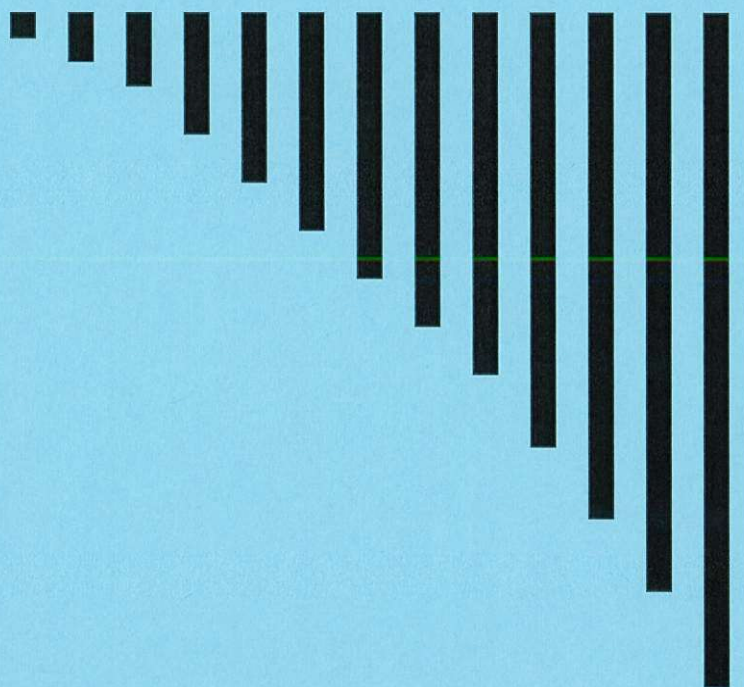


ภาคผนวก ง

สำเนาใบรับรองการสอบเทียบเครื่องมือตรวจวัด



Mettler-Toledo (Thailand) Ltd.  
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District  
Bangna District, Bangkok 10260  
+662 723 0382  
MT-TH.ServiceSupport@mt.com



## Accuracy Calibration Certificate

### Customer

Company: SGS (THAILAND) CO.,LTD.  
Address: 1/209,1/211 Moo 1, Ban Chang  
City: Ban Chang Contact: Hatairat Linjee  
Zip / Postal: 21130  
State / Province: Rayong  
Order Number: 0 3 3 2 7 1 0 0 6 1

### Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument  
Model: XS205DU Asset Number: N/A  
Serial No.: B036065880 Terminal Model: SAT  
Building: LABORATORY Terminal Serial No.: B036065880  
Floor: 1 Terminal Asset No.: N/A  
Room: BalanceLab

Range	Max. Capacity	Readability (d)
1	81 g	0.00001 g
2	220 g	0.0001 g

### Procedure

Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)

METTLER TOLEDO Work Instruction: CP/W002/20

This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.

The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.

In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature		Humidity	
As Found	Start: 20.1 °C	End: 19.9 °C	Start: 71.6 %	End: 60.2 %

As Found Calibration Date: 14-Mar-2023

Calibrator:

As Left Calibration Date: N/A

Issue Date: 15-Mar-2023

Approved Signatory:

Technical Manager / Head of Calibration Center

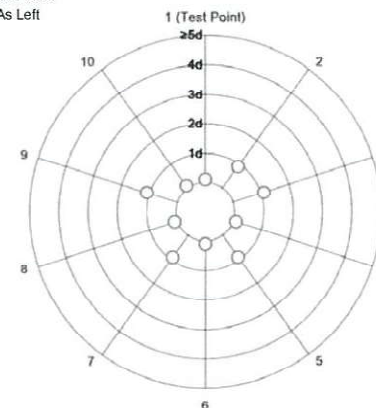
## Measurement Results

### Repeatability

Test Load: 70 g

	As Found	As Left
1	70.00005 g	N/A
2	70.00004 g	N/A
3	70.00006 g	N/A
4	70.00005 g	N/A
5	70.00004 g	N/A
6	70.00005 g	N/A
7	70.00004 g	N/A
8	70.00005 g	N/A
9	70.00006 g	N/A
10	70.00005 g	N/A

○ As Found  
◆ As Left



The "d" in the graph represents the readability of the range/interval in which the test was performed.

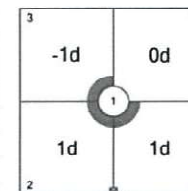
The results of this graph are based upon the absolute values of the differences from the mean value.

Standard Deviation	0.000007 g	N/A
--------------------	------------	-----

### Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	100.0000 g	N/A
2	100.0001 g	N/A
3	99.9999 g	N/A
4	100.0000 g	N/A
5	100.0001 g	N/A



Maximum Deviation	0.0001 g	N/A
-------------------	----------	-----

As Found

The "d" in the graph represents the readability of the range/interval in which the test was performed.

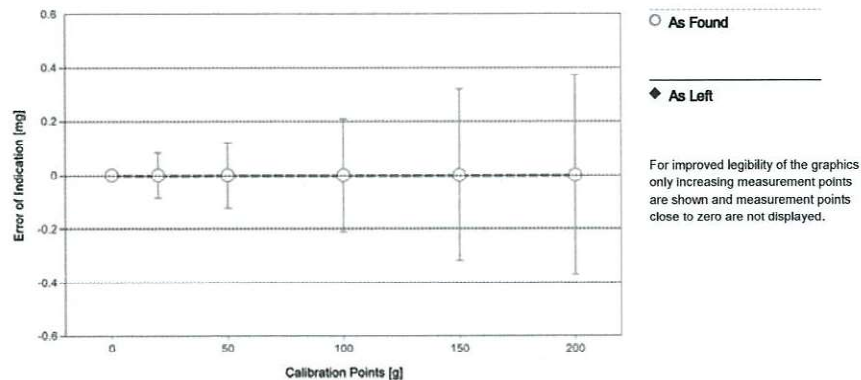


## Error of Indication

### As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.00000 g	0.016 mg	2
2	0.01000 g	0.01000 g	0.00000 g	0.018 mg	2
3	0.10000 g	0.10000 g	0.00000 g	0.022 mg	2
4	0.99999 g	0.99998 g	-0.00001 g	0.032 mg	2
5	4.99998 g	4.99997 g	-0.00001 g	0.048 mg	2
6	9.99999 g	10.00000 g	0.00001 g	0.061 mg	2
7	20.00000 g	20.00000 g	0.00000 g	0.082 mg	2
8 <sup>1</sup>	50.00005 g	50.00005 g	0.00000 g	0.12 mg	2
9	100.0001 g	100.0001 g	0.0000 g	0.21 mg	2
10	150.0001 g	150.0001 g	0.0000 g	0.32 mg	2
11	200.0001 g	200.0001 g	0.0000 g	0.37 mg	2

<sup>1</sup>The calculated uncertainty was replaced by the CMC (Calibration and Measurement Capabilities) value because the calculated uncertainty was smaller than the CMC value.



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor  $k$  – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95 %.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

## Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

### Weight Set 1: OIML E2

Weight Set No.: WS28 Date of Issue: 01-Apr-2022  
Certificate Number: 178498 Calibration Due Date: 17-Sep-2023

### Thermo Hygrometer

Equipment No.: IN51 Date of Issue: 17-Feb-2023  
Certificate Number: SG-H-00144/66 Calibration Due Date: 15-Feb-2024

## Remarks

FACT adjustment functionality activated

Equipment condition: Good

Next calibration according to customer's procedure

Calibration data not decide by calibration laboratory

### End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

## Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with  $k=2$  in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value  $R$  represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use:  $1.5 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use:  $5 K$

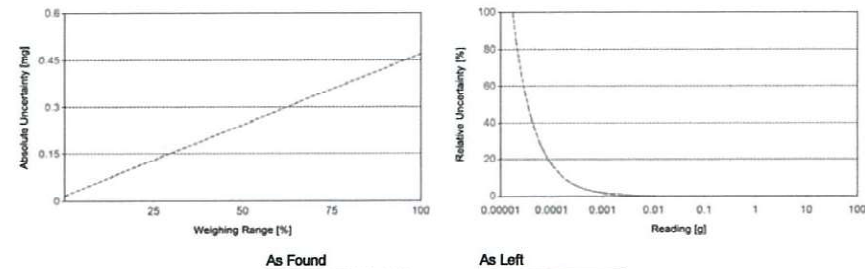
### Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.00001 g	81 g	$U_1 = 0.017 \text{ mg} + 0.00560 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	220 g	$U_2 = 0.06 \text{ mg} + 0.00554 \text{ mg/g} \cdot R$	N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

### Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found		As Left	
0.00220 g	0.017 mg	0.77%	N/A	N/A
0.02200 g	0.017 mg	0.078%	N/A	N/A
0.22000 g	0.018 mg	0.0083%	N/A	N/A
2.20000 g	0.029 mg	0.0013%	N/A	N/A
220.0000 g	1.3 mg	0.00058%	N/A	N/A



The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.

# GWP® Certificate



As  
Found



As  
Left



The weighing device meets the given process requirements.

The weighing device meets the given process requirements.

Tests Performed: ☒ As Found ☐ As Left ☒ No adjustments/modifications made. As Left results correspond to As Found.

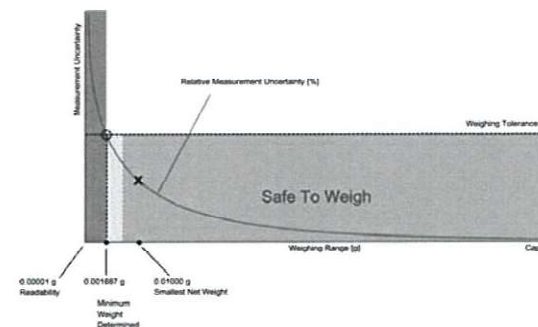
## Process Requirements

Weighing Tolerance: **1%**

Smallest Net Weight: **0.01000 g**

Safety Factor: **2**

### Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.



## Minimum Weight

## As Found Minimum Weight Table

## Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.016961 g	0.034113 g	0.051461 g	0.086758 g	0.178664 g
0.2%	0.008456 g	0.016961 g	0.025513 g	0.042763 g	0.086758 g
0.5%	0.003377 g	0.006761 g	0.010153 g	0.016961 g	0.034113 g
1%	0.001687 g	0.003377 g	0.005068 g	0.008456 g	0.016961 g
2%	0.000844 g	0.001687 g	0.002532 g	0.004222 g	0.008456 g
5%	0.000337 g	0.000675 g	0.001012 g	0.001687 g	0.003377 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

## As Left Minimum Weight Table

## Range 1

Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.016961 g	0.034113 g	0.051461 g	0.086758 g	0.178664 g
0.2%	0.008456 g	0.016961 g	0.025513 g	0.042763 g	0.086758 g
0.5%	0.003377 g	0.006761 g	0.010153 g	0.016961 g	0.034113 g
1%	0.001687 g	0.003377 g	0.005068 g	0.008456 g	0.016961 g
2%	0.000844 g	0.001687 g	0.002532 g	0.004222 g	0.008456 g
5%	0.000337 g	0.000675 g	0.001012 g	0.001687 g	0.003377 g

The minimum weight table applies to the fine range of the weighing device.

✓ Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with  $k = 2$  and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

## Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

## Measurement Results

## Results Summary

	Repeatability	Eccentricity	Error of Indication
As Found	✓	✓	✓
As Left	✓	✓	✓

✓ = Passed

✗ = Failed

⚠ = Safety Factor not met

## Repeatability

Test Load: 70 g

Tolerance	Control Limit	As Found		As Left	
		Std. Deviation	Result	Std. Deviation	Result
0.1%	0.000005 g	0.000007 g	✗	0.000007 g	✗
0.2%	0.000010 g		✓		⚠
0.5%	0.000025 g		✓		✓
1%	0.000050 g		✓		✓
2%	0.000100 g		✓		✓
5%	0.000250 g		✓		✓

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

## Eccentricity

Test Load: 100 g

Tolerance	Control Limit	As Found		As Left	
		Deviation	Result	Deviation	Result
0.1%	0.0500 g	0.0001 g	✓	0.0001 g	✓
0.2%	0.1000 g		✓		✓
0.5%	0.2500 g		✓		✓
1%	0.5000 g		✓		✓
2%	1.0000 g		✓		✓
5%	2.5000 g		✓		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

Error of Indication

As Found

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A
20.00000 g	0.00000 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g
50.00005 g	0.00000 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g
100.0001 g	0.0000 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	0.0000 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0001 g	0.0000 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

As Left

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A
20.00000 g	0.00000 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g
50.00005 g	0.00000 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g
100.0001 g	0.0000 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0001 g	0.0000 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0001 g	0.0000 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.





## Certificate of Calibration

**Equipment:** CONDUCTIVITY METER  
**Model:** HQ14d  
**Serial No. (or ID.):** 141200015083 (C2015003)  
**Manufacturer:** HACH  
**Electrode Serial No.** 150122587009  
**Condition:** In Condition

**Certificate No.:** C24230047  
**Issued Date:** 8 March 2023  
**Job No.:** KSPR2303450  
**Page:** 1 of 2  
**Model :** CDC401 **Brand :** HACH

**Customer:** SGS (THAILAND) CO., LTD.  
 1/209, 1/211 Moo 1, Tambol Banchang,  
 Amphur Banchang, Rayong 21130 Thailand

**Environment Condition:** Temperature 23 °C ± 2 °C  
 Humidity 50 %RH ± 15 %RH

**Calibration Place:** Environment Laboratory, DKSH Technology Limited.  
 2533 Sukhumvit Road, Bangchak,  
 Phrakhanong, Bangkok 10260 Thailand

**Calibration By:** Miss.Orawan Khlaiphloi  
**Calibration Date:** 8 March 2023  
**The Method used:** In house method, CAL-WI-49, base on ASTM D 1125-14 and D 5391-14  
**Traceability:** This certificate is traceable to the SI Units maintained by CRM of NIST(SRM) through CPA chem Co., Ltd. (ISO/IEC 17034) Certificate No. 838312, 838313, 838316



Person in charge



Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

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).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

บริษัท ดีเคเอส อีเซีย จำกัด  
 DKSH Technology Limited  
 2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260  
 2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260  
 Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth – in Asia and Beyond.

CAL-FM-C24-09: 12 Sep 2022

Certificate No.: C24230047

Page: 2 of 2

### Calibration Results:

#### Before Adjustment

Standard Conductivity Solution	Unit Under Calibration Reading	Correction	Coverage Factor ( k )	Uncertainty ( ± )
25.000 $\mu\text{S/cm}$	24.8 $\mu\text{S/cm}$	0.200 $\mu\text{S/cm}$	2.00	0.21 $\mu\text{S/cm}$
1413.0 $\mu\text{S/cm}$	1422 $\mu\text{S/cm}$	-9.0 $\mu\text{S/cm}$	2.00	9.0 $\mu\text{S/cm}$
111.3 mS/cm	110.6 mS/cm	0.70 mS/cm	2.00	0.67 mS/cm

#### After Adjustment ; at 1413 $\mu\text{S/cm}$

Standard Conductivity Solution	Unit Under Calibration Reading	Correction	Coverage Factor ( k )	Uncertainty ( ± )
25.000 $\mu\text{S/cm}$	25.1 $\mu\text{S/cm}$	-0.100 $\mu\text{S/cm}$	2.00	0.21 $\mu\text{S/cm}$
1413.0 $\mu\text{S/cm}$	1413 $\mu\text{S/cm}$	0.0 $\mu\text{S/cm}$	2.00	9.0 $\mu\text{S/cm}$
111.3 mS/cm	109.9 mS/cm	1.40 mS/cm	2.00	0.67 mS/cm

The End of Certificate

บริษัท ดีเคเอส อีเซีย จำกัด  
 DKSH Technology Limited  
 2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260  
 2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260  
 Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth – in Asia and Beyond.

CAL-FM-C24-09: 12 Sep 2022

## ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: KSPR2303450

ชนิดเครื่องมือ: CONDUCTIVITY METER

รุ่น: HQ14d

หมายเลขเครื่อง: 141200015083

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
08 Mar 2023			08 Mar 2023		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด ( ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด - เปิด เครื่อง (On-Off Swicth)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		Spectrophotometer			
<input type="checkbox"/>	<input type="checkbox"/>	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	<input type="checkbox"/>	<input type="checkbox"/>	
		pH Meter and Conductivity Meter			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด ( Electrode and Connection Cable )	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl )	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาจับอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
		Turbidimeter			
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (>= 2.5 ไม่นเกิน 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
		Automatic titrator			
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาพ Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ : Electrode วัดอุณหภูมิได้ 24.8 °C โดย Control Waterbath ที่ 25.0  $\pm$  0.1 °C

Miss.Orawan Khlaiphloi

Service Engineer



## **SGS (Thailand ) limited Rayong**

Automatic Mercury Analyzer

Model RA-4500

Preventive Maintenance Report

Serial No. RA-4500 : 14780131

Date : 6 FEBRUARY 2023

Next due Date : AUGUST 2023

PM by :

Approved by :



**Coax Group Corporation Ltd.**

1131/62, 64, 325-331 Nakornchaisri road,

Kwang ThanonNakornchaisri, Dusit, Bangkok 10300 Thailand

Tel. 02-2435263, 02-6682436 Fax. 02-2437386



NIC Mercury Analyzer Model: RA-4500

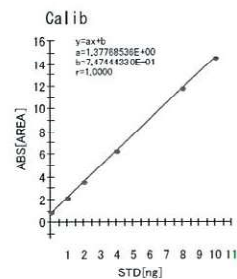
### Inspection result

ITEM	STANDARD		RESULT	JUDGE
1. Self Check	1.1	Heating	PASS	OK
	1.2	Cooling	PASS	OK
	1.3	Leak	PASS	OK
	1.4	Optical system	PASS	OK
	1.5	Drift	PASS	OK
2. Analytical curve inspection(AREA)				
2.1	No Pretreatment (Low Conc.)	Correlation coefficient	1.0000	OK
			( r ) ≥ 0.9990	
3. Repeatability (AREA)				
3.1	No Pretreatment 100ppb, n=5	1.	98.082	ppb
		2.	104.050	ppb
		3.	102.668	ppb
		4.	103.888	ppb
		5.	102.666	ppb
		C.V. ≤ 5%	2.38%	OK
4. Blank				
		Below1.0(AREA)	0.7855	OK

Title : Preventive Maintenance RA-4500 SN:14780131  
 Date : 6/2/2566  
 Name : Coax Group  
 Memo : Calibration Curve 0-10 ng

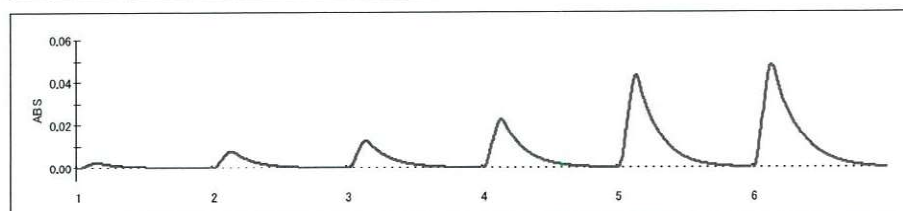
## Method

Method1 (Pretreatment: without)  
 (1+1) H<sub>2</sub>SO<sub>4</sub> : 0.9mL  
 10w/v% SnCl<sub>2</sub> : 0.5mL  
 Measurement Time (sec) : 120sec



## STD

No.	STD [ug/L]	SVOL [mL]	CVOL [mL]	DVOL [mL]	STD [ng]	AREA [ON]	MEAS [ng]	Dev [%]	Note
1	100.000	0.000	5.000	5.000	0.000	0.7855	0.0276	-	
2	100.000	0.010	5.000	5.000	1.000	2.1365	1.0083	0.8	
3	100.000	0.020	5.000	5.000	2.000	3.4693	1.9757	1.2	
4	100.000	0.040	5.000	5.000	4.000	6.2303	3.9798	0.5	
5	100.000	0.080	5.000	5.000	8.000	11.7452	7.9828	0.2	
6	100.000	0.100	5.000	5.000	10.000	14.5600	10.0259	0.3	

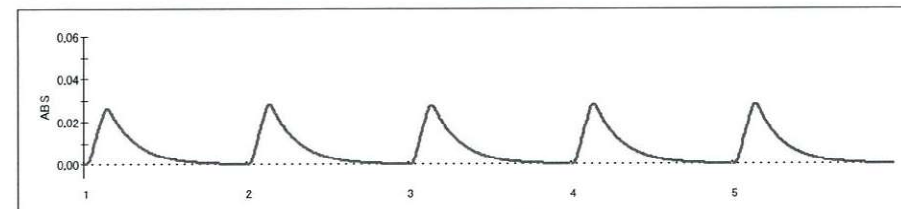


## SMP

No.	NAME	SVOL [mL]	CVOL [mL]	DVOL [mL]	AREA [ON]	MEAS [ng]	CONC [ug/L]	Note
1	Hg100ppb	0.050	5.000	5.000	7.5038	4.9041	98.082	
2	Hg100ppb	0.050	5.000	5.000	7.9148	5.2025	104.050	
3	Hg100ppb	0.050	5.000	5.000	7.8196	5.1334	102.668	
4	Hg100ppb	0.050	5.000	5.000	7.9037	5.1944	103.888	
5	Hg100ppb	0.050	5.000	5.000	7.8195	5.1333	102.666	

## Statistics

No.	NAME	TRY	AV [ug/L]	SD [ug/L]	Cv [%]
1	Hg100ppb	5	102.2708	2.431095	2.38



## Self Check

Heat check: PASS!! ( 27.5degC[05:00] -> 31.6degC[03:31])  
 Sensor check: PASS!! ( 123- 29= 94)  
 Leak check: PASS!! (0.17L/min)  
 Sig/Ref check: PASS!! (Sig: 4.37V, Ref: 4.10V)  
 Drift check: PASS!! (-0.0000022 - -0.0000173 = 0.0000151)





บริษัท แอนนาไลต์ดีเคิลแลบไซน์ จำกัด  
Analytical Lab Science Co., Ltd.

บริษัท เอสจีเอส (ประเทศไทย) จำกัด  
1/209, 1/211 หมู่ 1 ตำบลบ้านดง อำเภอบ้านดง จังหวัดระยอง 21130

**Spectrophotometer Inspection Report**

Apparatus : Spectrofluorometer  
Model : JASCO FP-8200  
Serial No. : C020461448  
Check Date : 05 May, 2023  
Standard Materials : DI Water, Air

**Items Test**

Wavelength Repeatability of Ex/Em	Conclusion :	<input checked="" type="checkbox"/> Passed	<input type="checkbox"/> Fail
Wavelength Accuracy of Ex/Em	Conclusion :	<input checked="" type="checkbox"/> Passed	<input type="checkbox"/> Fail
Resolution of Ex/Em	Conclusion :	<input checked="" type="checkbox"/> Passed	<input type="checkbox"/> Fail
Sensitivity	Conclusion :	<input checked="" type="checkbox"/> Passed	<input type="checkbox"/> Fail
Photometric Stability	Conclusion :	<input checked="" type="checkbox"/> Passed	<input type="checkbox"/> Fail

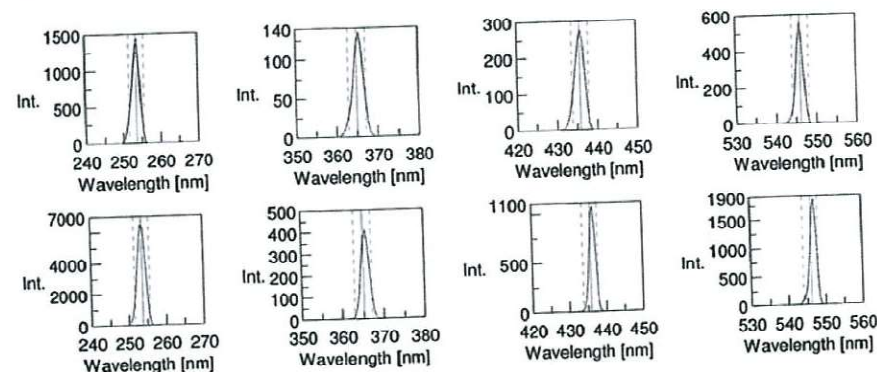
Rescription	Test By	Approve By
Sign		
Date	25-5-23	25-5-23

Inspection Sheet

Date 25 พฤษภาคม 2566  
Model name JASCO  
Serial No. C020461448  
Temperature 25 C  
Humidity 50 %  
Operator Apiwat  
Comprehensive inspection

Creation  
Review  
Approval

Pass



Wavelength Accuracy Pass/Fail : Pass

[Excitation]  
Standard 253.7 nm Criteria +/- 2.0 nm  
Average 254.00 nm, difference from standard 0.30 nm, Pass  
1: 254.0 nm, 2: 254.0 nm, 3: 254.0 nm  
Standard 365.0 nm Criteria +/- 2.0 nm  
Average 365.50 nm, difference from standard 0.50 nm, Pass  
1: 365.5 nm, 2: 365.5 nm, 3: 365.5 nm  
Standard 435.8 nm Criteria +/- 2.0 nm  
Average 436.00 nm, difference from standard 0.20 nm, Pass  
1: 436.0 nm, 2: 436.0 nm, 3: 436.0 nm  
Standard 546.1 nm Criteria +/- 2.0 nm  
Average 546.00 nm, difference from standard -0.10 nm, Pass  
1: 546.0 nm, 2: 546.0 nm, 3: 546.0 nm

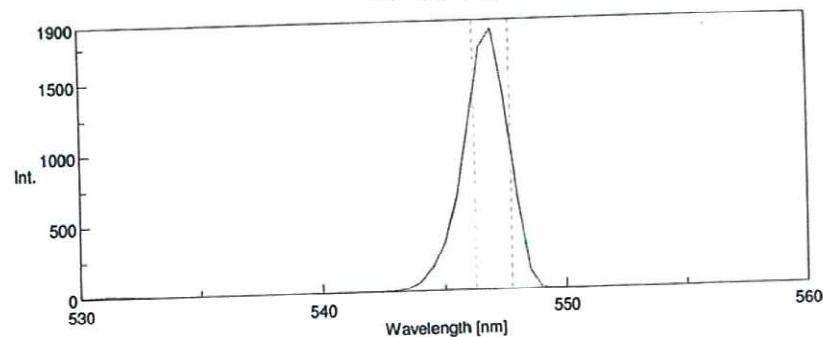
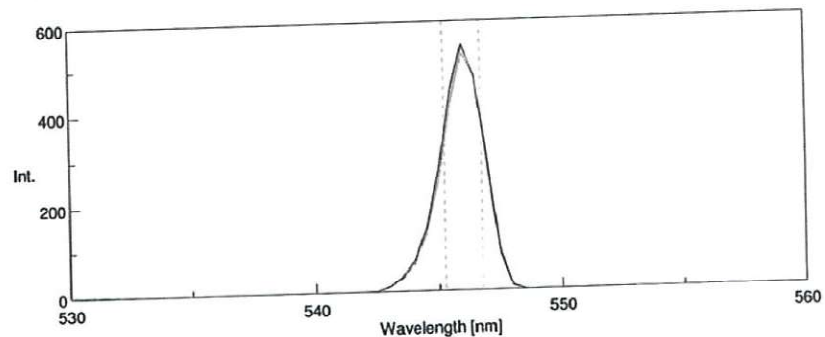
[Emission]  
Standard 253.7 nm Criteria +/- 2.0 nm  
Average 253.50 nm, difference from standard -0.20 nm, Pass  
1: 253.5 nm, 2: 253.5 nm, 3: 253.5 nm  
Standard 365.0 nm Criteria +/- 2.0 nm  
Average 365.50 nm, difference from standard 0.50 nm, Pass  
1: 365.5 nm, 2: 365.5 nm, 3: 365.5 nm  
Standard 435.8 nm Criteria +/- 2.0 nm  
Average 436.50 nm, difference from standard 0.70 nm, Pass  
1: 436.5 nm, 2: 436.5 nm, 3: 436.5 nm  
Standard 546.1 nm Criteria +/- 2.0 nm  
Average 547.00 nm, difference from standard 0.90 nm, Pass  
1: 547.0 nm, 2: 547.0 nm, 3: 547.0 nm

# Inspection Sheet

Date 25 พฤษภาคม 2566  
 Model name JASCO  
 Serial No. C020461448  
 Temperature 25 C  
 Humidity 50 %  
 Operator Apiwat  
 Comprehensive inspection

Creation  
 Review  
 Approval

Pass



Wavelength Repeatability

Pass/Fail : Pass

[Excitation]  
 Wavelength 546.1 nm Criteria +/- 1.5 nm  
 Minimum 546.0 nm, Maximum 546.0 nm, (Max.-Min.)/2 : 0.00 nm, Pass  
 1: 546.0 nm, 2: 546.0 nm, 3: 546.0 nm

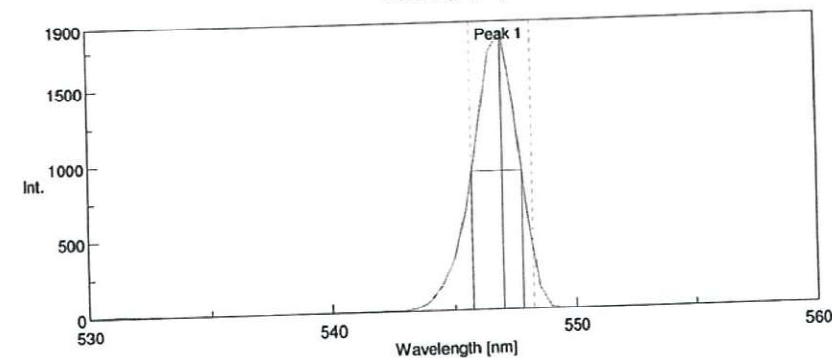
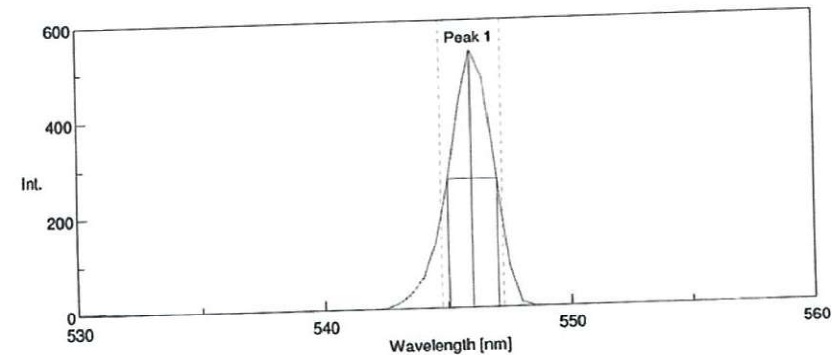
[Emission]  
 Wavelength 546.1 nm Criteria +/- 1.5 nm  
 Minimum 547.0 nm, Maximum 547.0 nm, (Max.-Min.)/2 : 0.00 nm, Pass  
 1: 547.0 nm, 2: 547.0 nm, 3: 547.0 nm

# Inspection Sheet

Date 25 พฤษภาคม 2566  
 Model name JASCO  
 Serial No. C020461448  
 Temperature 25 C  
 Humidity 50 %  
 Operator Apiwat  
 Comprehensive inspection

Creation  
 Review  
 Approval

Pass



Resolution Pass/Fail : Pass

[Excitation]  
 Criteria : equal to or less than 2.5 nm  
 Peak at 546.1 nm, FWHM : 1.99 nm, Pass

[Emission]  
 Criteria : equal to or less than 2.5 nm  
 Peak at 546.1 nm, FWHM : 2.06 nm, Pass

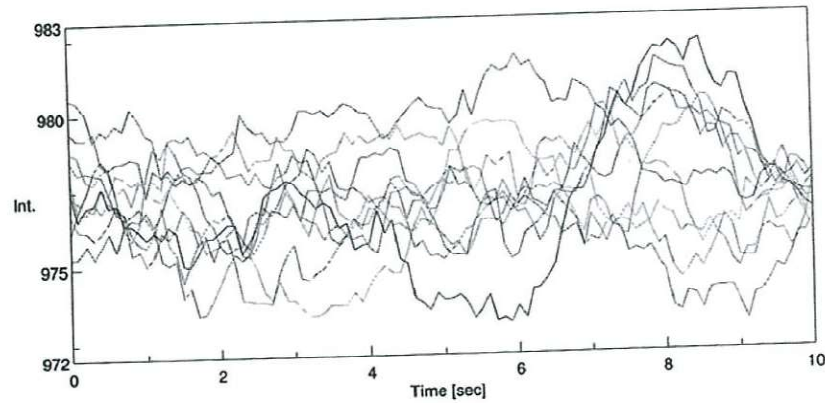
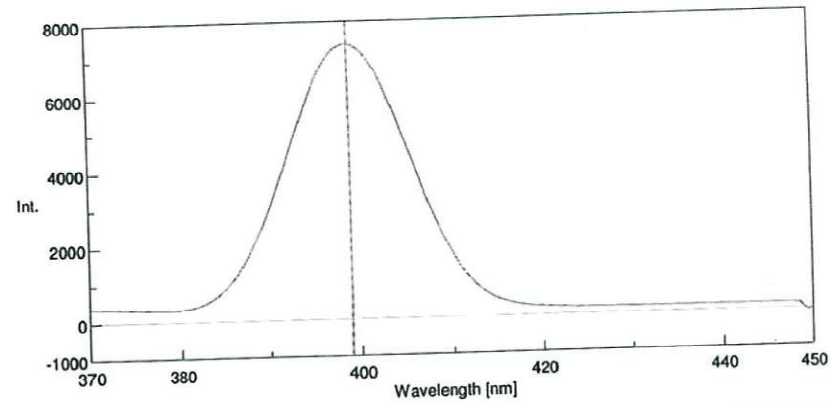


# Inspection Sheet

Date 25 พฤษภาคม 2566  
 Model name JASCO  
 Serial No. C020461448  
 Temperature 25 C  
 Humidity 50 %  
 Operator Apiwat  
 Comprehensive inspection

Creation  
 Review  
 Approval

Pass



Sensitivity

Pass/Fail : Pass

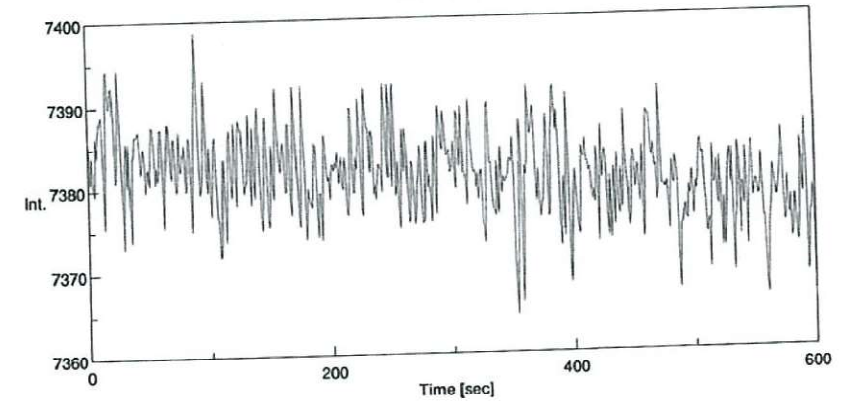
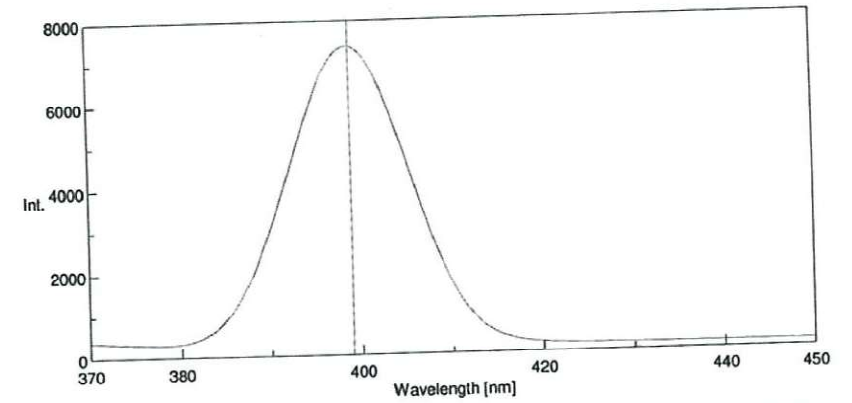
Criteria : S/N ratio equal to or greater than 500, Measured : 1205.2, Pass

# Inspection Sheet

Date 25 พฤษภาคม 2566  
 Model name JASCO  
 Serial No. C020461448  
 Temperature 25 C  
 Humidity 50 %  
 Operator Apiwat  
 Comprehensive inspection

Creation  
 Review  
 Approval

Pass



Photometric Stability

Pass/Fail : Pass

Criteria : within 2.0 %, Measured : 0.54 %, Pass

PlasmaQuant® MS (Elite)  
ICP-MS

## 1 Customer and service data

## Customer data

Company	SGS
Department	
Name	
Address (Street, Number, ZIP code, City)	Sukhumvit Road, Ban Chang District, Rayong
Telephone	
E-Mail	
Customer no.	
Order no.	

## Device data

Device Type	PQMS Elite
Serial number	10-5000-030-26-AR109

## Data of the authorized person for the Maintenance

Name, Company	Analytik-Jena Instrument Thailand
Date of the Maintenance	19 April 2023

	yes	no
Maintenance with following Operational Qualification OQ (requires a separate OQ protocol)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

## Maintenance Protocol

### 2 Maintenance Checklist

Tick each checkbox as the steps are completed.

#### Parts required

<input checked="" type="checkbox"/>	10-5000-220-20	Kit preventative maintenance ICP-MS
<input checked="" type="checkbox"/>	13-410-540	Cooling Water Additives
Choose one of the following oil types as it is important for rotary pump type:		
<input type="checkbox"/>	418-88089-0	Vacuum Pump Oil (Esther Oil LVO 200)
<input checked="" type="checkbox"/>	418-10-406-251	Vacuum Pump Oil (PFPE Oil LVO 420) <i>inspected</i>

#### Initial performance tests

<input checked="" type="checkbox"/>	Print out Details, Plasma Align (Time Scan mode), Res & Trim, Mass Call, Detector Setup, Mass Scan (after new scan with tuning solution), Vacuum (Gate Valve opened and closed), iCRC, Ion Optics and Stepper pages from the instrument setup
<input checked="" type="checkbox"/>	Verify performance (sensitivity/oxides/double charges) of system before starting maintenance

#### Vacuum system

<input checked="" type="checkbox"/>	Drain and replace oil in rotary pump. <i>inspected</i>
<input checked="" type="checkbox"/>	Clean exterior of pump.
<input checked="" type="checkbox"/>	Test vacuum interlock by attempting to start vacuum with Turbo pump #1 dismantled. Verify that appropriate error message is displayed.

#### Mass spectrometer system

<input checked="" type="checkbox"/>	Check/adjust gate valve.
<input checked="" type="checkbox"/>	Clean sampler/skimmer cones/replace O-rings.
<input checked="" type="checkbox"/>	Check quadrupole resolution and check Quad Controller resonance. Resonance peak voltage is <i>2.7 V</i>
<input checked="" type="checkbox"/>	Clean entrance lens and entrance plate Detector voltage is: <i>3113 V</i>

## Maintenance Protocol

#### Sample introduction system

<input checked="" type="checkbox"/>	Inspect torch.
<input checked="" type="checkbox"/>	Inspect/replace torch gas tubing.
<input checked="" type="checkbox"/>	Inspect/clean/adjust RF coil.
<input checked="" type="checkbox"/>	Inspect igniter/replace ignitor cable.
<input checked="" type="checkbox"/>	Clean sampler/skimmer cones/replace O-rings.
<input checked="" type="checkbox"/>	Clean extraction lenses #1 and #2.
<input checked="" type="checkbox"/>	Remove nebulizer from spray chamber. Turn on the peristaltic pump (15 rpm) and nebulizer gas flow (1.0 L/min) and aspirate de-ionized water. Check that the aerosol produced by the nebulizer is normal and uniform.
<input checked="" type="checkbox"/>	Check spray chamber and replace all O-rings and water tubing.
<input checked="" type="checkbox"/>	Inspect sample introduction system electrical connections.

#### Water cooling system

<input checked="" type="checkbox"/>	Drain water reservoir.
<input checked="" type="checkbox"/>	Clean air intake filters & heat exchange fins as needed.
<input checked="" type="checkbox"/>	Inspect all water hoses for cracks/leaks.
<input checked="" type="checkbox"/>	Disassemble inline water filter & clean cartridge.
<input checked="" type="checkbox"/>	Fill water reservoir with additives and check the water conductivity according to instruction. <i>97 µS/cm</i>
<input checked="" type="checkbox"/>	Inspect mains cable and plug.
<input checked="" type="checkbox"/>	Turn on and re-check water level.
<input checked="" type="checkbox"/>	Check pressure (440±40 kPa) and temperature set point (20 °C); adjust if necessary.
<input checked="" type="checkbox"/>	Verify operation of the water solenoid.

#### Basic instrument

<input checked="" type="checkbox"/>	Inspect condition of argon supply hose.
<input checked="" type="checkbox"/>	Inspect mains power cable and plug.
<input checked="" type="checkbox"/>	Check operation of exhaust system and inspect airflow sensor; if necessary clean according to instruction. <i>2.38 V</i>
<input checked="" type="checkbox"/>	Inspect USB and serial cables/connections.
<input checked="" type="checkbox"/>	Clean all external covers and fans.
<input checked="" type="checkbox"/>	Check argon inlet pressure if it is at recommended pressure of 700 kPa (100 psi) (allowed range is 600 to 830 kPa, 90 to 120 psi) Actual setting is <i>100</i> kPa/psi.
<input checked="" type="checkbox"/>	Check iCRC for leakage and blockage according to service info. Check gas pressures: He ~150 kPa (22 psi), H <sub>2</sub> ~100 kPa (16 psi)



## Maintenance Protocol

### Interlock Tests

- ☒ Turn off argon supply and ignite plasma. Verify if low argon error message is displayed.
- ☒ Ignite plasma and press emergency stop button. Verify that plasma goes out and appropriate error message is displayed.
- ☒ Ignite plasma and unlatch plasma compartment/main RF door. Verify that plasma goes out and appropriate error message is displayed.
- ☒ Ignite plasma and turn off argon supply. Check if plasma is turned off and appropriate low argon flow message is displayed.
- ☒ Turn off water cooler and light plasma. Verify if appropriate error message is displayed.

### Accessories

- ☒ Verify initialization and operation of auto sampler. Check belts and wheels etc.
- ☒ Check all other accessories.

### Performance tests

- ☒ Update entries in Details page of Instrument Setup window as required.
- ☒ Print out every section of the Instrument Setup (service mode) and put it into the logbook.
- ☒ Tune up Instrument and run performance test. Perform any corrective action necessary if results do not meet specifications. Add performance test results to logbook.

### Instrument condition

- ☒ Assess and comment on condition of ICP-MS system
- ☒ Discuss condition, preventative maintenance results and instrument performance with the customer.
- ☒ Sign and date this checklist after obtaining customer's signature.

### Instrument and environmental conditions

- ☒ Good ☐ Fair ☐ Poor

## Maintenance Protocol

### Comments and recommendations:

- recommend to replace skimmer cone and sampler cone due to degraded the cone's hole become bigger and not in a good shape.
- Nebulizer  
The inlet Argon port is broken.

[Redacted]

Authorized Person Analytik Jena AG  
(Name in bloc letters)

[Redacted]

Company

[Redacted]

Signature authorized person

SGS Rayong, 11/04/2023

Place, date (DD/MM/YYYY)

[Redacted]

Customer (name in bloc letters)

[Redacted]

Signature Customer

SGS 19/04/23

Place, date (DD/MM/YYYY)

# analytikjena

An Endress+Hauser Company

Analytik Jena Instruments (Thailand) Ltd.  
35 Moo 5, 345 Road, Khlong Khoi, Pak Kret,  
Nonthaburi 11120 Thailand.  
Phone: +66(2) 1062970-72  
Fax: +66(2) 1062973  
www.analytik-jena.com

## Service Report

Customer's address :		Customer's Ref. No.	
SGS			
Sukhumvit Road, Ban Chang			
District, Rayong			
E-mail :		Phone :	Fax :
Job No. 2304216PM	User :	Service Engineer : Somchi N	Date : 18-19/04/2023 Page : 1/1
Instrument model : POMS Elite	Serial No. 10-5000-030-26-AR109	Software Version No. 4.3.3	
<input type="checkbox"/> Repair (RE) <input checked="" type="checkbox"/> Maintenance (PM) <input type="checkbox"/> Installation (IN) <input type="checkbox"/> Warranty <input type="checkbox"/> Application (AP) <input type="checkbox"/> Site Prep.(SP) <input type="checkbox"/> Visit(VI)			
Fault / Claim :		<input type="checkbox"/> <input type="checkbox"/> Error Code	
PM 1/2 - 2023			
Action taken :			
<ul style="list-style-type: none"> <li>- clean water cooling system, Replace water type 1 and adjust water conductivity = 95 <math>\mu</math>S/cm, Pressure 4.0 bar.</li> <li>- clean water filter, clean water inlet solenoid valve</li> <li>- replace Arg flow sensor 10-500-700-96 1 ea.</li> <li>- replace skimmer cone's o-ring, sampler cone's o-ring.</li> <li>- replace activated Alumina (Vacuum oil trap).</li> <li>- inspect spray chamber's o-ring, Nebulizer's o-ring — OK.</li> <li>- clean instrument cooling fan</li> <li>- inspect Exhaust sensor = 2.38 V.</li> <li>- perform plasma alignment Ver 2.0, Resolution &amp; trim, Mass calibration, Detector set up</li> <li>- Performance test with 1 ppb during std, instrument working properly. Voltage = 3113 V.</li> </ul>			
Action Pending / Recommendation :			
recommend to replace - skimmer cone and sampler cone (degraded) - Nebulizer (broken at inlet Argon port)			
<input type="checkbox"/> Spare Part <input type="checkbox"/> Instrument Configuration			
Item No.	Name	Quantity	Unit Price
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Herewith the undersigned confirm the time devoted, the work performed, the perfect function of the device, and the receipt/delivery of the specified spare parts. *Traveled hours and kilometers can only be entered after the return of the service engineer.		Date / Signature of Customer Sirirat S. 19/04/23	Date / Signature of Service Engineer Somchi N.
		Work completed? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Services are subject to the General Terms and Conditions of Analytik Jena AG, which will be sent on request.

## analytikjena ASpect MS Worksheet Report

Page 1 of 2

Report Date 2023-04-19 11:45:44 GMT+07:00  
Worksheet System Test 19 Apr 2023 w Th.msww  
Analyst

### Worksheet Summary

Worksheet: System Test 19 Apr 2023 w Th.msww  
Created: 2020-06-03 07:36:54  
Analyst:  
Computer: APPLICATIONICP  
Last Saved: 2023-04-19 11:28:28 GMT+07:00  
Software Ver.: 4.3 r19995  
Firmware Ver.: 5.69  
Samples: 1  
Comment:

### Chemistry

Matrix:  
Acids Used:  
Keywords:  
CRM:

### Measurement Parameters

Analysis Modes Analysis Type: Quantitative, Acquisition Mode: Steady State, Scan Mode: Peak Hopping  
Spacing: Coarse, Points/Peak: 1, Scans/Replicate: 50, Replicates/Sample: 10

### Plasma

Plasma flow: 9.00 L/min Auxiliary flow: 1.35 L/min Sheath Gas Flow: 0.00 L/min Nebulizer flow: 1.04 L/min  
Sampling depth: 6.00 mm  
Power: 1.20 kW Pump rate: 20 rpm Stabilization delay: 30 sec Nitrox Flow: 0.00 mL/min

### Ion Optics (Volt)

Skimmer Bias: 0.00  
First Extraction Lens: -63.00 Second Extraction Lens: -620.00 Third Extraction Lens: -499.00  
Left Mirror Lens: 71.00 Right Mirror Lens: 59.00 Bottom Mirror Lens: 47.00  
Corner Lens: -446.00 Entrance Lens: 4.00  
Fringe Bias: -5.50 Entrance Plate: -60.00  
Detector Focus: True Pole Bias: 0.00

### iCRC

Skimmer Cone: Off iCRC Skimmer Gas Flow: 0 mL/min

### Nitrox

0 mL/min

### Sampling

Aerosol generation: Nebulizer, Source: Manual  
Fast pump during sample delay/rinse: On, Enable device control: Off  
Spray Chamber Cooling: On Spray Chamber Temp: 3.00 °C  
Sample uptake delay: 30 sec, Smart Rinse: No, Switch Delay: OFF  
Scan time: 1407 msec, Replicate time: 70.35 sec

### Analytes (6)

Be9, Co59, In115, Ce140, Pb208, Th232

### SemiQuant Analytes (0)

### Internal Standards (0)

### No. of isotope ratio standards: 0

### Isotope Ratios (2)

CeO/Ce(Ce140O16/Ce140), Ba+/-/Ba(Ba138+/-/Ba138)

### Default exclusions (7)

Ar40, Ar40Ar40, N14, N14H1, O16, O16H1, Ar40H1

### User-specified exclusions (0)

### Scan Segments (11)

Start (m/z)	Stop (m/z)	Dwell (usec)	Attenuation mode	Norm-Med	Med-High
5	5	60000	None		
8	10	60000	None		
58	60	60000	None		
69	69	60000	None		
114	116	60000	None		
138	140	60000	None		
156	156	60000	None		
207	209	60000	None		
220	220	60000	None		
228	228	60000	None		



Report Date 2023-04-19 11:45:44 GMT+07:00  
Worksheet System Test 19 Apr 2023 w.Th.msws  
Analyst

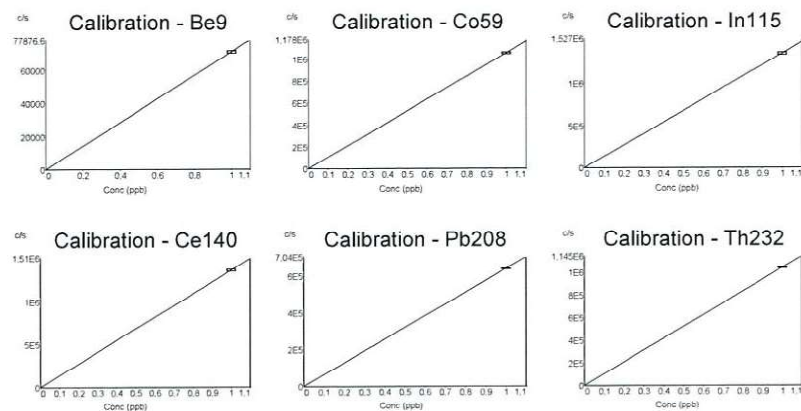
Start (m/z) Stop (m/z) Dwell (μsec) Attenuation mode Norm-Mcd Mcd-High  
231 233 60000 None

## 1 ppb Tuning solution [1 ppb Tuning solution]

Tube: 2, Replicates: 10, Auto Dilutions factor: -, Cal Set 1, Time measured: 2023-04-19 11:28:28  
Actual weight: 1.0000 g, Actual volume: 1.00 mL, Dilution Factor: 1.00  
Position Horizontal: -0.10 mm Position Vertical: -0.10 mm Detector Voltage: 3113.30 volt

Analyte	Solu Conc	Unit	QC	Mean c/s	%RSD	SD	Replicates (c/s)				
Be9	1.0000	ppb	-	70796.90	1.05	744.1	69272	69853	70779	70464	
							70899	71065	71602	71407	
							71217	71411			
Co59	1.0000	ppb	-	1052651	0.88	9252.2	1070788	1059344	1058902	1054481	
							1044617	1055291	1051262	1049296	
							1039008	1043517			
In115	1.0000	ppb	-	1350583	1.07	14470.2	1387990	1354391	1342678	1355775	
							1346393	1343764	1343574	1351588	
							1344088	1335587			
Ce140	1.0000	ppb	-	1358880	0.78	10538.3	1372294	1361915	1359379	1364263	
							1352358	1363052	1364580	1367608	
							1338478	1344870			
Pb208	1.0000	ppb	-	637976.3	0.34	2138.0	637639	642283	637894	638251	
							637605	635288	638976	640026	
							635122	636679			
Th232	1.0000	ppb	-	1039186	0.49	5053.7	1038166	1038502	1035407	1045001	
							1046529	1040346	1041805	1042407	
							1031801	1031891			

Isotope Ratio	Ratio	%RSD	SD	Replicates (ratio)							
Ce140O16/Ce140	0.015	1.63	0.000	0.016	0.016	0.015	0.015	0.015	0.015	0.016	0.015
				0.015	0.015						
Ba138+/Ba138	0.019	0.83	0.000	0.020	0.020	0.020	0.020	0.019	0.019	0.019	0.020
				0.019	0.019						



Report Date 2023-04-19 11:51:43 GMT+07:00  
Title PM1-2 19 Apr 2023

## Details

Instrument Details

Last Read : 2023-04-19 09:24:45

Link

Send to Instrument

Run Times (Hrs : Mins)

Plasma: 3:05 : 1

Turbo Pump 1 & 2: 40:812 : 40:812 :

Rotary Pump: 40:814 :

Component Serial Numbers & Installation Dates

Instrument: 10-5000-030-26-AR109

10/25/2017

Control Board: 0806170600010

10/25/2017

RF Generator: 10-5300S-AR239

10/25/2017

RF DC Supply: 22188

4/19/2023

Turbo Pump 1: 16872279

10/25/2017

Turbo Pump 2: 16872278

10/25/2017

Rotary Pump 1: 960365

2/26/2018

Gauge 2:

2/26/2018

Detector: 254534

10/25/2017

Ion Optics Board: 00091C

10/25/2017

Quad Controller: 60017090764

10/25/2017

Mass Flow Controller Neb: 2550

10/25/2017

Mass Flow Controller Sheath: 2523

10/25/2017

ICRC Skimmer Cone MFC: 2016

10/25/2017

☒ Nitrox Installed

1128

10/25/2017

Instrument Version Info

Instrument ID & Type: PQMS Elite, 6

Firmware Build Date: Sep 7 2020 10:11:53

Firmware Version: 5.69

Control Board Version: 06

FPGA Chip Version: 200

CPLD Chip Version: 16

Optics Board Version: 7

Type and Key Status: Not AMR

Accessories

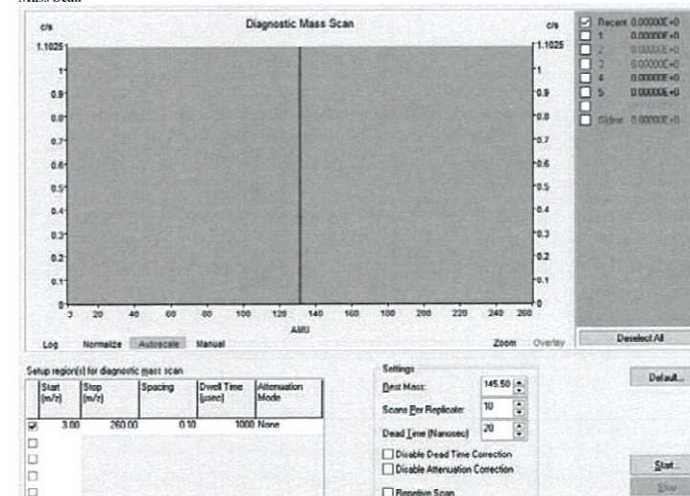
☐ Vacuum Exhaust Monitoring Installed

☒ Skimmer Installed

☐ Vacuum Gauge 2 Installed

☐ Sheath Gas MFC Installed

## Mass Scan

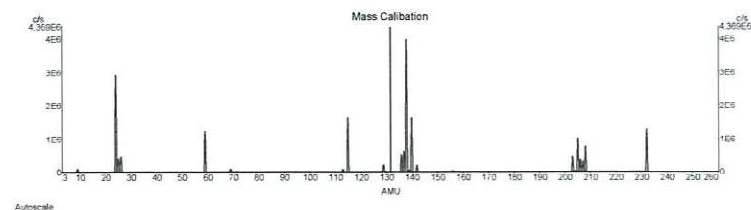




#### Mass Calibration

Last calibration: 2023-04-19 10:32:32  
[Worksheet: C:\ProgramData\Analytik Jena\ASpect MS\Supplied Worksheets\System Setup 2023-04-18.msws]

Isotope	Exact Mass	Current Mass	Theory - Curr	Resolution	Height (c/s)	Status
Bc9	9.012	9.020	-0.008	0.80	79312.66	Pass
Mg25	24.986	24.962	0.024	0.77	398418.66	Pass
Co59	58.933	58.906	0.027	0.73	1240887.38	Pass
In115	114.904	114.916	-0.012	0.72	1664403.00	Pass
Ce140	139.905	139.889	0.016	0.75	1654330.00	Pass
Pb206	205.975	206.003	-0.029	0.77	366063.66	Pass
Th232	232.038	232.032	0.006	0.80	1311951.00	Pass



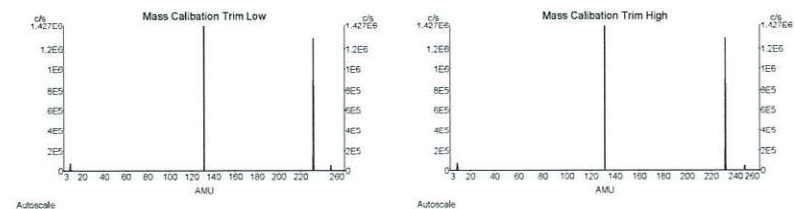
RF	Squared Term Scale Factor	Offset
	15.98E-7	-61.521E-5
		29.957E-3

#### Resolution and Trim

Last modified: 2023-04-19 10:32:32  
[Worksheet: C:\ProgramData\Analytik Jena\ASpect MS\Supplied Worksheets\System Setup 2023-04-18.msws]

	Offset	Scale Factor
RF	-135.926	214.11
DC	-200.202	252.684

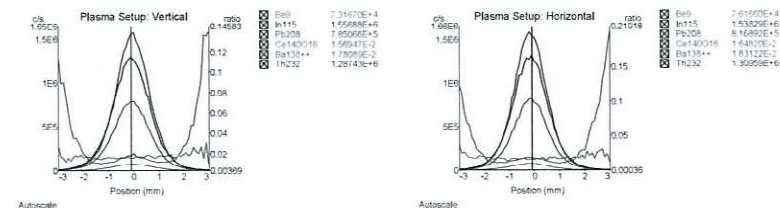
	Isotope	Observed AMU	Width
LOW Mass	Bc9	9.018	0.80
HIGH Mass	Th232	232.062	0.78



#### Plasma Setup

Last modified: 2023-04-19 10:28:09  
[Worksheet: C:\ProgramData\Analytik Jena\ASpect MS\Supplied Worksheets\System Setup 2023-04-18.msws]

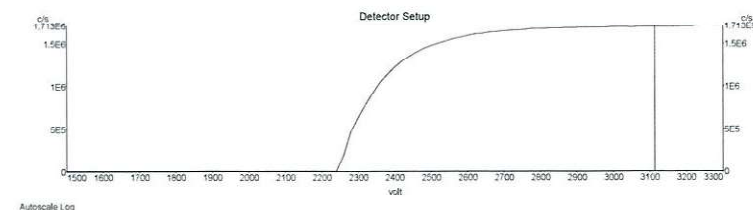
Horizontal (x) alignment: -0.10 mm, Vertical (y) alignment: -0.10 mm



#### Detector Setup

Last modified: 2023-04-19 10:37:53  
[Worksheet: C:\ProgramData\Analytik Jena\ASpect MS\Supplied Worksheets\System Setup 2023-04-18.msws]

Detector Voltage: 3113 volt, Scan Range From: 1500 - 3300 volt





# Thermology Co., Ltd.

96/177-96/178 Moo 6, T. La-harn, A. Bangbuathong, Nonthaburi 11110  
Tel : 0 2191 6479 Fax : 0 2191 6480 website : www.thermology.co



## CALIBRATION CERTIFICATE

Date of Issue Jun 23, 2023 Cert No. 23/2343  
Site Calibration Order No. 23060304

Customer SGS (Thailand) Limited.  
1/209, 1/211 Moo 1, T. Ban Chang, A. Ban Chang Rayong 21130 Thailand.

Place of Calibration Sample Area

Description Incubator  
Model i250DS  
Serial No. i250402-0810-0319  
ID.No. I2010004  
Date of Receipt Jun 21, 2023  
Date of Calibration Jun 21, 2023

### Environment

Temperature	(Min)	24.8	°C	(Max)	26.1	°C
Relative Humidity	(Min)	51.4	%RH	(Max)	59.9	%RH

### Calibration Method

WI-17: The reference thermometer was placed into the chamber and measurement was performed based on AS-2853.  
The temperature scale in use at this laboratory is the International Temperature Scale of 1990.

### Standard

1) Data Acquisition with Sensor Model 34972A S/N. MY49010059, Certificate No. QR23-0916, Calibrated by Quality Reborn Co., Ltd., ONAC Calibration No. 0292. Due Date Apr 18, 2024.

This certificate is traceable to SI unit.



# Thermology Co., Ltd.

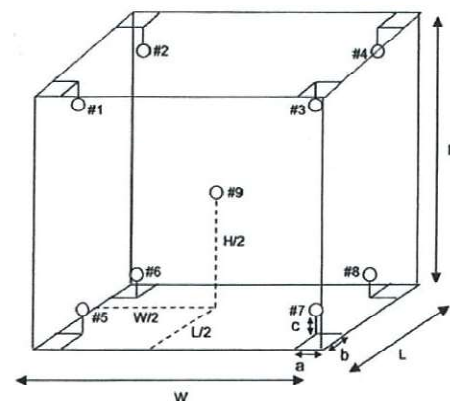
96/177-96/178 Moo 6, T. La-harn, A. Bangbuathong, Nonthaburi 11110  
Tel : 0 2191 6479 Fax : 0 2191 6480 website : www.thermology.co



## CALIBRATION CERTIFICATE

Date of Issue Jun 23, 2023 Cert No. 23/2343  
Site Calibration Order No. 23060304

Results (without adjustment)



Position of reference thermometers were placed

### Note.

- 1). Dimension ( $W \times L \times H$ ) is 50 x 50 x 105 cm
- 2). Stability - greatest one half of difference between max peak and min peak of each reference probe measured temperature obtained during the calibration interval.
- 3). 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. The reference sensor should preferably be located at the geometric center of the chamber.



# Thermology Co., Ltd.

96/177-96/178 Moo 6, T. La-harn, A. Bangbuathong, Nonthaburi 11110  
Tel : 0 2191 6479 Fax : 0 2191 6480 website : www.thermology.co



## CALIBRATION CERTIFICATE

Date of Issue Jun 23, 2023

Cert No. 23/2343

Site Calibration

Order No. 23060304

Results (without adjustment)

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability $\pm$ (°C)	Uniformity (°C)	Uncertainty $\pm$ (°C)
20.0	20.1	Position 1	20.541	0.243	0.606	0.47
		Position 2	20.409			
		Position 3	20.327			
		Position 4	19.982			
		Position 5	20.019			
		Position 6	20.117			
		Position 7	19.872			
		Position 8	19.995			
		Position 9	20.023			

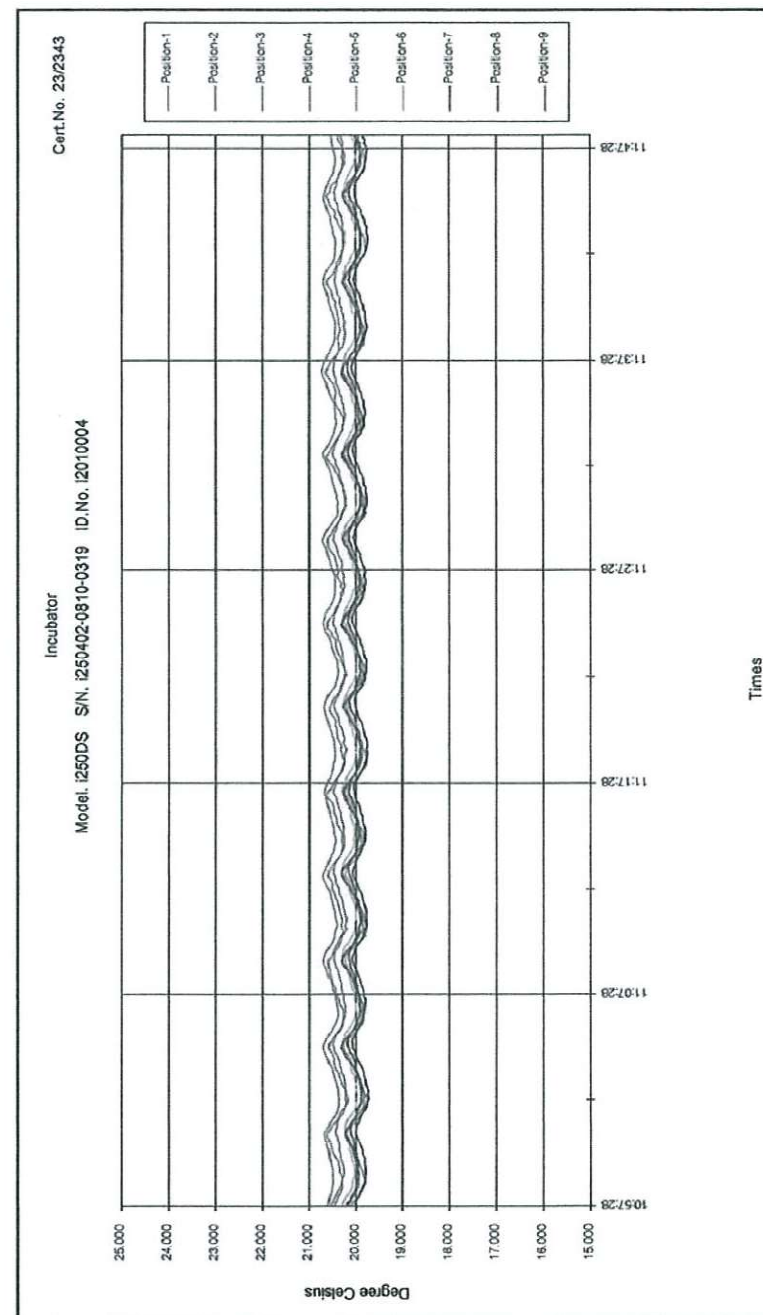
The stability and uniformity was taken into account in the measurement uncertainty stated.

The above results are valid exclusively for calibration samples as mentioned in the report.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with ONAC requirements.

APPROVED SIGNATORY :

- ☐ MR. PRAJUCKPETCH THONGSOOKCHOTE  
☒ MR. DAMRONG Mulsing  
☐ MR. JATURAPAT THONGSOOKCHOTE







# Thermology Co., Ltd.

96/177-96/178 Moo 6, T. La-harn, A. Bangbuathong, Nonthaburi 11110  
Tel : 0 2191 6479 Fax : 0 2191 6480 website : www.thermology.co



## CALIBRATION CERTIFICATE

Date of Issue Jun 23, 2023 Cert No. 23/2345  
Site Calibration Order No. 23060304

Customer SGS (Thailand) Limited.  
1/209, 1/211 Moo 1, T. Ban Chang, A. Ban Chang Rayong 21130 Thailand.

Place of Calibration Hot Lab

Description Oven  
Model UFE400  
Serial No. G410.0833  
ID.No. O2010002  
Date of Receipt Jun 21, 2023  
Date of Calibration Jun 21, 2023  
Environment  
Temperature (Min) 23.8 °C (Max) 25.9 °C  
Relative Humidity (Min) 41.3 %RH (Max) 63.0 %RH

### Calibration Method

WI-17: The reference thermometer was placed into the chamber and measurement was performed based on AS-2853.  
The temperature scale in use at this laboratory is the International Temperature Scale of 1990.

### Standard

1) Data Acquisition with Sensor Model 34972A S/N. MY59003190, Certificate No. QR23-1303, Calibrated by Quality Reborn Co., Ltd., ONAC Calibration No. 0292. Due Date May 15, 2024.

This certificate is traceable to SI unit.



# Thermology Co., Ltd.

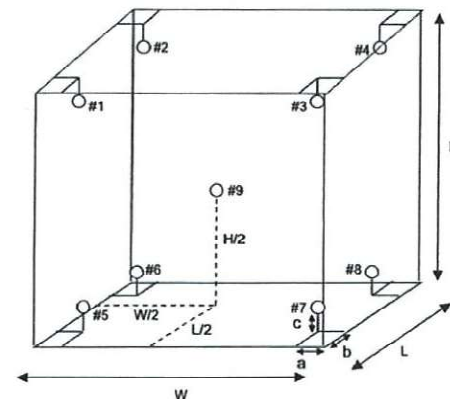
96/177-96/178 Moo 6, T. La-harn, A. Bangbuathong, Nonthaburi 11110  
Tel : 0 2191 6479 Fax : 0 2191 6480 website : www.thermology.co



## CALIBRATION CERTIFICATE

Date of Issue Jun 23, 2023 Cert No. 23/2345  
Site Calibration Order No. 23060304

Results (without adjustment)



Position of reference thermometers were placed

### Note.

- 1). Dimension (W x L x H) is 40 x 33 x 40 cm
- 2). Stability - greatest one half of difference between max peak and min peak of each reference probe measured temperature obtained during the calibration interval.
- 3). 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. The reference sensor should preferably be located at the geometric center of the chamber.



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## CALIBRATION CERTIFICATE

Date of Issue Jun 23, 2023

Cert No. 23/2345

Site Calibration

Order No. 23060304

Results (without adjustment)

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability $\pm$ (°C)	Uniformity (°C)	Uncertainty $\pm$ (°C)
85.0	85.0	Position 1	85.026	0.069	0.354	0.31
		Position 2	84.969			
		Position 3	84.774			
		Position 4	84.822			
		Position 5	84.584			
		Position 6	84.571			
		Position 7	84.573			
		Position 8	84.657			
		Position 9	84.710			

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability $\pm$ (°C)	Uniformity (°C)	Uncertainty $\pm$ (°C)
104.0	104.0	Position 1	104.144	0.080	0.455	0.32
		Position 2	104.090			
		Position 3	103.803			
		Position 4	103.860			
		Position 5	103.565			
		Position 6	103.553			
		Position 7	103.579			
		Position 8	103.653			
		Position 9	103.725			



# Thermology Co., Ltd.

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Tel : 0 2191 6479 Fax : 0 2191 6480 website : www.thermology.co



## CALIBRATION CERTIFICATE

Date of Issue Jun 23, 2023

Cert No. 23/2345

Site Calibration

Order No. 23060304

Results (without adjustment)

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability $\pm$ (°C)	Uniformity (°C)	Uncertainty $\pm$ (°C)
150.0	150.0	Position 1	150.660	0.119	0.757	0.40
		Position 2	150.645			
		Position 3	149.935			
		Position 4	150.091			
		Position 5	149.812			
		Position 6	149.782			
		Position 7	149.795			
		Position 8	149.820			
		Position 9	149.948			

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability $\pm$ (°C)	Uniformity (°C)	Uncertainty $\pm$ (°C)
180.0	180.0	Position 1	180.800	0.086	0.983	0.40
		Position 2	180.771			
		Position 3	179.786			
		Position 4	180.030			
		Position 5	179.861			
		Position 6	179.830			
		Position 7	179.929			
		Position 8	179.803			
		Position 9	179.886			



# Thermology Co., Ltd.

96/177-96/178 Moo 6, T. La-harn, A. Bangbuathong, Nonthaburi 11110  
Tel : 0 2191 6479 Fax : 0 2191 6480 website : www.thermology.co



## CALIBRATION CERTIFICATE

Date of Issue Jun 23, 2023

Cert No. 23/2345

Site Calibration

Order No. 23060304

The stability and uniformity was taken into account in the measurement uncertainty stated.

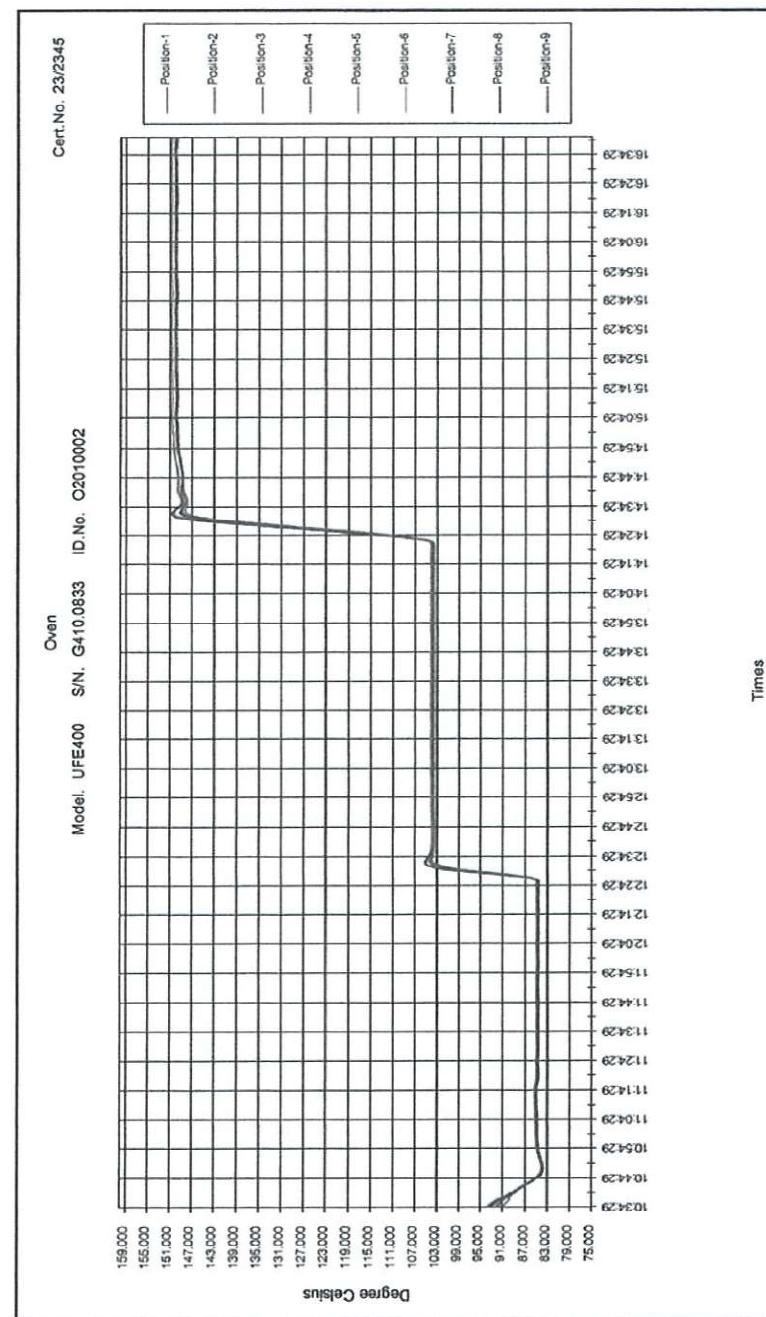
The above results are valid exclusively for calibration samples as mentioned in the report.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with ONAC requirements.

APPROVED SIGNATORY :

- ☐ MR. PRAJUCKPETCH THONGSOOKCHOTE  
☒ MR. DAMRONG MULSING  
☐ MR. JATURAPAT THONGSOOKCHOTE

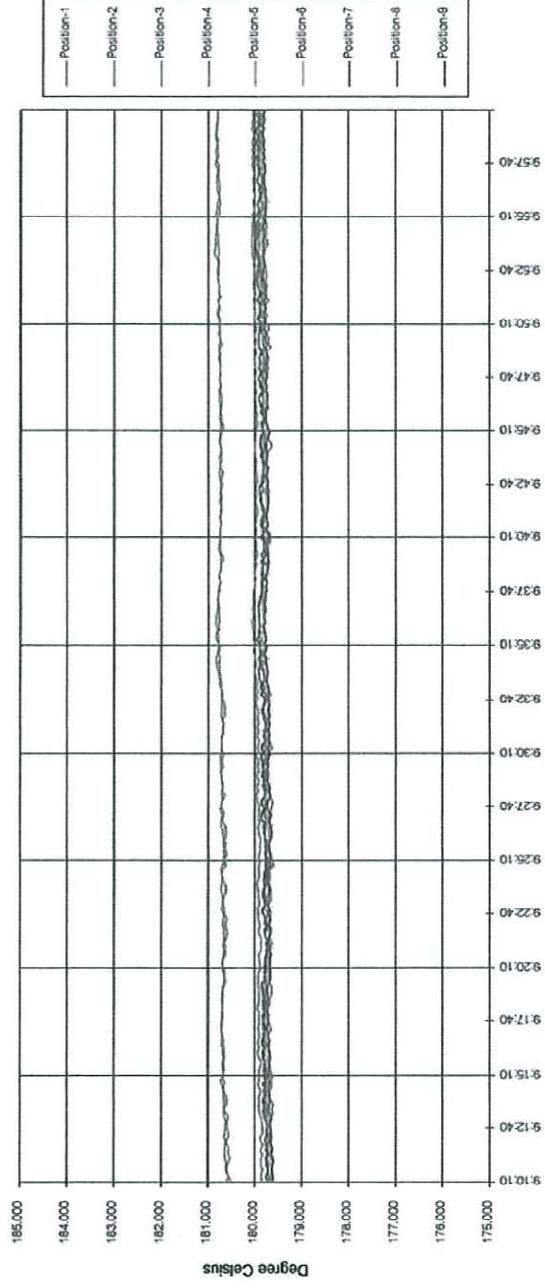
Page 5 of 5





Cert.No. 23/2345

Oven  
Model. UFE400 S/N. G410.0833 ID.No. 02010002





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert.No.: 23CH1117  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** pH Meter  
**Manufacturer :** Mettler Toledo  
**Model :** Seven Easy S20  
**Serial No. :** 1231235141  
**ID No. :** P2010024  
**Condition As-Received:** Used Item  
**Received Date :** 07 September 2023  
**Calibration Date :** 08 September 2023  
**Reference :** 2309-0247WSC-4  
**Submitted by :** SGS (Thailand) Limited  
1/209, 1/211 Moo 1, Ban Chang,  
Ban Chang, Rayong 21130  
**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)  
- CP-CH8 by comparison with standard thermometer

**Calibrated by :** Warakorn Lernagatrakul

**Approved by :**

Approved Signatory

(✓) Saithip Meangmai  
( ) Warakorn Lernagatrakul  
( ) Ponpan Paipim

**Issue Date :** 12 September 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 0058173



Cert.No.: 23CH1117  
Page.: 2 of 3

### Condition of this calibration result

1. Reference Standard Instrument : -

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	23E2802	27 Aug 2024
2) Ref. Standard Thermometer	4982054	110RC044	23I908	26 Jul 2024

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

- Technology Promotion Association (Thailand-Japan)

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

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 1.679	CPA chem	794119	25 Feb 2024
pH 4.008	CPA chem	863832	28 Dec 2024
pH 6.986	CPA chem	863833	28 Dec 2023
pH 9.997	CPA chem	913600	14 July 2024

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	Coverage factor
	pH	mV	mV	pH	( ±mV )	k
pH Meter S/N.: 1231235141	1.680	314.73	314.9	1.680	0.058	2.00
	4.000	177.48	177.7	4.000	0.058	2.00
	7.000	0.00	0.2	7.000	0.058	2.00
	10.000	-177.48	-177.2	10.000	0.058	2.00

a 1179502



Cert.No.: 23CH1117

Page.: 3 of 3

### Calibration Results

#### Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading ( mV )	Uncertainty of pH measurement ( $\pm$ )	Coverage factor $k$
pH Electrode S/N.: 9448396	1.679	1.709	300.9	0.0052	2.05
	4.008	4.011	167.3	0.0045	2.00
	6.986	6.991	-5.5	0.0084	2.00
	9.997	10.000	-183.8	0.0068	2.00

#### Function : Temperature Measurement

( \* ) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLab®Expert Pro  
- Serial No. : 9448396

Dimension of probe;

- Length : 120 mm  
- Diameter : 12 mm  
- Immersion Depth : 100 mm

Calibration Point ( °C )	Standard Temperature ( °C )	UUC* Reading ( °C )	Error ( °C )	Uncertainty of measurement ( $\pm$ °C )	Coverage factor $k$
25.0	25.002	24.9	-0.102	0.13	2.00

Remark : - UUC\* = Unit Under Calibration

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

-o0o-





Agilent Technologies (Thailand) Limited  
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968 RAMA 4 ROAD, SILOM, BANGRAK  
Bangkok 10500 Thailand

Tel: +662 637 6363  
Fax: +662 632 4334  
Email: [ccc-smt@agilent.com](mailto:ccc-smt@agilent.com)  
Website: [www.agilent.com/chem](http://www.agilent.com/chem)

#### Customer Contact:

SGS (Thailand) Limited  
Branch 00003  
1/209 1/211 Moo 1 T Bangchang  
A Banchang  
RAYONG 21130  
TAX ID : 0105532106079  
[Saijai.Ruangsawat@sgs.com](mailto:Saijai.Ruangsawat@sgs.com)  
038-685 260-4

#### Invoice To:

SGS (Thailand) Limited  
Branch 00003  
1/209 1/211 Moo 1 T Bangchang A  
Banchang RAYONG 21130

#### Delivery Site:

SGS (Thailand) Limited  
Branch 00003  
1/209 1/211 Moo 1 T Bangchang  
A Banchang  
RAYONG 21130

#### Location:

Room  
Bldg  
Lab  
Dept

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Agilent Technologies (Thailand) Limited. Head Office  
U Chu Liang Bldg. 22/F Unit A.D  
968 Rama 4 Road, Silom, Bangrak.  
Bangkok 10500 Thailand  
Tax ID : 0105542068218

### SERVICE REPORT

<b>Customer Purchase Order Number:</b>	<b>Customer Number:</b> 70205138
<b>Service Request:</b>	<b>Service Request Date:</b>
<b>Service Order:</b> 6006193098	<b>Service Confirmation:</b> 6904997683

#### Direct Inquiries to:

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

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Sub-district, Wattana District, Bangkok 10110 Thailand  
Acc. No: 012-4452-007,  
THB:Krung Thai Bank PCL  
Siam Square Br.,416/1-2 Rama I Rd.,Pathumwan, BKK 10330  
Thailand

ORIGINAL

Service Confirmation Number: 6904997683

Service Confirmation Date: 28.06.2023

#### Service Instrument:

Model Number	Model Description	Serial Number	System Handle	Parent Asset
SYS-GM-5977T-X	GCMS 5977 Turbo System Adv Funct			
G7077B	5977B Inert Plus MSD Turbo EI Mainframe	US1746M008	000000006002373266	SYS-GM-5977T-X
G4514A	7693A Tray, 150 Vial	CN17480003	000000006002373266	SYS-GM-5977T-X
TMR-ATOMX	Teledyne Tekmar Atomx	US10088004		SYS-GM-5977T-X
G4513A	7693A Autoinjector	CN17490204	000000006002373266	SYS-GM-5977T-X
G3440B	Agilent 7890B Series GC Custom	CN17493064	000000006002373266	SYS-GM-5977T-X

#### Service Items:



Item	Service/Part #	Description	Qty	Entitlement	Service Start	Service End
1000	PM	Preventive Maintenance	1.00	Agreement Entitlement - 100 % covered	26.06.2023	26.06.2023
1010	5188-6496	QuickPick Split Vent + Inlet PM Kit	1.00	Agreement Entitlement - 100 % covered		
1020	5188-6497	QuickPick Splitless Inlet/Vent PM Kit	1.00	Agreement Entitlement - 100 % covered		
1030	5191-5851	Agilent Vacuum Fluid 45 Platinum, 1Qt	1.00	Agreement Entitlement - 100 % covered		
1040	G7005-60061	Filament,high temperature EI for GCMS	2.00	Agreement Entitlement - 100 % covered		
1050	G8160-60120	Tubing, Drain, Self Retracting (per foot	1.00	Agreement Entitlement - 100 % covered		
1060	G1099-80039	Oil Mist Filter, 3/8 BSP Male Threads	1.00	Agreement Entitlement - 100 % covered		

#### Additional Information:

**Service Confirmation Number:** 6904997683

**Service Confirmation Date:** 28.06.2023

**Service Information:**

<b>Problem Description:</b> NR-C-PM-GMAtomX-5001151743		
<b>Service Provided:</b> PM 7890B/5977B/ATOMX. Clean source , change all comsumable.		
<b>Service Overview Code:</b> Reason Code: Scheduled Service Diagnosis Code: Scheduled Service Resolution Code: Scheduled Service		
<b>Reported Hours:</b> 6.0	<b>Travel Hours:</b> 2.0	
<b>Customer Field Service Representative Name:</b> Eaknarin Puangsopa	<b>Customer Field Service Representative Signature:</b> 	<b>Date:</b> 28 Jun 2023
<b>Customer Name:</b> Hatairat Linjee	<b>Customer Signature:</b> 	<b>Date:</b> 28 Jun 2023
<b>Additional Comments:</b>		