air.

Traceability to the International System of Units (SI) is verified by accreditation to ISO/IEC 17025 by NVLAP under NVLAP Code 200661-0.

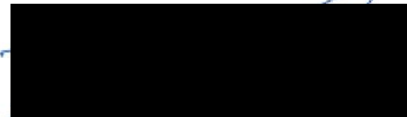
### Technician Notes:

By:

Approved By:



Aaron Schwartz  
Assembler I



David Thomas  
Quality Engineer

Mesa Laboratories, Inc. certifies that the above instrument meets or exceeds published specifications, and that the calibration results in this certificate were obtained using equipment capable of producing results that are traceable through NIST to the International System of Units (SI). Calibration results are in compliance with ISO/IEC 17025:2017. Calibrations process has a Test Uncertainty Ratio (TUR) of 4:1 or greater. Any Pass/Fail determination is made without taking measurement uncertainty into account and is based on UUT performance against required tolerance only.





## MULTI POINT CALIBRATION REPORT

REVIEW BY

APPROVED BY

NEXT CAL. DATE

บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

CUSTOMER NAME : ALS Laboratory Group (Thailand) Co.Ltd.

EQUIPMENT NAME : METHANE / NONMETHANE ANALYZER

MANUFACTURER : Teledyne - API

MODEL : N901

SERIAL NO : 75

STANDARD GAS METHANE CONCENTRATION (PPM) : 101

STANDARD GAS PROPANE CONCENTRATION (PPM) : 35.8

CYLINDER NO : 001450

CERTIFIED DATE : Oct 20,2021

EXPIRED DATE : Oct 19,2023

STANDARD GAS METHANE CONCENTRATION (%) : 0.415

CYLINDER NO : 242690

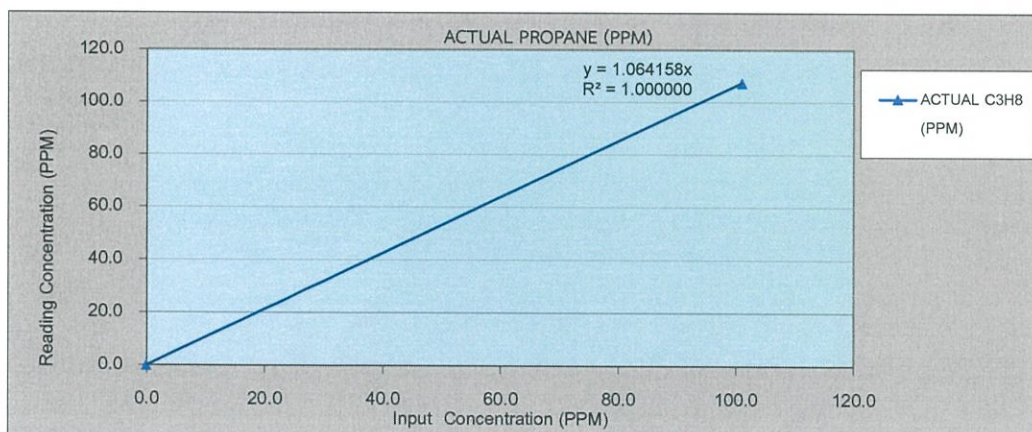
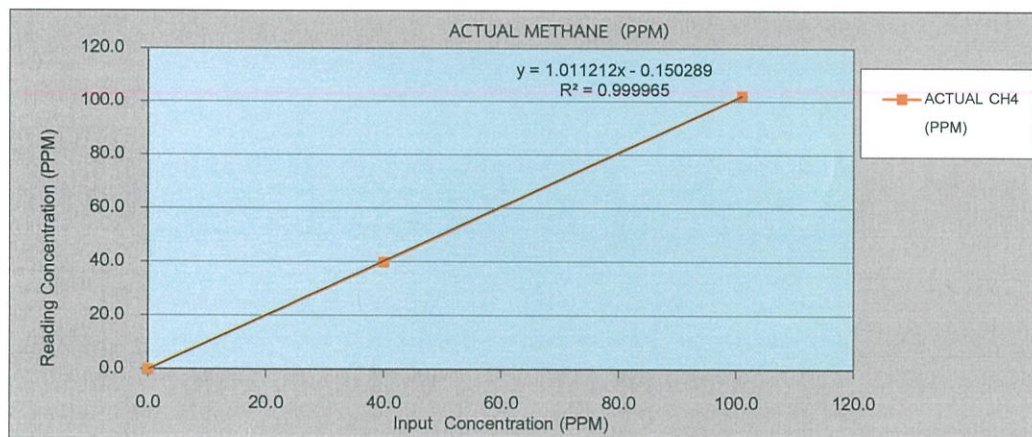
CERTIFIED DATE : May 24,2018

EXPIRED DATE : May 23,2022

CERTIFIED BY : SPECIAL GASES MIXTURE (THE LINDE GROUP)

## CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS						
	IDEAL (PPM)	ACTUAL CH <sub>4</sub> (PPM)	ERROR CH <sub>4</sub> (PPM)	% ERROR CH <sub>4</sub>	ACTUAL C <sub>3</sub> H <sub>8</sub> (PPM)	ERROR C <sub>3</sub> H <sub>8</sub> (PPM)	% ERROR C <sub>3</sub> H <sub>8</sub>
ZERO	0.00	0.06	0.06	0.00	0.05	0.05	0.00
1	40.00	39.95	-0.05	-0.12	-	-	-
2	101.00	102.12	1.12	1.11	107.48	6.48	6.42



CALIBRATED BY : คุณธีระวัฒน์ ศรีจรัส

DATE : 18 พฤษภาคม 2566

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณธีระวัฒน์ ศรีจรัส โทรศัพท์: 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทระเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th