

## ภาคผนวก จ

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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-Nov-22	21-May-24	18
Songkhla Lab	COD	COD Reactor	SGK_CL0085	23-Jan-23	23-Jan-24	12
Songkhla Lab	COD	Spectrophotometer	SGK_CL0038	24-Jan-23	24-Jan-24	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	25-Jan-23	25-Jan-24	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	25-Jan-23	25-Jan-24	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	25-Jan-23	25-Jan-24	12
Songkhla Lab	Total Suspended Solids	Oven	SGK_CL0024	28-Apr-23	28-Oct-24	18
Ambient	Benzene	GC-MSD	RYG_EN0136	7-Jul-22	7-Jan-24	18
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 .....Ananta B.....  
APPROVED BY .....Kamtha H.....  
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%**

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	23SDAT004	23-May-2024

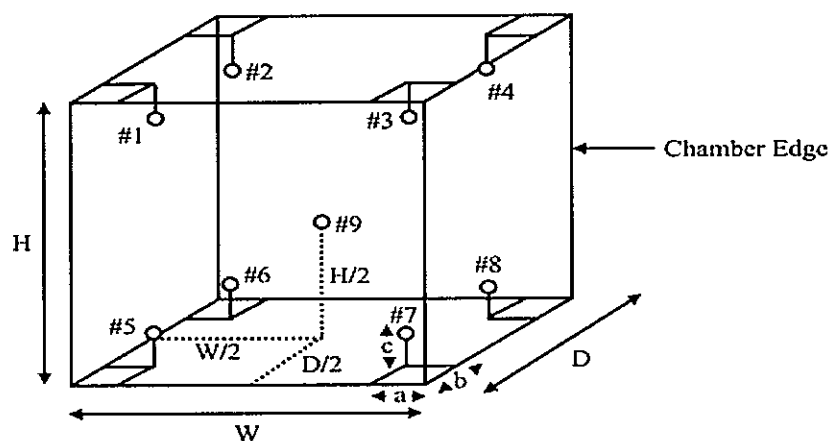
2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

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	Ananta B.
APPROVED BY	Kanitta H.
NEXT CAL. DATE	21 Nov 24.

Approved by :

*Malu.*

Approved Signatory

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

Issue Date :

22 November 2022

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written  
Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 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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Maku-



**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 FAX. 0-2719-9484

**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>	 Approved Signatory
<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

<b>Titration Method (Azide Modification Method) (mg/L)</b>	<b>DO Meter Reading (mg/L)</b>	<b>Standard Deviation (mg/L)</b>
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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*Malu.*

a 1136621



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
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Cert. No.: 23TM74/1

Page.: 1 of 3

## Certificate of Calibration

This Certificate was issued to replace to the Certificate No.23TM74

Equipment : COD Reactor

Manufacturer : Hach

Model : DRB 200

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 : 23 January 2023

Calibration Date : 23 - 24 January 2023

Ambient Temperature : ( 26 ± 10 ) °C

Relative Humidity : ( 50 ± 30 ) %

Calibrated by : Kunchit Promprat

Approved by :

*Malu .*

Approved Signatory

( ) Pornthippa Tameyakul

( / ) Malee Butkruea

( ) Suwit Imjai

Issue Date : 2 March 2023

**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 0010625



Equipment : COD Reactor  
 Condition As-Received : Used Item  
 Reference : 2301-0661OC-4

Cert. No.: 23TM74/1  
 Page.: 2 of 3

**Procedure Used :-**

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:-**

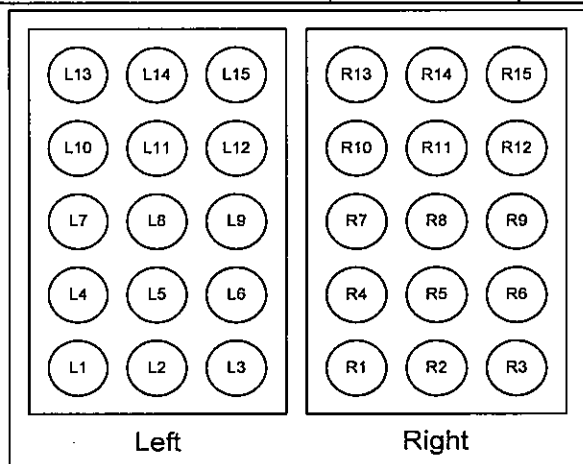
Instrument	Model	Serial No.	Cert. No.	Due Date
1 ) Data Acquisition	34972A	MY44073381	22LM78/1	12 May 2023

- This certification is traceable to the SI unit.
- This result of calibration was found accurate as shown on date and place of calibration only.
- This certification is traceable to the International System of Unit.

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

**Heat transfer medium used : Alumina Calcined**

Environment during calibration		
	Beginning	Finished
Temp.(°C)	28	28
REL.Humi.(%)	58	55
AC Supply (Volt)	225	225



Left		Right	
Position	ID No. of Sensor	Position	ID No. of Sensor
L1	20-01TC-01	R1	20-01TC-01
L2	20-01TC-02	R2	20-01TC-02
L3	20-01TC-03	R3	20-01TC-03
L4	20-01TC-04	R4	20-01TC-04
L5	20-01TC-05	R5	20-01TC-05
L6	20-01TC-06	R6	20-01TC-06
L7	20-01TC-07	R7	20-01TC-07
L8	20-01TC-08	R8	20-01TC-08
L9	20-01TC-09	R9	20-01TC-09
L10	20-01TC-10	R10	20-01TC-10
L11	20-01TC-01	R11	20-01TC-01
L12	20-01TC-02	R12	20-01TC-02
L13	20-01TC-03	R13	20-01TC-03
L14	20-01TC-04	R14	20-01TC-04
L15	20-01TC-05	R15	20-01TC-05

*Malu.*



Equipment : COD Reactor  
 Condition As-Received : Used Item  
 Reference : 2301-0661OC-4  
Result of Calibration :- ( \* ) Without Adjustment  
 Function of UUC\* : Temperature Source

Cert. No.: 23TM74/1

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Calibration Point 150 °C

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	0.59	2
		148.290	148.623	148.360	149.812	150.003	149.566			
		L10	L11	L12	R10	R11	R12			
		148.929	148.812	149.120	150.357	149.814	149.593			
152	152	L7	L8	L9	R7	R8	R9	Right  0.10		
		149.534	149.895	150.362	151.629	151.699	151.581			
		L4	L5	L6	R4	R5	R6			
		149.999	149.972	149.971	151.721	151.690	151.682			
		L1	L2	L3	R1	R2	R3			
		149.639	149.855	149.415	151.444	151.419	150.728			

**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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*Malu.*

a 1149779



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

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

REVIEW BY	.....Ananta B.....
APPROVED BY	.....Kanitta H.....
NEXT CAL. DATE	24/01/24

Calibrated by : Kunchit Promprat

Approved by :

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

Malee  
Approved Signatory

Issue Date : 7 February 2023

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 0050506



Cert. No. : 23CHO30

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**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

*Malu*

**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-

Malu

a 1146845



**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 : 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	Ananta B.
APPROVED BY	Kamrta H.
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

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

- WK : WK Electric 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 ...

**Sartorius (Thailand) Co., Ltd.**

129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310

Tel: +66 2643 8361-6 , e-mail: service.thailand@sartorius.com

**SARTORIUS**

# Certificate

## of Calibration

REVIEW BY Ananta B.  
APPROVED BY Kanitta H.  
NEXT CAL. DATE 25/1/23-24

Model Number : MSE224S-100-DUCertificate No. : 23BCI0044Description : Analytical BalanceIssued Date : Friday, January 27, 2023Serial Number : 0034705158Reference No. : 202361ID No. : SGK\_CL0045Manufacturer : SartoriusPage No. : 1 of 2Customer Name : ALS Laboratory Group (Thailand) Co., Ltd.Songkhla Branch:114/1 Moo 8 Karnchanawanich Rd.,T. Ban Phru, A. Hat Yai, Songkhla. 90250.Calibrated Place : Balance Room.Calibrated By : Mr. Chonchai InthanaCalibration Date : Wednesday, January 25, 2023

Calibration

Procedure No. : This calibration was conducted byUsing in-house calibration procedure number (WI-003)Based on UKAS LAB 14 : 2019**Metrological data :**Capacity : 220 g Readability : 0.0001 g**Ambients Conditions:**Temperature : 22.4 °C ± 3.0 °CHumidity : 65.0 % RH ± 5.0 % RHPressure :                      ±                     **Reasons for calibration**☐ New Installation ☐ Service / Repaired ☒ Re-calibration/ MaintenanceEquipment Condition: ☒ Good Operate ☐ Fair**Measurement Method UKAS Publication Ref :Lab 14**

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor ( $k=2$ ) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came form list of Sartorius Metrological Specifications.

**Traceability:**

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 1kg E2 s/n 37929119	SPC-RT	C02212565	14-Sep-2023
MHB-382SD	Humidity/Barometer/Temp Lutron MHB-382SD	DKSH	C19220444	5-Sep-2023

This certificate relate and apply this equipment only.

This certificate may not be reproduced other than in full except with  
the prior written approval of the Verification Operation Division  
Sartorius (Thailand) Co., Ltd.

Mr.Chonchai Inthana(Technical Manager)

S  
T  
A  
M  
P

# Certificate of Calibration

Model Number : MSE224S-100-DU

Certificate No. : 23BCI0044

Description : Analytical Balance

Issued Date : Friday, January 27, 2023

Serial Number : 0034705158

Reference No. : 202361

ID No. SGK\_CL0045

Manufacturer : Sartorius

Page No. : 2 of 2

## Calibration Results : Without Adjustment

### Repeatability

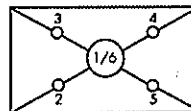
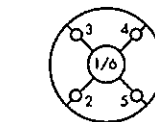
The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.

Nominal Value : (Low Load)	20.0000	200.0000
20 g	20.0001	200.0000
Tolerance	20.0000	200.0000
0.0001 g	20.0000	200.0000
	20.0000	200.0001
Nominal Value : (High Load)	20.0000	200.0000
200 g	20.0000	200.0001
Tolerance	20.0000	200.0000
0.0001 g	20.0000	200.0001
	20.0000	200.0001
<b>Standard Deviation</b>	0.00003	0.00005

### Eccentricity (Off-center loading error)

The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).

Nominal value : 50 g  
Tolerance 0.0004 g



	Difference
1	—
2	0.0001
3	0.0000
4	0.0000
5	0.0000
6	—

### Linearity

The linearity, also called linearity error. Describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance 0.0002 g

Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.01	0.0100	0.0100	0.0000	0.00013
0.1	0.1000	0.1000	0.0000	0.00013
1	1.0000	1.0000	0.0000	0.00014
2	2.0000	2.0000	0.0000	0.00014
5	5.0000	5.0000	0.0000	0.00014
10	10.0000	10.0000	0.0000	0.00014
20	20.0000	20.0000	0.0000	0.00014
50	50.0000	50.0000	0.0000	0.00015
100	100.0000	100.0000	0.0000	0.00019
200	200.0000	200.0001	0.0001	0.00030

End of Report.



**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 : 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	..... Ananta B. ....
APPROVED BY	..... Kanitta H. .... 10
NEXT CAL. DATE	..... 28/11/2024 .... 10

### 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%**

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	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

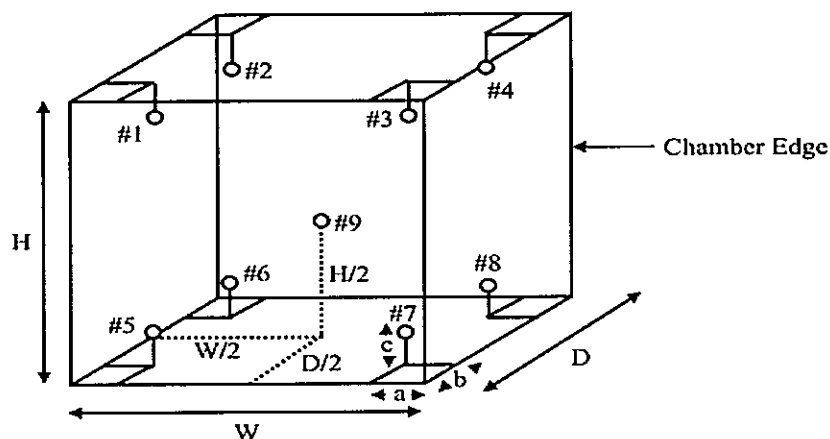
4. Condition of Item : normal condition , no indication for any damage or malfunction

#### 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 ...



**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. : 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 Ananta B.

APPROVED BY Kanitha B.

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

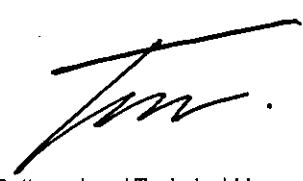
### Traceability of measurement :

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%**

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	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

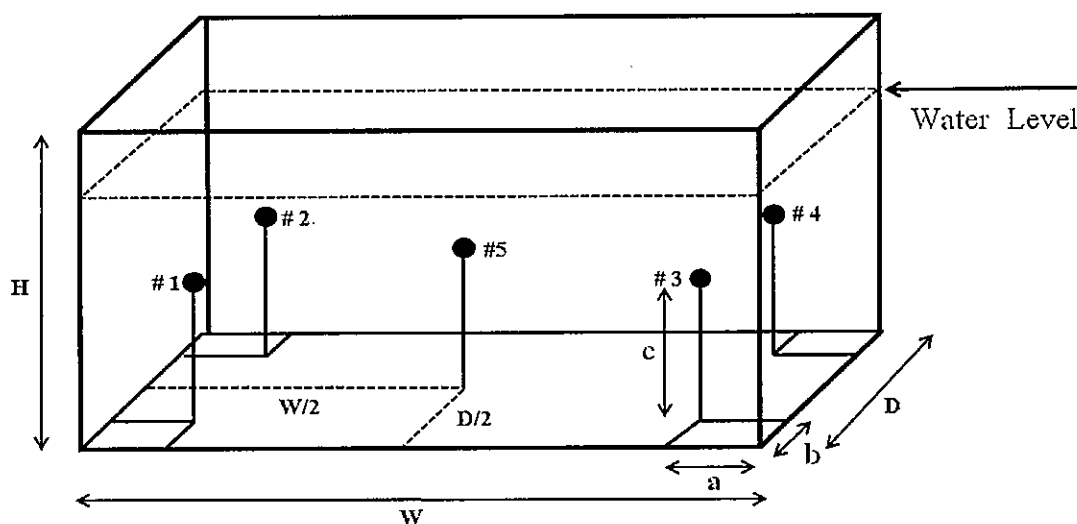
4. Condition of Item : normal condition , no indication for any damage or malfunction

#### 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 Koo, A.Pluakdaeng, Rayong, 21140, Thailand  
Date: July 7, 2022 11:27:53 AM  
EQP Name: AgilentRecommended , AgilentRecommended  
EQP Revision: GC.02.52, GCMS.02.52  
Overall Qualification Status: Pass

REVIEW BY N. Banniy  
APPROVED BY [Signature]  
NEXT CAL. DATE 07/01/24

## CDS Logon Verification - GC

Logon: dej.changchon

## 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	25.1 psi
Accuracy:		0.1 psi
Agilent Recommended:		<= 1.2

Date: July 7, 2022 11:27:53 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: 230.0 230.6 °C

Accuracy: 0.6 °C

Agilent Recommended:  $\geq -1.0$  % setpoint in K ( -5.0 °C )  
 $\leq 1.0$  % setpoint in K ( 5.0 °C )

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 100.0 99.9 °C

Accuracy: -0.1 °C

Agilent Recommended:  $\geq -1.0$  % setpoint in K ( -3.7 °C )  
 $\leq 1.0$  % 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 99.91667 °C

Stability: 0.1 °C

Agilent Recommended:  $\leq 0.5$ 

## 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:
---------------------------

RFPA Voltage:
---------------

	-1	mV		479	mV
Agilent Recommended:	>= -100	and	<= 100	<= 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
------

---

**Signal to Noise EI**

---

Date:	July 7, 2022 11:27:53 AM
System ID:	RYG_EN0136

---

Tested Combination1	Front	SSL	/ External	SQ
Name:	5977B			

---

Source:	El - Extractor	Filament:	1
---------	----------------	-----------	---

Setpoint Status:	Pass
------------------	------

Signal to Noise:	7485
------------------	------

Agilent Recommended:	>= 1200
----------------------	---------

---

Source:	El - Extractor	Filament:	2
---------	----------------	-----------	---

Setpoint Status:	Pass
------------------	------

Signal to Noise:	2097
------------------	------

Agilent Recommended:	>= 1200
----------------------	---------

---

This test's 2 comment(s) and 7 deviation(s) are available in the Attachments section.

**Overall Signal to Noise EI Test Status**

Pass
------

## 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
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

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and logon to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

## Details

Full Name of Signer:	Eaknarin Puangsopa
Logged On User Name:	eaknarin_puangsopa@agilent.com
Signature Creation Date:	July 7, 2022
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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---

Date:	July 7, 2022 11:27:53 AM
System ID:	RYG_EN0136



User Name: eaknarin\_puangsoa  
 Hostname: ASRYGW7002

System Id: RYG\_EN0136  
 Print Date: July 7, 2022 11:27:56 AM

ALS\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 1:11:54 PM	Audit	SessionCreated	Session	None
July 6, 2022 1:11:54 PM	Start	Configuration	Session	None
July 6, 2022 1:11:54 PM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
July 6, 2022 1:17:19 PM	Audit	EqpLoaded	Session	EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.52/Gc.02.52.eqp], EQP File Name: [Gc.02.52.eqp], EQP Name: [AgilentRecommended] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.52/GcMs.02.52.eqp], EQP File Name: [GcMs.02.52.eqp], EQP Name: [AgilentRecommended]
July 6, 2022 1:17:25 PM	End	Configuration	Session	None
July 6, 2022 1:17:29 PM	Start	Qualification	Session	OQ
July 6, 2022 1:17:30 PM	Start	Execution	CDS Logon Verification - GC : - Qualitative test	None
July 6, 2022 1:19:43 PM	End	Execution	CDS Logon Verification - GC : - Qualitative test	Run Count : 1
July 6, 2022 1:19:46 PM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None

User Name: eaknarin\_puangsoa  
 Hostname: ASRYGW7002

System Id: RYG\_EN0136  
 Print Date: July 7, 2022 11:27:56 AM

ALS\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 1:19:59 PM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
July 6, 2022 1:20:15 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
July 6, 2022 1:21:43 PM	End	Execution	Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
July 6, 2022 1:21:45 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
July 6, 2022 1:25:12 PM	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
July 6, 2022 1:25:15 PM	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
July 6, 2022 1:25:17 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
July 6, 2022 1:25:32 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
July 6, 2022 1:33:42 PM	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

Page 2 / 10

User Name: eaknarin\_puangsoa  
 Hostname: ASRYGW7002

System Id: RYG\_EN0136  
 Print Date: July 7, 2022 11:27:56 AM

## ALS\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 1:33:43 PM	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
July 6, 2022 1:33:45 PM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
July 6, 2022 1:53:05 PM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
July 6, 2022 1:53:07 PM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
July 6, 2022 1:53:11 PM	Start	Execution	Log Amp - 5977B SQ: - Source: None EI - Extractor	
July 6, 2022 1:57:10 PM	End	Execution	Log Amp - 5977B SQ: - Source: EI EI - Extractor	Run Count : 1
July 6, 2022 1:57:24 PM	Start	Execution	RFPA - 5977B SQ: - Source: EI - Extractor	None
July 6, 2022 2:09:24 PM	End	Execution	RFPA - 5977B SQ: - Source: EI - Extractor	Run Count : 1
July 6, 2022 2:09:28 PM	Start	Execution	Tune EI - 5977B SQ: - Source: - None EI - Extractor Filament 1 (Qualitative - No setpoints associated)	
July 6, 2022 2:24:46 PM	End	Qualification	Session	OQ
July 6, 2022 2:24:46 PM	Start	Reporting	Session	None
July 6, 2022 2:41:39 PM	End	Reporting	Session	None
July 6, 2022 2:41:39 PM	Start	Configuration	Session	None
July 6, 2022 2:41:40 PM	End	Configuration	Session	None

User Name: eaknarin\_puangsoa  
 Hostname: ASRYGW7002

System Id: RYG\_EN0136  
 Print Date: July 7, 2022 11:27:56 AM

ALS\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 2:41:40 PM	Start	Qualification	Session	OQ
July 6, 2022 2:41:40 PM	Start	Execution	Tune EI - 5977B SQ: - Source: - None EI - Extractor Filament 1 (Qualitative - No setpoints associated)	
July 6, 2022 2:41:56 PM	End	Execution	Tune EI - 5977B SQ: - Source: - Run Count : 1 EI - Extractor Filament 1 (Qualitative - No setpoints associated)	
July 6, 2022 2:41:58 PM	Start	Execution	Tune EI - 5977B SQ: - Source: - None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
July 6, 2022 2:42:48 PM	End	Qualification	Session	OQ
July 6, 2022 2:42:48 PM	Start	Reporting	Session	None
July 6, 2022 2:50:52 PM	End	Reporting	Session	None
July 6, 2022 2:50:52 PM	Start	Qualification	Session	OQ
July 6, 2022 2:50:52 PM	Start	Execution	Tune EI - 5977B SQ: - Source: - None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
July 6, 2022 2:51:12 PM	End	Qualification	Session	OQ
July 6, 2022 2:51:12 PM	Start	Reporting	Session	None
July 6, 2022 2:55:29 PM	End	Reporting	Session	None
July 6, 2022 2:55:29 PM	Start	Qualification	Session	OQ
July 6, 2022 2:55:29 PM	Start	Execution	Tune EI - 5977B SQ: - Source: - None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	

User Name: eaknarin\_puangsoapa  
 Hostname: ASRYGW7002

System Id: RYG\_EN0136  
 Print Date: July 7, 2022 11:27:56 AM

ALS\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 2:55:40 PM	End	Execution	Tune EI - 5977B SQ: - Source: - Run Count : 1 EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
July 6, 2022 2:55:45 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 6, 2022 3:21:52 PM	End	Qualification	Session	OQ
July 6, 2022 3:21:52 PM	Start	Reporting	Session	None
July 6, 2022 3:25:04 PM	End	Reporting	Session	None
July 6, 2022 3:25:04 PM	Start	Qualification	Session	OQ
July 6, 2022 3:25:04 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 6, 2022 4:06:40 PM	Audit	AceClosed	Session	None
July 7, 2022 9:13:47 AM	Audit	AceRestarted	Session	None
July 7, 2022 9:13:49 AM	Audit	SessionReloaded	Session	None
July 7, 2022 9:13:54 AM	Start	Qualification	Session	OQ
July 7, 2022 9:13:54 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 9:58:06 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2022\OQF_N_SN_F01.D

User Name: eaknarin\_puangsoa  
 Hostname: ASRYGW7002

System Id: RYG\_EN0136  
 Print Date: July 7, 2022 11:27:56 AM

ALS\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 9:59:53 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 1
July 7, 2022 10:01:46 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Deviation filed for Run Count : 1
July 7, 2022 10:01:46 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 10:02:00 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F01.D
July 7, 2022 10:04:55 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 2
July 7, 2022 10:07:30 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Deviation filed for Run Count : 2
July 7, 2022 10:07:30 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 10:07:44 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F01.D

User Name: eaknarin\_puangsoa  
 Hostname: ASRYGW7002

System Id: RYG\_EN0136  
 Print Date: July 7, 2022 11:27:56 AM

## ALS\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 10:08:18 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 3
July 7, 2022 10:10:28 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Deviation filed for Run Count : 3
July 7, 2022 10:10:28 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 10:10:55 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F01.D
July 7, 2022 10:14:03 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 4
July 7, 2022 10:14:54 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Deviation filed for Run Count : 4
July 7, 2022 10:14:54 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 10:15:15 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F01.D

User Name: eaknarin\_puangsoa  
 Hostname: ASRYGW7002

System Id: RYG\_EN0136  
 Print Date: July 7, 2022 11:27:56 AM

ALS\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 10:15:27 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 5
July 7, 2022 10:16:48 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Deviation filed for Run Count : 5
July 7, 2022 10:16:48 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 10:17:05 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F01.D
July 7, 2022 10:17:14 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 6
July 7, 2022 10:18:40 AM	End	Qualification	Session	OQ
July 7, 2022 10:18:40 AM	Start	Reporting	Session	None
July 7, 2022 10:21:10 AM	End	Reporting	Session	None
July 7, 2022 10:21:10 AM	Start	Qualification	Session	OQ
July 7, 2022 10:21:17 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
July 7, 2022 10:56:49 AM	End	Qualification	Session	OQ
July 7, 2022 10:56:49 AM	Start	Reporting	Session	None
July 7, 2022 10:57:38 AM	End	Reporting	Session	None

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Date: July 7, 2022 11:27:53 AM  
 System ID: RYG\_EN0136



User Name: eaknarin\_puangsoa  
 Hostname: ASRYGW7002

System id: RYG\_EN0136  
 Print Date: July 7, 2022 11:27:56 AM

ALS\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 10:57:38 AM	Start	Qualification	Session	OQ
July 7, 2022 10:57:38 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
July 7, 2022 11:06:50 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F021.D
July 7, 2022 11:11:47 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
July 7, 2022 11:13:13 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 1
July 7, 2022 11:14:29 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
July 7, 2022 11:14:29 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
July 7, 2022 11:14:47 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F021.D
July 7, 2022 11:16:34 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 2

User Name: eaknarin\_puangsoa

System Id: RYG\_EN0136

Hostname: ASRYGW7002

Print Date: July 7, 2022 11:27:56 AM

## ALS\_RYG\_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 11:19:56 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
July 7, 2022 11:19:56 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	None
July 7, 2022 11:20:13 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path : D:\OQ2022\OFN_SN_F021.D
July 7, 2022 11:21:52 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 3
July 7, 2022 11:22:49 AM	End	Qualification	Session	OQ
July 7, 2022 11:22:49 AM	Start	Reporting	Session	None
July 7, 2022 11:26:46 AM	Audit	Reporting	Session	Report Generated : Certificate

REVIEW BY Tanyatorn M.APPROVED BY KL ALNEXT CAL. DATE 18 May 24

## MULTI POINT CALIBRATION REPORT

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

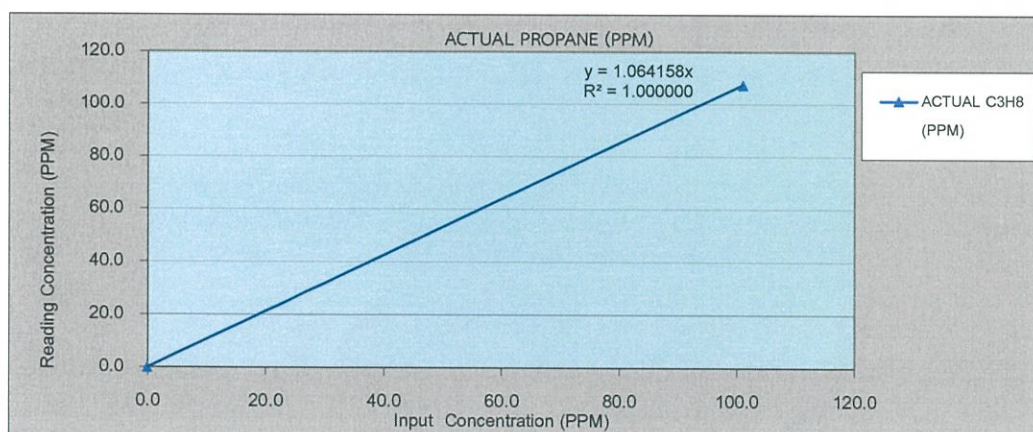
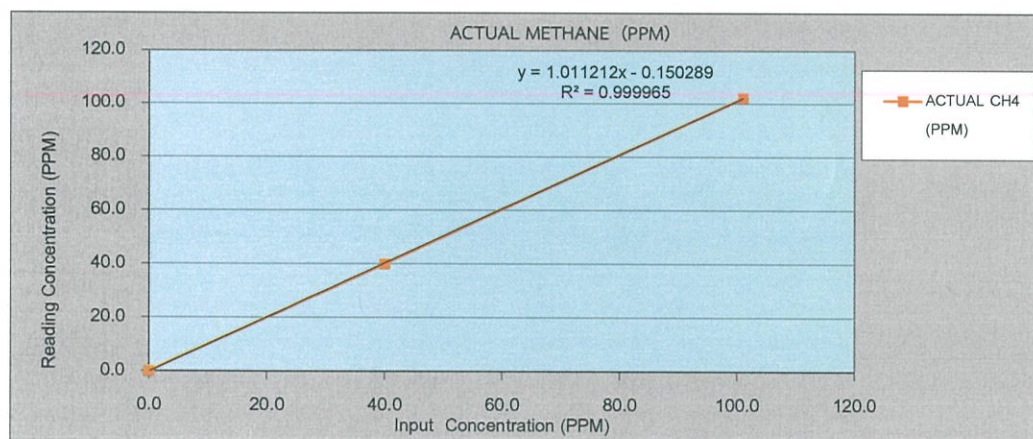
CERTIFIED DATE : May 24,2018

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