

Serial-No.: R170A0143 Customer-No.: C104-002  
Date: 6/06/2022. Carried out by: Mr. Srichan Fah-on.

Maintenance with following Operational Qualification (OQ)  
(requires a separate OQ protocol)



Company	บริษัท 1010105 จำกัด (มหาชน) บมจ.
User	สุวิทย์ วัฒนวิเศษ
Department	Lab
Street	104 ถนนพหลโยธิน 40 แขวงพญาไท เขตพญาไท กรุงเทพมหานคร
Zip Code, City	กรุงเทพมหานคร เขตพญาไท 10250
Country	ประเทศไทย
Phone	
Fax	
E-mail	

### Maintenance works basic unit

tightness visual check inside the Mercur	<input checked="" type="checkbox"/>
visual check if gold-traps are broken	<input checked="" type="checkbox"/>
visual check if spectrometer is contaminated	<input checked="" type="checkbox"/>
visual check of the fluorescence cell	<input checked="" type="checkbox"/>
visual check of the absorption cell, incl. window	<input checked="" type="checkbox"/>
reactor cleaning	<input checked="" type="checkbox"/>
check pump-hose, if necessary change it	<input checked="" type="checkbox"/>
check swivel drive (SEV)	<input checked="" type="checkbox"/>
check drying-hose, output gas-liquid-separator	<input checked="" type="checkbox"/>
test Bubble-Sensor	<input checked="" type="checkbox"/>
check gas flows	<input checked="" type="checkbox"/>
check volume flows, reagents	<input checked="" type="checkbox"/>
recording stray light values	<input checked="" type="checkbox"/>
measurement with 30 ng/l	<input checked="" type="checkbox"/>

### Maintenance works Autosampler

Serial No.: 52 1102 250

lubricate the dosing-winding (Teflon-grease-spray)	<input checked="" type="checkbox"/>
clean the dosing cylinder, if necessary exchange it	<input checked="" type="checkbox"/>
lubricate the winding system of the height drive with some drops of oil	<input checked="" type="checkbox"/>
check the toothed belt	<input checked="" type="checkbox"/>
check the position of the mechanical stopper (height: 13mm )	<input checked="" type="checkbox"/>
check the pump rate of mixing pump (<14s AS52, typ.7s/<20s AS52S, typ.10s)	<input checked="" type="checkbox"/>
check the pump rate of washing cup	<input checked="" type="checkbox"/>
check the electrical hose connections for good contact	<input checked="" type="checkbox"/>
check the connectors of the magnetic valves	<input checked="" type="checkbox"/>
check the dosing hose for buckling, if necessary exchange it	<input checked="" type="checkbox"/>

Device parameter	nominal value	actual value
visual check general tightness inside the Mercur	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
visual check Goldtraps <i>(Goldtraps 2 / NG)</i>	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
visual check spectrometer		
Fluorescence cell	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
Absorption cell, incl. window	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
lens	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
Swivel drive (SEV)	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check pump hoses	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check hoses and hose connectors	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check and clean reactor	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check drying hose output Gas-liquid-separator	o.k.: <input checked="" type="checkbox"/>	changed: <input type="checkbox"/>
check bubble-sensor	o.k.: <input checked="" type="checkbox"/>	not o.k.: <input type="checkbox"/>
<b>Check gasflow</b>		
Argon pressure valve 4	1.2 – 1.5 bar	<i>1.5 bar</i>
Valve 1	10 NI/h or 0.166 NL/min	<i>0.166</i>
Valve 2	50 NI/h or 0.833 NL/min	<i>0.831</i>
Valve 3	5 NI/h or 0.083 NL/min	<i>0.084</i>
Valve 4	10 NI/h or 0.166 NL/min	<i>0.167</i>
<b>Check liquidflow</b>		
Acid	2.5ml/min ± 1 ml	<i>2.5 ml/min.</i>
Red.-agent	2.5ml/min ± 1 ml	<i>2.5 ml/min.</i>
Sample	10ml/min ± 2 ml	<i>10 ml/min.</i>
<b>Adventitious light - values</b>	<b>(V)</b>	<b>from file</b>
100	<i>0</i>	<i>0</i>
200	<i>0</i>	<i>0</i>
300	<i>0</i>	<i>0</i>
350	<i>0</i>	<i>1</i>
400	<i>1</i>	<i>3</i>
450	<i>4</i>	<i>7</i>
500	<i>9</i>	<i>17</i>
550	<i>19</i>	<i>36</i>
575	<i>26</i>	<i>51</i>
600	<i>36</i>	<i>91.</i>



Device parameter	nominal value	actual value
<b>Analytical parameters Fluorescence cell</b>		
Conditions.: max.conc.: 10µg/L PMT-voltage: ..... <u>369</u> .....V		
Blank-solution		Int ..... <u>0.0003</u>
without enrichment / FBR 30 ng/L	Int > 0.0015 RSD < 3 %	Int <sub>1</sub> ..... <u>0.0058</u> RSD..... <u>1.07</u> ....%
Conditions.: max.conc.: 1.7µg/L PMT-voltage: ..... <u>352</u> .....V		
Blank-solution		Int..... <u>0.0040</u>
with enrichment / FBR 30 ng/L	Int > 0.008 RSD < 3 %	Int <sub>2</sub> ..... <u>0.0244</u> RSD..... <u>0.87</u> ....%
Fok.- factor ( Int <sub>2</sub> / Int <sub>1</sub> )	> 3.5	<u>4.206</u> ,
<b>Analytical parameters Absorption cell</b>		
Blank-solution		Ext..... <u>0.0010</u>
without enrichment / FBR 100 ng/L	Ext. > 0.0012 RSD < 5 %	Ext..... <u>0.0048</u> RSD..... <u>3.92</u> ....%
<b>Comments</b>		

Mr. Srichai Pak-on

Signature Technician

สอริชัย ปาก-on

Signature Customer

Bangkok, 6/06/2022.

Place, Date (DD/MM/YYYY)

6/06/2022

Place, Date (DD/MM/YYYY)





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
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534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 22TM676

Page.: 1 of 3

## Certificate of Calibration

Equipment : Autoclave

Manufacturer : TOMY

Model : SX-700

Serial No. : 48134190

ID No. : BKK\_ML0041

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

Received Order : 20 May 2022

Calibration Date : 20 May 2022

Ambient Temperature : ( 26 ± 10 ) °C

Relative Humidity : ( 50 ± 30 ) %

Calibrated by : Preecha Hlahib

Approved by :

Approved Signatory

( ) Pornthippa Tameyakul

( ) Malee Butkruea

(✓) Suwit Imjai

Issue Date : 24 May 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 0041435



**Equipment :** Autoclave  
**Condition As-Received :** Used Item  
**Reference :** 2205-0404OC-2

**Cert. No.:** 22TM676

**Page.:** 2 of 3

**Procedure Used :-**

Calibration were conducted using in-house calibration procedure CP-OT03 according to direct 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>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1 ) Data Acquisition	34972A	MY57013823	22LM24	26 Feb 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.

4. This result of calibration covers laboratory autoclaves for the sterilization of goods and material which could be infected with organisms categorized as Hazard Group 1, 2 and 3\*\*

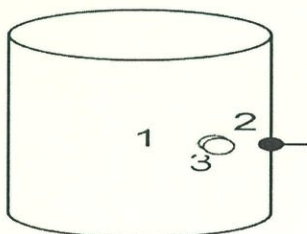
(\*\* = Categorization of pathogens according to hazard and categories of containment, second edition, 1990 )

It does not cover autoclaves for use with material infect with organisms in Hazard Group 4, for which complete containment and sterilization of infected condensate is considered to be essential.

This result of calibration does not apply to sterilizers or disinfectors used for medical, dental, pharmaceutical or veterinary purposes which are directly concerned with patient care, or those used for fabrics subjected to sterilization which are required to be dry at the end of cycle.

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

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



	Environmental		
	( °C )	( %R.H. )	( Volt )
Beginning of Calibration	24	55	220
Finished of Calibration	26	57	221

<u>Position</u>	<u>Description</u>	<u>Ref. Std. ID No.:</u>
1 =	Center of chamber	19-17TC-11
2 =	Temperature sensor	19-17TC-12
3 =	Exhaust port	19-17TC-13

*Signature*





Equipment : Autoclave  
Condition As-Received : Used Item  
Reference : 2205-0404OC-2

Cert. No.: 22TM676

Page.: 3 of 3

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

Operating parameter Set : Temperature = 108 °C  
Sterilization period = 10 minute

UUC* Setting ( °C )	UUC* Reading ( °C )	Position	Average* Standard Reading ( °C )	Stability ( ± °C )	Pressure Reading ( MPa )	Uncertainty ( ± °C )	Coverage Factor <i>k</i>
108	108	1	107.536	0.19	0.04	0.91	2
		2	107.542				
		3	107.471				

Operating parameter Set : Temperature = 115 °C  
Sterilization period = 20 minute

UUC* Setting ( °C )	UUC* Reading ( °C )	Position	Average* Standard Reading ( °C )	Stability ( ± °C )	Pressure Reading ( MPa )	Uncertainty ( ± °C )	Coverage Factor <i>k</i>
115	115	1	114.502	0.15	0.08	0.89	2
		2	114.582				
		3	114.539				

Operating parameter Set : Temperature = 118 °C  
Sterilization period = 10 minute

UUC* Setting ( °C )	UUC* Reading ( °C )	Position	Average* Standard Reading ( °C )	Stability ( ± °C )	Pressure Reading ( MPa )	Uncertainty ( ± °C )	Coverage Factor <i>k</i>
118	118	1	117.517	0.094	0.09	0.88	2
		2	117.616				
		3	117.530				

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

Operating parameter Set : Temperature = 121 °C  
Sterilization period = 30 minute

UUC* Setting ( °C )	UUC* Reading ( °C )	Position	Average* Standard Reading ( °C )	Stability ( ± °C )	Pressure Reading ( MPa )	Uncertainty ( ± °C )	Coverage Factor <i>k</i>
121	121	1	120.400	0.18	1.1	0.90	2
		2	120.511				
		3	120.465				

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

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

**UUC\*** : Unit Under Calibration

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

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

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*Signature*





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Cert. No.: 22TM102

Page.: 1 of 3

## Certificate of Calibration

Equipment : Incubator  
Manufacturer : SHEL-LAB  
Model : 1915A  
Serial No. : 0200599  
ID No. : BKK\_ML0010  
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.  
104 Phatthanakan 40, Phatthanakan Rd.,  
Khwaeng Phatthanakan, Khet Suan Luang,  
Bangkok 10250 Thailand  
Location : Incubation & Micrological Reading  
Received Order : 21 January 2022  
Calibration Date : 21 January 2022  
Ambient Temperature : ( 26 ± 10 ) °C  
Relative Humidity : ( 50 ± 30 ) %  
Calibrated by : Krisda Malee

REVIEW BY	Sithichok T.
APPROVED BY	[Signature]
NEXT CAL. DATE	22/07/23

Approved by :

*Malee*

Approved Signatory

- ( ☒ ) Pornthippa Tameyakul  
( ☒ ) Malee Butkruea  
( ☐ ) Suwit Imjai

Issue Date :

3 February 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 0037377



Equipment : Incubator  
 Condition As-Received : Used Item  
 Reference : 2201-0616OC-1

Cert. No.: 22TM102

Page.: 2 of 3

**Procedure Used :-**

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector ( RTD ).

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	MY57013711	21LM7	16 Jun 2022

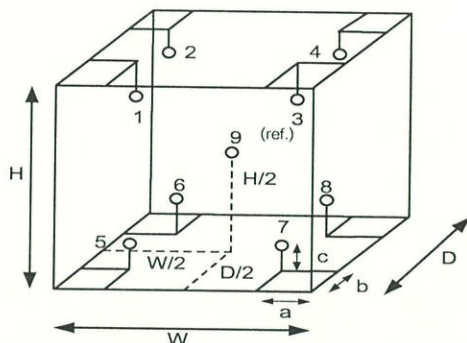
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

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

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

**Fresh air setting :** Close



Environment during calibration		
	Beginning	Finished
Temp. ( °C )	26	25
REL.Humid. ( % )	53	54
AC Supply ( Volt )	220	221

Position :	Ref. Std. ID No.:
1	18-18RTD-01
2	18-18RTD-02
3	18-18RTD-03
4	18-18RTD-04
5	18-18RTD-05
6	18-18RTD-06
7	18-18RTD-07
8	18-18RTD-08
9 (ref.)	18-18RTD-09

**Probe Installation Details :**

a = 10 cm  
 b = 10 cm  
 c = 10 cm

**Dimension of Chamber :**

D = 0.90 m  
 W = 0.75 m  
 H = 1.2 m  
 Capacity = 0.81 m<sup>3</sup>

*Maku .*





Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2201-0616OC-1  
**Result of Calibration :-** ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 22TM102

Page.: 3 of 3

Calibration Point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Temperature stability ( ± °C )	Temperature uniformity ( °C )	Overall Variation ( °C )	Uncertainty ( ± °C )	Coverage Factor <i>k</i>
35.0	35.0	35.0	0.043	0.41	0.42	0.30	2

Calibration Point ( °C )	Measured Temperature ( °C )								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
35.0	34.801	34.868	34.862	35.012	35.040	35.010	35.084	35.040	35.178

**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.

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

**Overall Variation** : The Difference of the maximum and minimum measured temperatures throughout observation.

**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.*





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Cert. No.: 22TM1571

Page : 1 of 3

## Certificate of Calibration

Equipment : Hot Air Oven

Manufacturer : Binder

Model : ED 240/E2

Serial No. : 00-15533

ID No. : BKK\_ML0013

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

Location : Media Preparation Room

Received Order : 21 November 2022

Calibration Date : 21 November 2022

Ambient Temperature : ( 26 ± 10 ) °C

Relative Humidity : ( 50 ± 30 ) %

Calibrated by : Krisda Malee

Approved by :

*Malee*

Approved Signatory

( ) Pornthippa Tameyakul

(✓) Malee Butkruea

( ) Suwit Imjai

Issue Date : 29 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 0048150



Equipment : Hot Air Oven  
 Condition As-Received : Used Item  
 Reference : 2211-0623OC-1

Cert. No.: 22TM1571

Page : 2 of 3

**Procedure Used :-**

Calibration were conducted using calibration procedure CP-OT02 according to direct 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	34970A	MY44067817	22LM121	22 Aug 2023

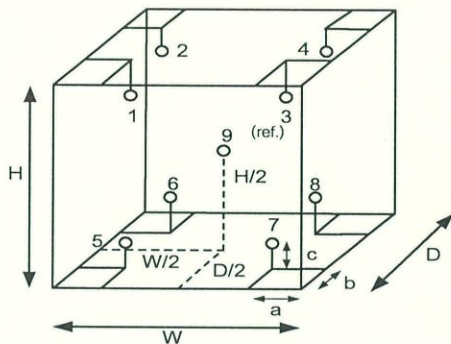
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

**Result of Calibration :-** ( \* ) After Adjustment

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

**Fresh air setting :** Not Available



Environment during calibration		
	Beginning	Finished
Temp. ( °C )	26	26
REL.Humid. ( % )	53	55
AC Supply ( Volt )	219	220

Position :	Ref. Std. ID No.:
1	21-15TC-01
2	21-15TC-02
3	21-15TC-03
4	21-15TC-04
5	21-15TC-05
6	21-15TC-06
7	21-15TC-07
8	21-15TC-08
9 (ref.)	21-15TC-09

**Probe Installation Details :**

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

**Dimension of Chamber :**

D = 0.50 m  
 W = 0.80 m  
 H = 0.60 m  
 Capacity = 0.24 m<sup>3</sup>

*Malu.*





Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2211-0623OC-1  
Result of Calibration :- ( \* ) After Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Not Available

Cert. No.: 22TM1571

Page : 3 of 3

Calibration Point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Temperature stability ( ± °C )	Temperature uniformity ( °C )	Overall Variation ( °C )	Uncertainty ( ± °C )	Coverage Factor <i>k</i>
180	180	180	0.70	1.5	2.9	1.4	2

Calibration Point ( °C )	Measured Temperature ( °C )								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
180	179.520	180.585	178.855	179.482	178.827	179.938	179.074	180.199	180.068

**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.

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

**Overall Variation** : The Difference of the maximum and minimum measured temperatures throughout observation.

**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*





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Cert. No.: 22TM677

Page.: 1 of 3

## Certificate of Calibration

Equipment :	Water Bath
Manufacturer :	Memmert
Model :	WNE 45
Serial No. :	L712.0429
ID No. :	BKK_ML0056
Submitted by :	ALS Laboratory Group (Thailand) Co.,Ltd. 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang , Bangkok 10250 Thailand
Location :	Incubator & Microbiological Reading
Received Order :	20 May 2022
Calibration Date :	20 May 2022
Ambient Temperature :	( 26 ± 10 ) °C
Relative Humidity :	( 50 ± 30 ) %

Calibrated by : Preecha Hlahib

Approved by :

  
Approved Signatory

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

Issue Date : 24 May 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 0041433



Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2205-0404OC-1

Cert. No.: 22TM677

Page.: 2 of 3

**Procedure Used :-**

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

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

**Instrument**

**Model**

**Serial No.**

**Cert. No.**

**Due Date**

1 ) Data Acquisition

34972A

MY57013823

22LM24

26 Feb 2023

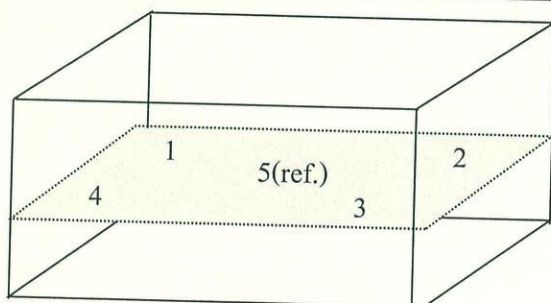
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

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

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

	Environmental		AC Voltage Supply ( Volt )
	( °C )	( %R.H. )	
Beginning of Calibration	24	47	220
Finished of Calibration	24	52	221



Front

Position :	Ref. Std. S/N.:
1	4804539-006
2	4804539-007
3	4804539-008
4	4804539-009
5(ref.)	4804539-010

*Signature*





Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2205-0404OC-1  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source

Cert. No.: 22TM677

Page.: 3 of 3

Calibration point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Average* Standard Reading ( °C )				
			Position				
			1	2	3	4	5 (ref.)
44.5	44.4	44.4	44.539	44.497	44.476	44.506	44.507

Calibration point ( °C )	Uniformity ( °C )	Stability ( ± °C )	Uncertainty ( ± °C )	Coverage Factor <i>k</i>
44.5	0.068	0.030	0.15	2

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

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

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

**UUC\*** : Unit Under Calibration

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

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

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*Unit*





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Cert. No.: 23TM637

Page : 1 of 3

## Certificate of Calibration

Equipment : Water Bath

Manufacturer : Memmert

Model : WNE 45

Serial No. : L712.0429

ID No. : BKK\_ML0056

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

Location : Incubator & Microbiological Reading

Received Order : 20 April 2023

Calibration Date : 20 April 2023

Ambient Temperature : ( 26 ± 10 ) °C

Relative Humidity : ( 50 ± 30 ) %

Calibrated by : Kunchit Promprat

REVIEW BY	Sithichok
APPROVED BY	
NEXT CAL. DATE	20/4/24

Approved by :

Malee

Approved Signatory

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

Issue Date :

24 April 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 Corporate Services 3 : Equipment Calibration and Testing Services.

A 0053357



Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2304-0253OC-1

Cert. No.: 23TM637

Page : 2 of 3

**Procedure Used :-**

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

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1 ) Data Acquisition	34970A	MY44073381	22LM78/1	12 May 2023

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

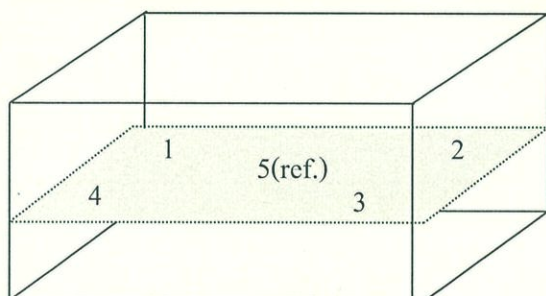
3. This certification is traceable to the International System of Unit.

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

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

**Heat transfer medium used :** Water

	<u>Environmental</u>		<u>AC Voltage Supply</u>
	( °C )	( %R.H. )	( Volt )
Beginning of Calibration	25	45	223
Finished of Calibration	25	43	223



Front

<u>Position :</u>	<u>Ref. Std. S/N.:</u>
1	4803988-006
2	4803988-007
3	4804539-014
4	4804539-015
5(ref.)	4804539-016

*Malu*





Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2304-0253OC-1  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source

Cert. No.: 23TM637

Page : 3 of 3

Calibration point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Average* Standard Reading ( °C )					Uncertainty  ( ± °C )
			Position					
			1	2	3	4	5 (ref.)	
44.5	44.5	44.5	44.492	44.463	44.475	44.510	44.491	0.15
45.0	45.0	45.0	45.005	44.962	44.979	45.016	44.986	0.15

Calibration point ( °C )	Uniformity ( °C )	Stability ( ± °C )	Coverage Factor <i>k</i>
44.5	0.051	0.022	2
45.0	0.080	0.026	2

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

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

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

**UUC\*** : Unit Under Calibration

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

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

-o0o-

*Malu*

# Certificate of System Qualification

GC-OQ + GCMS-OQ

REVIEW BY	<i>Nant Sam</i>
APPROVED BY	<i>LLAL</i>
CAL DATE	22/05/23

System ID: GM-10  
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.  
Organization Location: 104 Patthanakarn 40, Patthanakarn Rd., Kwang Suan Luang, Khet Suan Luang, Bangkok 10250  
Date: November 23, 2021 1:12:35 PM  
EQP Name: AgilentRecommended , AgilentRecommended  
EQP Revision: GC.02.52, GCMS.02.51  
Overall Qualification Status: Pass

## CDS Logon Verification - GC

Logon: Nanthawadee.Somboon

## 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 MMI

Setpoint Status: Pass

	Setpoint	Actual
Inlet Pressure:	25.0 psi	24.9 psi
Accuracy:		0.1 psi
Agilent Recommended:	<=	1.2

Date: November 23, 2021 1:12:35 PM  
System ID: GM-10



## Overall Inlet Pressure Accuracy Test Status

Pass

## GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 229.8 °C

Accuracy: -0.2 °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 99.8 °C

Accuracy: -0.2 °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 99.78333 °C

Stability: 0.1 °C

Agilent Recommended:  $\leq$  0.5

## Overall GC Oven Temperature Stability Test Status

Pass

Date: November 23, 2021 1:12:35 PM

System ID: GM-10

## Tune EI

Tested Combination1	Front	MMI	/ External	TQ
Name:	7000D			
Setpoint Status:	Pass			
Filament:	1			
Setpoint Status:	Pass			
Filament:	2			

## Overall Tune EI Test Status

Pass
------

## Scouting Run

Tested Combination1	Front	MMI	/ External	TQ
	Injection Tower			
Name:	7693A			
Source:	EI - Extractor			
Setpoint Status:	Completed			
Injection Volume on Column:	1.0 uL			

## Overall Scouting Run Status

Completed
-----------

## Instrument Detection Limit

Tested Combination1	Front	MMI	/ External	TQ
	Injection Tower			
Name:	7693A			
Source:	EI - Extractor			



## Setpoint Status:

Pass

Injection Volume on Column:

1.0 uL

Area

Retention Time

Minimum RSD:

5.79 %

0.05 %

Agilent Recommended:

&lt;= 12.00

&lt;= 1.00

Status:

Pass

Pass

Instrument Detection Limit:

1.94800 fg

Agilent Recommended:

&lt;= 4.03800

Status:

Pass

## Overall Instrument Detection Limit Test Status

Pass

## Mass Ratio Precision

Tested Combination1 Front MMI / External TQ

Injection Tower

Name:

7693A

Source:

EI - Extractor

## Setpoint Status:

Pass

Injection Volume on Column:

1.0 uL

Area Mass 1

Mass Ratio

Abundance\*s

RSD:

4.07 %

2.66 %

Agilent Recommended:

&lt;= 5.00

&lt;= 5.00

Pass

Pass

## Overall Mass Ratio Precision Test Status

Pass

## Instrument Details

### Purpose

This section describes the as found system configuration.

### Details

#### System

System ID	GM-10
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

#### Tested Combination1

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

#### Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN18180003
Firmware Revision	A.11.03
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10



## Sampler 2

Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN18170137
Firmware Revision	A.11.03
Vial Heater	Not installed

## Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3442B
Serial Number	CN18153080
Firmware Revision	B.02.05
Oven Type	Standard

## Inlet 1

Manufacturer	Agilent Technologies
Name	7890
Type	MMI
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	TQ
Name	7000D
Serial Number	US1826U108
Firmware Revision	G.7000.085A
High Vacuum System	Turbo Pump
Scouting Run Standard	OFN Std

## 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:	Jaruwat Channarong
Logged On User Name:	jaruwat.channarong@agilent.com
Signature Creation Date:	November 23, 2021
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: jaruwat.channarong  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: November 23, 2021 1:12:38 PM

ALS\_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:13:35 AM	Audit	SessionCreated	Session	None
November 23, 2021 10:13:35 AM	Start	Configuration	Session	None
November 23, 2021 10:13:35 AM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
November 23, 2021 10:20:27 AM	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/02.51/GcMs.02.51.eqp], EQP File Name: [GcMs.02.51.eqp], EQP Name: [AgilentRecommended]
November 23, 2021 10:20:37 AM	End	Configuration	Session	None
November 23, 2021 10:21:34 AM	End	Configuration	Session	None
November 23, 2021 10:21:52 AM	Start	Qualification	Session	OQ
November 23, 2021 10:21:54 AM	Start	Execution	CDS Logon Verification - GC : - Qualitative test	None
November 23, 2021 10:26:40 AM	End	Execution	CDS Logon Verification - GC : - Qualitative test	Run Count : 1

Page 1 / 7

User Name: jaruwat.channarong  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: November 23, 2021 1:12:38 PM

ALS\_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:26:42 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
November 23, 2021 10:26:54 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
November 23, 2021 10:26:56 AM	Start	Execution	Inlet Pressure Accuracy - Front MMI: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
November 23, 2021 10:27:01 AM	End	Execution	Inlet Pressure Accuracy - Front MMI: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
November 23, 2021 10:27:05 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
November 23, 2021 10:27:28 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
November 23, 2021 10:27:31 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
November 23, 2021 10:27:33 AM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
November 23, 2021 10:27:44 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

User Name: jaruwat.channarong  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: November 23, 2021 1:12:38 PM

ALS\_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:27:45 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
November 23, 2021 10:28:26 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
November 23, 2021 10:35:24 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
November 23, 2021 10:35:29 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
November 23, 2021 10:37:44 AM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
November 23, 2021 10:39:20 AM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
November 23, 2021 10:39:23 AM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
November 23, 2021 10:39:26 AM	Start	Execution	Tune EI - 7000D TQ: - Source: - EI - Extractor Filament 1 (Qualitative - No setpoints associated)	None
November 23, 2021 10:41:10 AM	End	Execution	Tune EI - 7000D TQ: - Source: - EI - Extractor Filament 1 (Qualitative - No setpoints associated)	Run Count : 1



User Name: jaruwat.channarong  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: November 23, 2021 1:12:38 PM

ALS\_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:41:13 AM	Start	Execution	Tune EI - 7000D TQ: - Source: - None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
November 23, 2021 10:41:34 AM	End	Execution	Tune EI - 7000D TQ: - Source: - Run Count : 1 EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
November 23, 2021 10:43:42 AM	Start	Execution	Scouting Run - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None
November 23, 2021 10:44:20 AM	Audit	Data	Scouting Run - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor- Part of GCMS System Preparation	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\SQ_001.D
November 23, 2021 10:45:10 AM	End	Execution	Scouting Run - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor- Part of GCMS System Preparation	Run Count : 1
November 23, 2021 10:45:14 AM	Start	Execution	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	None
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_003.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_004.D

User Name: jaruwat.channarong  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: November 23, 2021 1:12:38 PM

ALS\_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_005.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_006.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_007.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_008.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_009.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_010.D
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_011.D

User Name: jaruwat.channarong  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: November 23, 2021 1:12:38 PM

ALS\_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:45:39 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\IDL_012.D
November 23, 2021 10:46:50 AM	End	Execution	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Run Count : 1
November 23, 2021 10:47:03 AM	Start	Execution	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	None
November 23, 2021 10:47:23 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\MRP_001.D
November 23, 2021 10:47:23 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\MRP_002.D
November 23, 2021 10:47:23 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\MRP_003.D
November 23, 2021 10:47:23 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\MRP_004.D
November 23, 2021 10:47:23 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ2021\MRP_005.D



User Name: jaruwat.channarong  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: November 23, 2021 1:12:38 PM

ALS\_GM10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
November 23, 2021 10:47:23 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Data files Path : D:\MassHunter\GCMS\1\data \\Agilent\OQ2021\MRP_006.D
November 23, 2021 10:48:02 AM	End	Execution	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	Run Count : 1
November 23, 2021 10:48:07 AM	End	Qualification	Session	OQ
November 23, 2021 10:48:07 AM	Start	Reporting	Session	None
November 23, 2021 1:01:43 PM	Audit	AceClosed	Session	None
November 23, 2021 1:03:30 PM	Audit	AceRestarted	Session	None
November 23, 2021 1:03:32 PM	Audit	SessionReloaded	Session	None
November 23, 2021 1:03:37 PM	Start	Qualification	Session	OQ
November 23, 2021 1:11:56 PM	Audit	Reporting	Session	Report Generated : Certificate

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID:

GM-10

Organization Name:

ALS Laboratory Group (Thailand) Co., Ltd.

Organization Location:

104 Patthanakarn 40, Patthanakarn Rd., Kwang Suan Luang, Khet Suan Luang, Bangkok 10250

Date:

May 25, 2023 11:05:07 AM

EQP Name:

AgilentRecommended , AgilentRecommended

EQP Revision:

GC.02.52, GCMS.02.51

Overall Qualification Status:

Pass

REVIEW BY Suchada T.

APPROVED BY Nant Somb

NEXT CAL. DATE 25 Nov 24

CDS Logon Verification - GC

Logon: SESSIONNAME

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

MMI

Setpoint Status:

Pass

Setpoint

Actual

Inlet Pressure:

25.0

psi

24.9

psi

Accuracy:

0.1

psi

Agilent Recommended:

<=

1.2

Date:

May 25, 2023 11:05:07 AM

System ID:

GM-10

## Overall Inlet Pressure Accuracy Test Status

Pass

## GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 230.0 °C

Accuracy: 0.0 °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: 100.0 100.0 °C

Accuracy: 0.0 °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: 100.0 100.0333 °C

Stability: 0.1 °C

Agilent Recommended:  $\leq 0.5$ 

## Overall GC Oven Temperature Stability Test Status

Pass



---

**Tune EI**

Tested Combination1

Front

MMI

/ External

TQ

Name:

7000D

Setpoint Status:

Pass

Filament:

1

Setpoint Status:

Pass

Filament:

2

**Overall Tune EI Test Status**

Pass

---

**Scouting Run**

Tested Combination1

Front

MMI

/ External

TQ

Injection Tower

Name:

7693A

Source:

EI - Extractor

Setpoint Status:

Completed

Injection Volume on Column:

1.0

uL

**Overall Scouting Run Status**

Completed

---

**Instrument Detection Limit**

Tested Combination1

Front

MMI

/ External

TQ

Injection Tower

Name:

7693A

Source:

EI - Extractor

Date:

May 25, 2023 11:05:07 AM

System ID:

GM-10

## Setpoint Status:

Pass

Injection Volume on Column:

1.0 uL

Area

Retention Time

Minimum RSD:

10.98 %

0.05 %

Agilent Recommended:

&lt;= 12.00

&lt;= 1.00

Status:

Pass

Pass

Instrument Detection Limit:

3.69552 fg

Agilent Recommended:

&lt;= 4.03800

Status:

Pass

## Overall Instrument Detection Limit Test Status

Pass

## Mass Ratio Precision

Tested Combination1

Front

MMI

/ External

TQ

Injection Tower

Name:

7693A

Source:

EI - Extractor

## Setpoint Status:

Pass

Injection Volume on Column:

1.0 uL

Area Mass 1

Mass Ratio

Abundance\*s

RSD:

3.22 %

4.06 %

Agilent Recommended:

&lt;= 5.00

&lt;= 5.00

Pass

Pass

## Overall Mass Ratio Precision Test Status

Pass

Date:

May 25, 2023 11:05:07 AM

System ID:

GM-10

## Instrument Details

### Purpose

This section describes the as found system configuration.

### Details

#### System

System ID	GM-10
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

#### Tested Combination1

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

#### Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN18180003
Firmware Revision	A.11.02
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10



## Sampler 2

Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN18170137
Firmware Revision	A.11.03
Vial Heater	Not installed

## Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3442B
Serial Number	CN18153080
Firmware Revision	B.02.05
Oven Type	Standard

## Inlet 1

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

## Inlet 2

Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Back
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	TQ
Name	7000D
Serial Number	US1826U108
Firmware Revision	G.7000.085A
High Vacuum System	Turbo Pump
Scouting Run Standard	OFN Std

## 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:	Nattapat Hengcharoen
Logged On User Name:	nattapat.hengcharoen@agilent.com
Signature Creation Date:	May 25, 2023
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: nattapat.hengcharoen  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: May 25, 2023 11:05:08 AM

## ALS\_GM-10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 22, 2023 1:32:30 PM	Audit	SessionCreated	Session	None
May 22, 2023 1:32:30 PM	Start	Configuration	Session	None
May 22, 2023 1:32:30 PM	Audit	Entitlement	Licensing	User is FieldEngineer and does not require an unlock code
May 22, 2023 1:37:48 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], Protocol Revision :[Gc.02.52] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.51/GcMs.02.51.eqp], EQP File Name: [GcMs.02.51.eqp], EQP Name: [AgilentRecommended]
May 22, 2023 1:37:52 PM	End	Configuration	Session	None
May 22, 2023 1:37:55 PM	Start	Qualification	Session	OQ
May 22, 2023 1:37:55 PM	Start	Execution	CDS Logon Verification - GC : - Qualitative test	None
May 22, 2023 2:02:27 PM	Start	Execution	CDS Logon Verification - GC : - Qualitative test	None
May 22, 2023 2:02:33 PM	Start	Execution	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	None



User Name: nattapat.hengcharoen  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: May 25, 2023 11:05:08 AM

## ALS\_GM-10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 22, 2023 2:02:37 PM	Start	Execution	CDS Logon Verification - GC : - Qualitative test	None
May 22, 2023 2:03:33 PM	End	Execution	CDS Logon Verification - GC : - Qualitative test	Run Count : 1
May 22, 2023 2:34:48 PM	Start	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	None
May 22, 2023 2:35:02 PM	End	Execution	System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated	Run Count : 1
May 22, 2023 2:35:17 PM	Start	Execution	Inlet Pressure Accuracy - Front MMI: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
May 22, 2023 2:35:22 PM	End	Execution	Inlet Pressure Accuracy - Front MMI: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
May 22, 2023 2:35:24 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
May 22, 2023 2:35:48 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
May 22, 2023 2:35:54 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

User Name: nattapat.hengcharoon  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: May 25, 2023 11:05:08 AM

## ALS\_GM-10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 22, 2023 2:35:55 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
May 22, 2023 2:59:09 PM	Start	Execution	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	None
May 22, 2023 3:08:09 PM	Start	Execution	Scouting Run - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None
May 22, 2023 3:10:34 PM	Start	Execution	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	None
May 22, 2023 3:12:01 PM	Start	Execution	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): <= 5.00%	None
May 22, 2023 3:17:49 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
May 22, 2023 3:17:55 PM	Start	Execution	GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
May 22, 2023 3:18:05 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

User Name: nattapat.hengcharoen  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: May 25, 2023 11:05:08 AM

## ALS\_GM-10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 22, 2023 3:18:07 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
May 22, 2023 3:39:07 PM	Start	Execution	Scouting Run - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None
May 22, 2023 3:39:10 PM	Start	Execution	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	None
May 22, 2023 4:02:59 PM	Start	Execution	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	None
May 22, 2023 4:03:06 PM	Start	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
May 22, 2023 4:03:52 PM	Audit	Data	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
May 22, 2023 4:03:54 PM	End	Execution	GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
May 23, 2023 3:58:15 PM	Audit	AceClosed	Session	None
May 24, 2023 4:03:19 PM	Audit	AceRestarted	Session	None
May 24, 2023 4:14:45 PM	Audit	AceClosed	Session	None
May 25, 2023 10:13:57 AM	Audit	AceRestarted	Session	None
May 25, 2023 10:27:12 AM	Audit	SessionReloaded	Session	None

User Name: nattapat.hengcharoen  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: May 25, 2023 11:05:08 AM

## ALS\_GM-10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 25, 2023 10:27:13 AM	Start	Qualification	Session	OQ
May 25, 2023 10:27:16 AM	Start	Execution	Tune EI - 7000D TQ: - Source: - None EI - Extractor Filament 1 (Qualitative - No setpoints associated)	
May 25, 2023 10:27:42 AM	Start	Execution	Tune EI - 7000D TQ: - Source: - None EI - Extractor Filament 1 (Qualitative - No setpoints associated)	
May 25, 2023 10:27:56 AM	End	Execution	Tune EI - 7000D TQ: - Source: - Run Count : 1 EI - Extractor Filament 1 (Qualitative - No setpoints associated)	
May 25, 2023 10:27:57 AM	Start	Execution	Tune EI - 7000D TQ: - Source: - None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
May 25, 2023 10:28:07 AM	End	Execution	Tune EI - 7000D TQ: - Source: - Run Count : 1 EI - Extractor Filament 2 (Qualitative - No setpoints associated)	
May 25, 2023 10:28:08 AM	Start	Execution	Scouting Run - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None
May 25, 2023 10:28:17 AM	Start	Execution	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	None
May 25, 2023 10:28:20 AM	Start	Execution	Scouting Run - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor- Part of GCMS System Preparation	None



User Name: nattapat.hengcharoen  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: May 25, 2023 11:05:08 AM

## ALS\_GM-10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 25, 2023 10:28:58 AM	Audit	Data	Scouting Run - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor- Part of GCMS System Preparation	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ_2023\ISQ_01.D
May 25, 2023 10:29:24 AM	End	Execution	Scouting Run - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor- Part of GCMS System Preparation	Run Count : 1
May 25, 2023 10:29:25 AM	Start	Execution	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	None
May 25, 2023 10:30:00 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ_2023\IDL_001.D
May 25, 2023 10:30:00 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ_2023\IDL_002.D
May 25, 2023 10:30:00 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ_2023\IDL_003.D
May 25, 2023 10:30:00 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\OQ_2023\IDL_004.D

User Name: nattapat.hengcharoen  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: May 25, 2023 11:05:08 AM

## ALS\_GM-10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 25, 2023 10:30:00 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\IQ_2023\IDL_005.D
May 25, 2023 10:30:00 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\IQ_2023\IDL_006.D
May 25, 2023 10:30:00 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\IQ_2023\IDL_007.D
May 25, 2023 10:30:00 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\IQ_2023\IDL_008.D
May 25, 2023 10:30:00 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\IQ_2023\IDL_009.D
May 25, 2023 10:30:01 AM	Audit	Data	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\IQ_2023\IDL_010.D
May 25, 2023 10:30:19 AM	End	Execution	Instrument Detection Limit - Injection Tower, Front MMI, TQ: - Source: - EI - Extractor - RSD L (Area): <= 12.00% - RSD L (Ret. Time): <= 1.00%	Run Count : 1

User Name: nattapat.hengcharoen  
 Hostname: ASBKKWX265

System Id: GM-10  
 Print Date: May 25, 2023 11:05:08 AM

## ALS\_GM-10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 25, 2023 10:30:22 AM	Start	Execution	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): ≤ 5.00%	None
May 25, 2023 10:30:49 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): ≤ 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\IQ_2023\MRP_01.D
May 25, 2023 10:30:49 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): ≤ 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\IQ_2023\MRP_02.D
May 25, 2023 10:30:49 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): ≤ 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\IQ_2023\MRP_03.D
May 25, 2023 10:30:49 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): ≤ 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\IQ_2023\MRP_04.D
May 25, 2023 10:30:49 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): ≤ 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\IQ_2023\MRP_05.D
May 25, 2023 10:30:49 AM	Audit	Data	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): ≤ 5.00%	Data files Path : D:\MassHunter\GCMS\1\data Agilent\IQ_2023\MRP_06.D
May 25, 2023 10:30:57 AM	End	Execution	Mass Ratio Precision - Injection Tower, Front MMI, TQ: - Source: EI - Extractor - L (RSD): ≤ 5.00%	Run Count : 1
May 25, 2023 10:31:02 AM	End	Qualification	Session	OQ

User Name: nattapat.hengcharoen  
Hostname: ASBKKWX265

System Id: GM-10  
Print Date: May 25, 2023 11:05:08 AM

## ALS\_GM-10 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
May 25, 2023 10:31:02 AM	Start	Reporting	Session	None
May 25, 2023 11:04:34 AM	Audit	Reporting	Session	Report Generated : Certificate





From Insight to Outcome

## Agilent CrossLab Start Up Services

### Agilent 5100 5110 ICP-OES Preventive Maintenance

REVIEW BY	<i>Chamath L.</i>
APPROVED BY	<i>Savitha M.</i>
NEXT CAL. DATE	<i>01/03/24</i>

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.

## Introduction

### Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.
- For customers using HF applications, the instrument should be returned to its standard sample introduction system.

## Important Customer Web Links

- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
  - Sample Prep and Containment
  - Chemical Standards
  - Analysis
  - Service and Support
  - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- **Need to place a service call?** [Flexible Repair Options | Agilent](#)

## Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check **"Service not applicable"** check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the **Service Review** section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Completion section
- **Ask the customer to sign the Service Verification section including the customer's and your signature.**



## Instrument Maintenance

### System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	G8010A ; MY16010005
Instrument System Site and Location	ALS C BKK

List System Component Product Numbers	List the Serial Numbers of each Component
1. G8010A	MY16010005
2. G8410A	AU15440764
3. G3292	2008-00159
4. G8485	AU16040115
5.	
6.	
7.	
8.	
9.	

ICP-OES Configuration Table	Circle the type or write in the type if other
Nebulizer Type	<u>SeaSpray</u>   OneNeb   Conikal   Other
Spray Chamber	<u>Cyclonic Single Pass</u>   Cyclonic Double Pass   Other
Torch	Radial   <u>Dual View</u>   Other
Torch Type	<u>One Piece</u>   Semi Demountable   Fully Demountable   Other
Injector Diameter	2.4mm   <u>1.8mm</u>   1.4mm   0.8mm   Other
Injector Material	<u>Quartz</u>   Ceramic   Other

## Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and implementation of Service Notes
- ☒ Check for required firmware/software updates and verify with customers if they would like them installed.
- ☒ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it.
- ☐ Ask the customer to remove any samples from the ICP-OES sample introduction area, auto sampler or around the ICP-OES.

## Preventive Maintenance Procedures

### Record Pre-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table – Pre-PM.

### Clean and inspect ICP-OES system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments.
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☒ Replace high capacity air inlet dust filter element if installed.
- ☒ Remove and clean instrument water inlet filter.

### Agilent Water Recirculator

- ☐ **Service not applicable**
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter if present.
- ☒ Re fill with Agilent Cool Clear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser.



## SPS 3 Auto Sampler

☒ **Service not applicable**

- ☐ Power cycle the autosampler and verify successful initialization.
- ☐ Inspect X and Z axis belts for wear. Replace is necessary.
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

## SPS 4 Auto sampler

☐ **Service not applicable**

- ☒ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☒ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner.
- ☒ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☒ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☒ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles
- ☒ Test using customer's tray and move the sample probe to the sample vial 1, wash vial and rinse port and ensure that the probe is centered in the vial. If not use calibration wizard and calibrate the position.

## AVS 4, 6, 7 Advanced Valve System

☐ **Service not applicable**

- ☒ Replace valve rotor seal — *inspect*
- ☒ Check fittings for signs of leaks
- ☒ Check tubing including autosampler tubing for kinks or excessive wear
- ☒ Check high flow pump for signs of leaks

## ICP-OES adjustment

- ☒ Check position of Zn peak, adjust if required.
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.

## Record Post-PM instrument performance

- ☒ Run Instrument Performance test.
- ☒ Record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above, run the following Instrument tests
  - ☒ Subsystem Communications Test
  - ☒ Air Flow
  - ☒ Water Flow
  - ☒ Gas Flows
  - ☒ RF Generator
  - ☒ Camera Test
  - ☒ Optics Test
  - ☒ Nebulizer Test
- ☒ Record the result in the Instrument Test Results Table



## Restore Instrument

- ☐ For HF applications, ask the customer to reinstall their sample introduction system.
- ☒ Leave system in an idle state: on and purging.
- ☒ Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

## Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☐ **Complete the Signature Page with both Service Engineer and Customer signatures.**

## Test Results

### Instrument Performance Test Results Table

Note: These measurements do not form part of any specification and are for reference only.

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial *	Radial	Axial*
Zn 213.857 nm SRBR	37,603.8	146,365.1	37,348.7	164,359.5
Mn 257.610 nm SRBR	153,638.7	670,560.3	159,750.0	717,496.1
Al 396.152 nm SBR	28,883.5	200,141.7	28,985.9	196,402.0
K 766.491 nm SBR	99,616.7	3,151,227.8	99,388.4	2,863,954.9

\* Axial result is not applicable for G8016AA, G8012AA Radial View instruments.

### Instrument Test Results Table

Note: The Instrument Test results are for systems using ICP Expert version 7.3 and above only.

Instrument Test	Result
Subsystem Communications Test	Pass
Air Flow	Pass
Water Flow	Pass
Gas Flows	Pass
RF Generator	Pass
Camera Test	Pass
Optics Test	Pass
Nebulizer test	Pass

## ICP-OES Status Results Table

Note: These measurements do not form part of any specification and are for reference only.

Measurement	Standby Mode		Plasma On	
Mains Voltage	218.378	VAC	215.135	VAC
Mains Current	0.217	A	0.116	A
Instrument Temperature	24.4	°C	24.3	°C
RF Air Flow (sensor speed)	16.0	Hz	20.0	Hz
Plasma Exhaust Temperature	No measurement		47.3	°C
Water Flow Oscillator	No measurement		1.20	L/min
Water Flow Detector	1.12	L/min	1.09	L/min
Water Inlet Temperature	23.0	°C	23.5	°C
Polychromator Temperature	35.0	°C	35.0	°C
CCD Temperature	-40.0	°C	-40.0	°C
Thermal Stabilizer	34.8	°C	35.0	°C
Argon Supply Pressure	613.73	kPa	541.92	kPa
Purge Gas Supply Pressure*1	609.38	kPa	567.77	kPa
Option Gas Supply Pressure*1	—	kPa	—	kPa
Nebulizer Flow	No measurement		0.70	L/min
Nebulizer Back Pressure	No measurement		255.76	kPa
Plasma Gas Flow	No measurement		11.98	L/min
Auxiliary Gas Flow	No measurement		1.0	L/min
RF Power	No measurement		1199.9	W
RF Supply Current	No measurement		8.227	A
RF Supply Voltage	No measurement		194.422	V

\*1 If option installed



## Consumed PM Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
Axial Pre-Optic Window	G8010-68014	G8010A, G8011A, G8014A/G8015A	1
Radial Pre-Optic Window	G8010-68015	All	1
Agilent Cool Clear Coolant Fluid	5799-0037	Agilent Water Recirculator	1
Purge Gas Filter	G8010-60136	All	1
Air inlet filter	G8000-68002	All	1
High Capacity Air Filter	G8010-60189	Optional	1
Rotor seal for 6-7 port valve for AVS6/7	G8494-60002	G8494A/G8495	1
Rotor seal for 4 port valve for AVS4	G8493-60002	G8493A	1
Rinse solution to rinse station 2.5mm id x 1m	G8410-80123	SPS 4	1
Barb connector 2.5mm-1.5mm ID	G8410-80124	SPS 4	1
PVC waste tubing, 8mm od x 5mm id, 2m	G8410-80122	SPS 4	1
<b>Additional Parts may be required from engineer's stock:</b>			
X axis drive belt	5410047500	SPS 3	1
Z axis drive belt	5410047400	SPS 3	1
Peristaltic pump tubing, PVC SolvaFlex, 3 bridged,	3710049000	SPS 4	1

## Consumed Parts Reference (Purchased by customer, not included as part of PM)

☐ Section Not Applicable.

Part Description	Part Number	Product or Model# where used	Quantity consumed

## Signature Page

### Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

- During PM found water tubing in instrument broken then water leaking inside instrument.
- Replace all water tube inside instrument, after replace found water flow sensor water leak also.
- Replace water module and continue PM without deviation.

## Service Verification

Service Request Number: 6005833474

Date Service Completed: 2 - Mar - 2023

Service Engineer Name: Burin Ngamvijit

Customer Name: Thitima Boonpeng

Service Engineer Signature: Burin Ng.

Customer Signature: Thiti ma. B.

Total number of pages in this document:





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.: 22CH1222

Page.: 1 of 2

## Certificate of Calibration

Equipment :	pH Meter
Manufacturer :	Mettler Toledo
Model :	Seven Compact S220
Serial No. :	B520948426
ID No. :	BKK_EN0072
Condition As-Received:	Used Item
Received Date :	09 September 2022
Calibration Date :	12 September 2022
Reference :	2209-0312DSC-1
Submitted by :	ALS Laboratory Group (Thailand) Co.,Ltd. 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 15) %
Calibration Procedure :	In - house method : - CP-CH5 by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM)

REVIEW BY	Sinluk P.
APPROVED BY	KL AL
NEXT CAL. DATE	12/03/24

Calibrated by : Warakorn Lerngagtrakul

Approved by :

*Malee*

Approved Signatory

- ( ☒ ) Malee Butkruea  
( ☐ ) Saithip Meangmai  
( ☐ ) Warakorn Lerngagtrakul

Issue Date : 15 September 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.



Cert. No.: 22CH1222

Page.: 2 of 2

**Condition of this calibration result**

## 1. Reference Standard Instrument : -

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	54030049	130RC116	22E2769	24 Aug 2023

This certification is traceable to the International System of Unit maintained at:-

- Traceable to National Institute of Metrology (Thailand), NIMT

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

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.008	CPA chem	823320	20 June 2024
pH 6.985	CPA chem	794122	14 Feb 2023
pH 10.008	CPA chem	823323	20 June 2023

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

**Calibration Results****Function : mV Measurement****Performing standard curve by Fluke at pH (4,7,10)**

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement ( $\pm$ mV)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter S/N.: B520948426	4.000	177.48	177.4	4.000	0.058	2.00
	7.000	0.00	0.0	7.000	0.058	2.00
	10.000	-177.48	-177.5	10.000	0.058	2.00

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement ( $\pm$ )	Coverage factor <i>k</i>
pH Electrode S/N.: PCE-86-EX1001	4.008	3.999	153.9	0.0055	2.09
	6.985	7.017	-13.7	0.0084	2.00
	10.008	9.996	-179.0	0.0078	2.06

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 1126274

**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	<u>Sirilut P.</u>
APPROVED BY	<u>LL AL</u>
NEXT CAL. DATE	<u>8/2/24</u>

Model Number : MSE224S-100-DUDescription : Analytical BalanceSerial Number : 26207042ID No. : BKK\_EN0002Manufacturer : SartoriusCertificate No. : 23BCI0072Issued Date : Monday, February 13, 2023Reference No. : 203245Page No. : 1 of 2Customer Name : ALS Laboratory Group (Thailand)Co., Ltd.104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250.Calibrated Place : Balance RoomCalibrated By : Mr. Chonchai InthanaCalibration Date : Wednesday, February 08, 2023**Calibration**Procedure No. : This calibration was conducted by  
Using 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 : 23.2 °C ± 5.0 °CHumidity : 60.0 % RH ± 10.0 % 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 expended 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 - 5000g E2, YCS011-522-00	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.

SOP FM 33 03 February 2022

  
Mr. Chonchai Inthana (Technical Manager)S  
T  
A  
M  
P

# Certificate of Calibration

Model Number : MSE224S-100-DU  
 Description : Analytical Balance  
 Serial Number : 26207042  
 ID No. : BKK\_EN0002  
 Manufacturer : Sartorius

Certificate No. : 23BCI0072Issued Date : Monday, February 13, 2023Reference No. : 203245Page No. : 2 of 2

## Calibration Results : Without Adjustment

### Repeatability

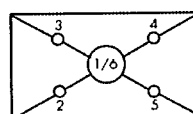
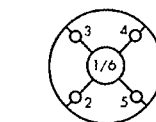
The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.

Nominal Value : (Low Load)	20.0000	200.0000
20 g	20.0000	199.9999
Tolerance	20.0000	200.0000
0.0001 g	20.0000	199.9999
	20.0001	200.0000
	20.0000	200.0000
Nominal Value : (High Load)	20.0000	199.9999
200 g	20.0000	199.9999
Tolerance	20.0000	200.0000
0.0001 g	20.0000	199.9999
	20.0001	199.9999
Standard Deviation	0.00004	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	0.0001
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	0.00014
0.1	0.1000	0.1000	0.0000	0.00014
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	199.9999	-0.0001	0.00030

End of Report.



**Scientist  
Instrument**

REVIEW BY *P. Swinyaring*  
APPROVED BY *Santana N.*  
NEXT CAL. DATE *30/11/23*

## Performance Verification Certificate

**for Mercury Analyzer**

**Product ID** *Quicktrace M-8000 , Teledyne Leeman Labs*

**Equipment ID** *BKK\_EL0128 Mercury Analyzer*  
S/N: US22133002

*BKK\_EL0129 Autosampler*  
S/N: 052222A560

**Customer Name** *ALS Laboratory Group (Thailand) Co., Ltd.*  
**Address** *104 Soi Pattana 40, Pattana Rd. Suan Luang, Suan Luang*  
*Bangkok 10250 Thailand*

**Date of Qualified** *November 30, 2022*  
**Next Due date** *November 30, 2023*

This certifies for products which was performed in acceptable criteria specifications

<b>Autosampler &amp; Sample Introduction</b>	<b>PASSED</b>
<b>Analyzer</b>	<b>PASSED</b>
<b>Gas Liquid Separator &amp; Dryer</b>	<b>PASSED</b>
<b>CVFS Detector</b>	<b>PASSED</b>
<b>Electronics/Mechanical</b>	<b>PASSED</b>
<b>Data station/PC</b>	<b>PASSED</b>
<b>Analytical test</b>	<b>PASSED</b>

**Provided by**

**Scientist Instrument Co.,Ltd.**  
113 Soi Ekachai 44, Ekachai Road  
Khlong Bang Phran, Bangbon  
Bangkok 10150 Thailand

**Certified by** *Thunraphol Sakdayos*

**Thunraphol Sakdayos**

**Service Engineer**