

ภาคผนวกที่ 30

เอกสารแสดงปริมาณของเหลว/สารเคมีที่ใช้ในการเจาะ
หลุมปิโตรเลียม และปริมาณเศษดินเศษหินจากการเจาะ

Location Name: YMG-A

Chemicals Used

PRODUCT	UNIT	CONSUMPTION
BENTONITE		
CALCIUM CARBONATE FINE		
CALCIUM CARBONATE MEDIUM		
CALCIUM CARBONATE COARSE		
CALCIUM CHLORIDE POWDER 94-97 PERCENT for SBM		
CALCIUM CHLORIDE POWDER 94-97 PERCENT for Completion Brine		
CYBERTROL		
AVOIL FC		
AVOIL WA/LT		
AVOIL VS/LT		
LIME		
BARITE for SBM		
BARITE for Cementing Spacer		
POTASSIUM CHLORIDE 97% Purity Minimum		
AVOIL PE/LT		
AVOIL SE/LT		
AVOIL FR/HT		
AVABENTOIL HY		
Escaid 110		
Saraline 185V		
NEWZAN D		

Summary Volume of Waste Disposal By Well

[illegible]

ภาคผนวกที่ 31
หนังสือรับรองผลการตรวจวัด

ภาคผนวกที่ 31 - 1
เศษดินเศษหินจากการเจาะ

Report No. : 2022-5003611-15(1) / 002-1 (Page 1 of 1)

Issued date : March 24, 2023

CLIENT : PTTEP SIAM LIMITED.

CONTACT :

ADDRESS :

Bangkok 10900

E-mail address :

Analysis Report

SAMPLE DESIGNATED AS : Cuttings

SAMPLING DATE : February 22, 2023

SAMPLING LOCATION : YMG-A (After Drilling) : Top Hole Cutting Pit,

SAMPLING TIME : 10:35

UTM47Q 0591385E, 1851407N

SAMPLING BY : Watchararat Linjee

Parameter	Unit (dry basis)	Method	Result	Standard	
				Class 1	Class 2
Electrical Conductivity (EC)*	dS/m	Electrical conductivity 1:5 soil to water ratio (EC 1:5)	0.71	-	-
Heavy Metals					
Arsenic (As)	mg/kg	U.S.EPA 3051A	13.2	6	25

Remark : - Analytical Methods followed to United States Environmental Protection Agency.

* Electrical Conductivity (EC), Chloride and Salinity (Soluble Salt) analysis by Department of Silviculture, Faculty of Forestry, Kasetsart University.

Source : - Notification of the National Environmental Board, Subject Soil Quality Standard, published in the Royal Government Gazette, Vol.138 special part 54D, dated March 11, B.E. 2564 (2021).

Standard of Soil Class 1 : for residential to protect the populace and a cluster of risky population i.g. children under 6 years old

Standard of Soil Class 2 : for merchandising, agriculture and other activities to protect working-age population and agriculturists



Thepsan Y.
(Thepsan Yommana)
Technical Manager

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ภาคผนวกที่ 31 – 2
คุณภาพน้ำใต้ดิน

Report No. : 2022-5003611-15(1) / 003-1 (Page 1 of 1)

Issued date : January 20, 2023

CLIENT : PTTEP SIAM LIMITED.

CONTACT :

ADDRESS :

Bangkok 10900

E-mail address :

Analysis Report

SAMPLE DESIGNATED AS : Groundwater Quality

SAMPLING DATE : November 15, 2022

SAMPLING BY : Watchararat Linjee

SAMPLING TIME : 10:38

SAMPLING LOCATION : YMG-A Drilling: Deep well (บ่อน้ำบาดาลภายในฐานหลุมผลิต), UTM47Q 0591371E, 1851512N

Parameters	Unit	Method	Results	Standard*		Standard**
				Optimal Value	Max. Allowable	
pH	-	APHA, 4500-H ⁺ B	8.4	7.0-8.5	6.5-9.2	-
Electrical Conductivity (EC)	µs/cm	APHA, 2510 B	323	-	-	-
Chloride (Cl)	mg/l	APHA, 4500-Cl D	<1	250	600	-
Total Hardness (as CaCO ₃)	mg/l	APHA, 2340 C	18	300	500	-
Total Dissolved Solids (TDS)	mg/l	APHA, 2540 C	167	>600	1,200	-
Arsenic (As)	mg/l	APHA, 3125 B	0.006	None	0.05	0.01
Barium (Ba)	mg/l	APHA, 3125 B	0.099	-	-	-
Cadmium (Cd)	mg/l	APHA, 3125 B	<0.0001	None	0.01	0.003
Chromium Hexavalent (Cr(VI))	mg/l	APHA, 3500-Cr B	<0.01	-	-	0.05
Iron (Fe)	mg/l	APHA, 3125 B	0.301	>0.5	1.0	-
Mercury (Hg)	mg/l	U.S.EPA 245.1	<0.0005	None	0.001	0.001
Manganese (Mn)	mg/l	APHA, 3125 B	0.285	>0.3	0.5	0.5
Lead (Pb)	mg/l	APHA, 3125 B	0.0027	None	0.05	0.01

Remarks : - Analytical Methods followed to Standard Methods for the Examination of Water and Wastewater, recommended by APHA, AWWA&WEF 23rd ed., 2017.

Sources : * Notification of the Ministry of Natural Resources and Environment, B.E. 2551 (2008), published in the Royal Government Gazette, Vol. 125, Special Part 85D, dated May 21, B.E. 2551 (2008)

** Notification of the National Environmental Board No. 20, B.E. 2543 (2000), published in the Royal Government Gazette, Vol. 117, Special part 95 D, dated September 15, B.E. 2543 (2000).

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Technical Manager

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Report No. : 2022-5003611-15 (1) / 003-2 (Page 1 of 2)

Issued date : March 13, 2023

CLIENT : PTTEP SIAM LIMITED.

CONTACT :

ADDRESS :

Bangkok 10900

E-mail address :

Analysis Report

SAMPLE DESIGNATED AS : Groundwater Quality

SAMPLING DATE : February 22, 2023

SAMPLING BY : Watchararat Linjee

SAMPLING TIME : 09:31

SAMPLING LOCATION : YMG-A (After Drilling) : Observation well (บ่อสังเกตการณ์น้ำใต้ดินในฐานหลุมผลิต)

UTM47Q 0591402E, 1851521N

Parameter	Unit	Method	Result	Standard*		Standard**
				Optimal Value	Max. Allowable	
pH	-	APHA, 4500-H+ B	8.2	7.0-8.5	6.5-9.2	-
Electrical Conductivity (EC)	µs/cm	APHA, 2510 B	330	-	-	-
Chloride (Cl)	mg/l	APHA, 4500 Cl ⁻ D	3	250	600	-
Total Dissolved Solids (TDS)	mg/l	APHA, 2540 C	194	>600	1,200	-
Total Petroleum Hydrocarbon (TPH)						
- C10-C14	mg/l	based on U.S.EPA 3510C/8015D	<0.050	-	-	-
- C15-C28	mg/l		<0.002			
- C29-C36	mg/l		<0.002			
VOC						
- Benzene	µg/L	APHA, 6200B	<0.5	-	-	5
- Toluene	µg/L		<1	-	-	1,000
- Ethylbenzene	µg/L		<1	-	-	700
- Xylene	µg/L		<1	-	-	10,000
Arsenic (As)	mg/l	APHA, 3125 B	0.019	None	0.05	0.01
Barium (Ba)	mg/l	APHA, 3125 B	0.156	-	-	-
Cadmium (Cd)	mg/l	APHA, 3125 B	0.0002	None	0.01	0.003
Copper (Cu)	mg/l	APHA, 3125 B	0.0047	>1.0	1.5	1.0
Total Chromium (Total Cr)	mg/l	APHA, 3125 B	<0.010	-	-	-
Mercury (Hg)	mg/l	APHA, 3112 B	<0.0005	None	0.001	0.001
Iron (Fe)	mg/l	APHA, 3125 B	2.085	>0.5	1.0	-
Lead (Pb)	mg/l	APHA, 3125 B	0.0132	None	0.05	0.01
Selenium (Se)	mg/l	APHA, 3125 B	<0.001	None	0.01	0.01
Zinc (Zn)	mg/l	APHA, 3125 B	1.369	>5.0	15.0	5.0

Remark : - Analytical Methods followed to Standard Methods for the Examination of Water and Wastewater, recommended by APHA-AWWA-WEF.
Sources : * Notification of the Ministry of Natural Resources and Environment, B.E. 2551 (2008), published in the Royal Government Gazette, Vol. 125, Special Part 85D, dated May 21, B.E. 2551 (2008).
 ** Notification of the National Environmental Board No. 20, B.E. 2543 (2000), published in the Royal Government Gazette, Vol. 117, Special part 95 D, dated September 15, B.E. 2543 (2000).

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Report No. : 2022-5003611-15 (1) / 003-2 (Page 2 of 2)

Issued date : March 13, 2023

CLIENT : PTTEP SIAM LIMITED.

CONTACT :

ADDRESS :

Bangkok 10900

E-mail address :

Analysis Report

SAMPLE DESIGNATED AS : Groundwater Quality

SAMPLING DATE : February 22, 2023

SAMPLING BY : Watchararat Linjee

SAMPLING TIME : 09:31

SAMPLING LOCATION : YMG-A (After Drilling) : Observation well (บ่อสังเกตการณ์น้ำใต้ดินในฐานหลุมผลิต)

UTM47Q 0591402E, 1851521N

Parameter	Unit	Method	Result	Standard*		Standard**
				Optimal Value	Max. Allowable	
Total Suspended Solids (SS)	mg/l	APHA, 2540 D	20	-	-	-
Cyanide	mg/l	APHA, 4500-CN C,E	<0.001	None	0.1	0.2
Sodium (Na)	mg/l	APHA, 3030 K,3120 B	5.16	-	-	-
Potassium (K)	mg/l	APHA, 3030 K,3120 B	1.26	-	-	-
Calcium (Ca)	mg/l	APHA, 3030 K,3120 B	5.42	-	-	-
Magnesium (Mg)	mg/l	APHA, 3030 K,3120 B	2.36	-	-	-
Sulfate (SO ₄ ²⁻)	mg/l	APHA, 4500 SO ₄ ²⁻ -E	4	>200	250	-
Nitrate (NO ₃ as N)	mg/l	APHA, 4110 B	0.706	>45	45	-
Carbonate Alkalinity (CO ₃)	mg/l CaCO ₃	APHA, 2320 B	<1	-	-	-
Bicarbonate Alkalinity (HCO ₃)	mg/l CaCO ₃	APHA, 2320 B	172	-	-	-
Silver (Ag)	mg/l	APHA, 3125 B	<0.001	-	-	-
Fecal Coliform Bacteria	MPN/100 ml	APHA, 9221B, 9221C, 9221E,	<1.1	-	-	-

Remark : - Analytical Methods followed to Standard Methods for the Examination of Water and Wastewater, recommended by APHA-AWWA-WEF.

Sources : * Notification of the Ministry of Natural Resources and Environment, B.E. 2551 (2008), published in the Royal Government Gazette, Vol. 125, Special Part 85D, dated May 21, B.E. 2551 (2008).

** Notification of the National Environmental Board No. 20, B.E. 2543 (2000), published in the Royal Government Gazette, Vol. 117, Special part 95 D, dated September 15, B.E. 2543 (2000).



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Report No. : 2022-5003611-15 (1) / 003-3 (Page 1 of 2)

Issued date : March 13, 2023

CLIENT : PTTEP SIAM LIMITED.

CONTACT :

ADDRESS :

Bangkok 10900

E-mail address :

Analysis Report

SAMPLE DESIGNATED AS : Groundwater Quality

SAMPLING DATE : February 22, 2023

SAMPLING BY : Watchararat Linjee

SAMPLING TIME : 11:10

SAMPLING LOCATION : YMG-A (After Drilling) : U2, บ่อน้ำใต้ดิน บ้านเลขที่ 38 หมู่ที่ 2 บ้านวังกร่าง ต.ทุ่งยางเมือง อ.ศรีราชา จ.ชลบุรี UTM47Q 0590551E, 1851674N

Parameter	Unit	Method	Result	Standard*		Standard**
				Optimal Value	Max. Allowable	
pH	-	APHA, 4500-H+ B	7.0	7.0-8.5	6.5-9.2	-
Electrical Conductivity (EC)	µs/cm	APHA, 2510 B	829	-	-	-
Chloride (Cl)	mg/l	APHA, 4500 Cl D	25	250	600	-
Total Dissolved Solids (TDS)	mg/l	APHA, 2540 C	491	>600	1,200	-
Total Petroleum Hydrocarbon (TPH)						
- C10-C14	mg/l	based on U.S.EPA 3510C/8015D	<0.050	-	-	-
- C15-C28	mg/l		<0.002			
- C29-C36	mg/l		<0.002			
VOC						
- Benzene	µg/L	APHA, 6200B	<0.5	-	-	5
- Toluene	µg/L		<1	-	-	1,000
- Ethylbenzene	µg/L		<1	-	-	700
- Xylene	µg/L		<1	-	-	10,000
Arsenic (As)	mg/l	APHA, 3125 B	0.002	None	0.05	0.01
Barium (Ba)	mg/l	APHA, 3125 B	0.083	-	-	-
Cadmium (Cd)	mg/l	APHA, 3125 B	<0.0001	None	0.01	0.003
Copper (Cu)	mg/l	APHA, 3125 B	0.0025	>1.0	1.5	1.0
Total Chromium (Total Cr)	mg/l	APHA, 3125 B	<0.010	-	-	-
Mercury (Hg)	mg/l	APHA, 3112 B	<0.0005	None	0.001	0.001
Iron (Fe)	mg/l	APHA, 3125 B	0.041	>0.5	1.0	-
Lead (Pb)	mg/l	APHA, 3125 B	<0.0002	None	0.05	0.01
Selenium (Se)	mg/l	APHA, 3125 B	<0.001	None	0.01	0.01
Zinc (Zn)	mg/l	APHA, 3125 B	0.006	>5.0	15.0	5.0

Remark : - Analytical Methods followed to Standard Methods for the Examination of Water and Wastewater, recommended by APHA-AWWA-WEF.

Sources : * Notification of the Ministry of Natural Resources and Environment, B.E. 2551 (2008), published in the Royal Government Gazette, Vol. 125, Special Part 85D, dated May 21, B.E. 2551 (2008).

** Notification of the National Environmental Board No. 20, B.E. 2543 (2000), published in the Royal Government Gazette, Vol. 117, Special part 95 D, dated September 15, B.E. 2543 (2000).

SGS (THAILAND) LIMITED

Thepsan Y.
(Thepsan Yommana)
Technical Manager

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Report No. : 2022-5003611-15 (1) / 003-3 (Page 2 of 2)

Issued date : March 13, 2023

CLIENT : PTTEP SIAM LIMITED.

CONTACT :

ADDRESS :

Bangkok 10900

E-mail address :

Analysis Report

SAMPLE DESIGNATED AS : Groundwater Quality

SAMPLING DATE : February 22, 2023

SAMPLING BY : Watchararat Linjee

SAMPLING TIME : 11:10

SAMPLING LOCATION : YMG-A (After Drilling) : U2, บ่อน้ำใต้ดิน บ้านเลขที่ 38 หมู่ที่ 2 บ้านวังกว้าง ต.ทุ่งยางเมือง อ.ศรีราชา จ.ชลบุรี UTM47Q 0590551E, 1851674N

Parameter	Unit	Method	Result	Standard*		Standard**
				Optimal Value	Max. Allowable	
Total Suspended Solids (SS)	mg/l	APHA, 2540 D	<2.5	-	-	-
Cyanide	mg/l	APHA, 4500-CN C,E	0.001	None	0.1	0.2
Sodium (Na)	mg/l	APHA, 3030 K,3120 B	1.29	-	-	-
Potassium (K)	mg/l	APHA, 3030 K,3120 B	0.91	-	-	-
Calcium (Ca)	mg/l	APHA, 3030 K,3120 B	39.23	-	-	-
Magnesium (Mg)	mg/l	APHA, 3030 K,3120 B	16.74	-	-	-
Sulfate (SO ₄ ²⁻)	mg/l	APHA, 4500 SO ₄ ²⁻ -E	24	≠200	250	-
Nitrate (NO ₃ as N)	mg/l	APHA, 4110 B	0.528	≠45	45	-
Carbonate Alkalinity (CO ₃)	mg/l CaCO ₃	APHA, 2320 B	<1	-	-	-
Bicarbonate Alkalinity (HCO ₃)	mg/l CaCO ₃	APHA, 2320 B	381	-	-	-
Silver (Ag)	mg/l	APHA, 3125 B	<0.001	-	-	-
Fecal Coliform Bacteria	MPN/100 ml	APHA, 9221B, 9221C, 9221E,	1.1	-	-	-

Remark : - Analytical Methods followed to Standard Methods for the Examination of Water and Wastewater, recommended by APHA-AWWA-WEF.

Sources : * Notification of the Ministry of Natural Resources and Environment, B.E. 2551 (2008), published in the Royal Government Gazette, Vol. 125, Special Part 85D, dated May 21, B.E. 2551 (2008).

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SGS (THAILAND) LIMITED

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Technical Manager

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ภาคผนวกที่ 32
ผลการเปรียบเทียบอุปกรณ์และเครื่องมือตรวจวัด

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



NSC-TISI-TIS 17025
CALIBRATION 0062

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 4 0 0 7 0 8 *

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: Balance Lab

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: 23.4 °C	End: 23.5 °C	Start: 74.0 %	End: 72.6 %

As Found Calibration Date: 18-Mar-2022
As Left Calibration Date: N/A
Issue Date: 19-Mar-2022

Calibrator:

Sirasit K

Sirasit Kositcharoenkul

Approved Signatory:

Kassakorn

- ☒ Kassakorn Tassanachaisakul
☐ Santi Jitniyom
☐ Surachet Sukkate

Measurement Results

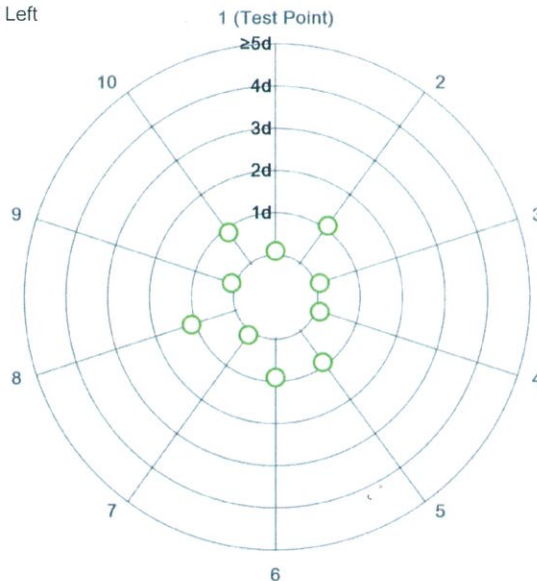
Repeatability

Test Load: 70 g

	As Found	As Left
1	69.99992 g	N/A
2	69.99993 g	N/A
3	69.99992 g	N/A
4	69.99992 g	N/A
5	69.99991 g	N/A
6	69.99991 g	N/A
7	69.99992 g	N/A
8	69.99993 g	N/A
9	69.99992 g	N/A
10	69.99991 g	N/A

Standard Deviation	0.000007 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.

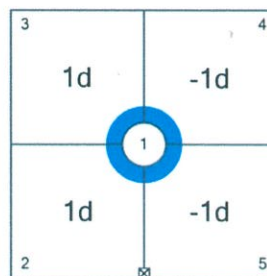
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	99.9999 g	N/A
2	100.0000 g	N/A
3	100.0000 g	N/A
4	99.9998 g	N/A
5	99.9998 g	N/A

Maximum Deviation	0.0001 g	N/A
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As Found

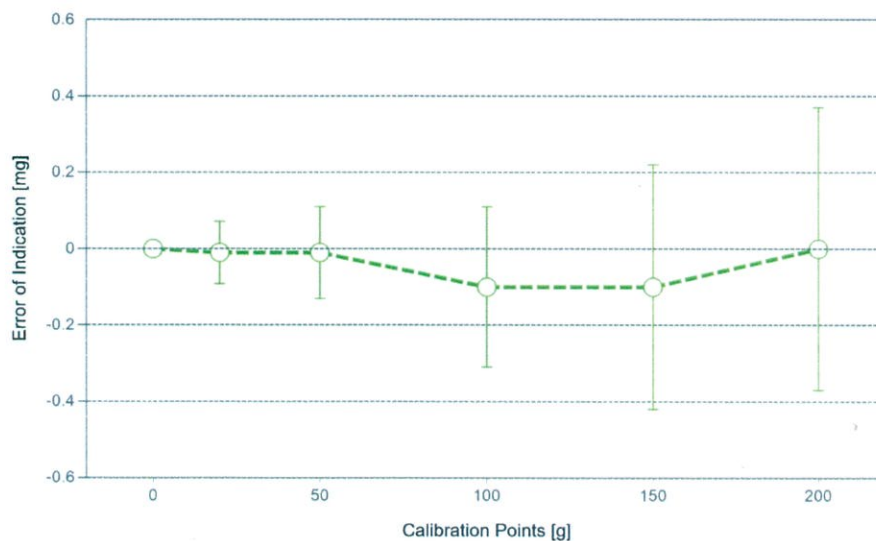
The "d" in the graph represents the readability of the range/interval in which the test was performed.

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	0.00999 g	-0.00001 g	0.018 mg	2
3	0.10000 g	0.10000 g	0.00000 g	0.022 mg	2
4	1.00000 g	1.00000 g	0.00000 g	0.032 mg	2
5	5.00000 g	5.00000 g	0.00000 g	0.048 mg	2
6	9.99999 g	9.99999 g	0.00000 g	0.061 mg	2
7	19.99995 g	19.99994 g	-0.00001 g	0.082 mg	2
8 ¹	49.99998 g	49.99997 g	-0.00001 g	0.12 mg	2
9	100.0000 g	99.9999 g	-0.0001 g	0.21 mg	2
10	150.0000 g	149.9999 g	-0.0001 g	0.32 mg	2
11	199.9998 g	199.9998 g	0.0000 g	0.37 mg	2

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



○ As Found

◆ As Left

For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

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.:	WS34	Date of Issue:	05-Jul-2021
Certificate Number:	174045	Calibration Due Date:	01-Jan-2023

Weight Set 2: OIML E2

Weight Set No.:	WS71	Date of Issue:	21-Oct-2021
Certificate Number:	C142784703	Calibration Due Date:	27-Mar-2023

Hygrometer

Equipment No.:	IN285	Date of Issue:	11-May-2021
Certificate Number:	21H1104	Calibration Due Date:	06-May-2022

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

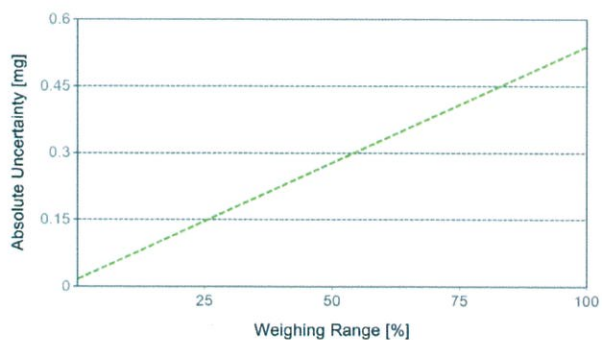
Linearization of Uncertainty Equation

Range			As Found	As Left
	d	Max		
1	0.00001 g	81 g	$U_1 = 0.017 \text{ mg} + 0.00645 \text{ mg/g} \cdot R$	N/A
2	0.0001 g	220 g	$U_2 = 0.06 \text{ mg} + 0.00639 \text{ mg/g} \cdot R$	N/A

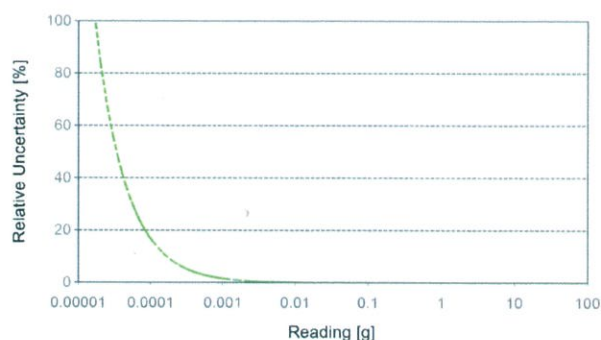
To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

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	0.0084%	N/A	N/A
2.20000 g	0.031 mg	0.0014%	N/A	N/A
220.0000 g	1.5 mg	0.00067%	N/A	N/A



As Found



As Left

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.

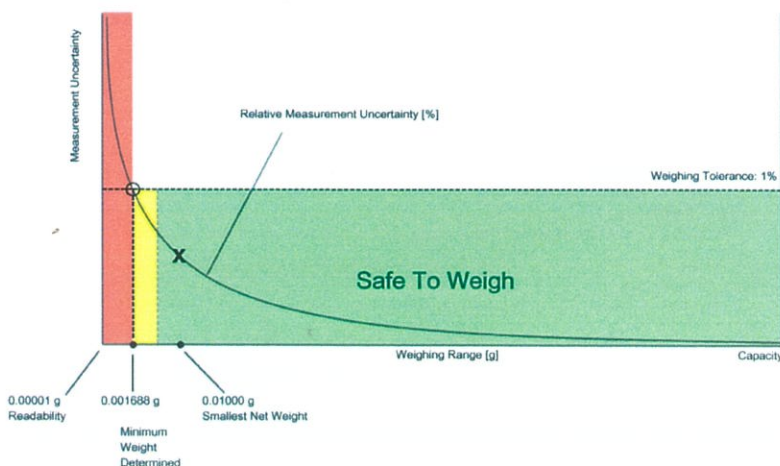
Process Requirements

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%	0.016975 g	0.034172 g	0.051595 g	0.087139 g	0.180288 g
0.2%	0.008460 g	0.016975 g	0.025545 g	0.042855 g	0.087139 g
0.5%	0.003377 g	0.006764 g	0.010159 g	0.016975 g	0.034172 g
1%	0.001688 g	0.003377 g	0.005069 g	0.008460 g	0.016975 g
2%	0.000844 g	0.001688 g	0.002532 g	0.004223 g	0.008460 g
5%	0.000337 g	0.000675 g	0.001012 g	0.001688 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%	0.016975 g	0.034172 g	0.051595 g	0.087139 g	0.180288 g
0.2%	0.008460 g	0.016975 g	0.025545 g	0.042855 g	0.087139 g
0.5%	0.003377 g	0.006764 g	0.010159 g	0.016975 g	0.034172 g
1%	0.001688 g	0.003377 g	0.005069 g	0.008460 g	0.016975 g
2%	0.000844 g	0.001688 g	0.002532 g	0.004223 g	0.008460 g
5%	0.000337 g	0.000675 g	0.001012 g	0.001688 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
19.99995 g	-0.00001 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g
49.99998 g	-0.00001 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g
100.0000 g	-0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0000 g	-0.0001 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
199.9998 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
19.99995 g	-0.00001 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g
49.99998 g	-0.00001 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g
100.0000 g	-0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0000 g	-0.0001 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
199.9998 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.

Service Date: 2022-03-18
 Document Number: TH2076-029-031822-LABBalanceHR
 SGS (THAILAND) CO.,LTD.
 1/209,1/211 Moo 1, Ban Chang, Ban Chang, Rayong 21130
 Hatairat Linjee

METTLER TOLEDO

Balance Health Report

Device Details

System Details			
Manufacturer:	Mettler Toledo	Accessory 1:	
Model:	XS205DU	Accessory 2:	
Serial number:	B036065880	Weight set for routine testing:	Yes /
Firmware:	1.0/5.0		

History

Device History		Service History	
Instrument in use:	Yes	Last preventive maintenance:	< 1 year
Instrument age:	> 10 years	Last instrument calibration:	< 1 year
Spare parts available:	Yes	Last minimum weight determination:	Never
Regulations:	ISO		
Process tolerance in %:	1%	Routine testing performed:	Yes
Smallest sample net weight:	0.01000g		

Check List

Environmental Conditions		General & Functional Checks	
Room temperature fluctuation	✓	Levelling	✓
Exposure to direct sun	✓	Cleanliness	✓
Vibrations	✓	Completeness - missing parts see additional remarks	✓
Draft	✓	Settings optimized for operating environment	✓
Dirt or dust	✓	Other - objections noted as additional remarks	—
Static	✓	Electrical Component Checks	
Mechanical Component Checks		Power supply	✓
Draft shield	✓	Sliding door drive	✓
Weighing pan position	✓	Internal weight drive	✓
Housing	✓	Display	✓
Other - objections noted as additional remarks	—	Other - objections noted as additional remarks	—

Recommendations

Measurement Result Quality		Process Efficiency	
Instrument calibration		Uninstall instrument	
Identify safe weighing range		Replace instrument	
GWP verification / risk assessment		Replace / add parts (see additional remarks)	
Preventive maintenance		Onsite repair	
Perform routine testing with test weights		Depot repair	
User training		Use of accessories (see additional remarks)	

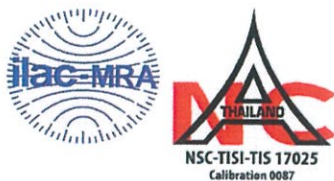
Contact	Name: Hatairat Linjee	Position: Chemist	Phone: 0922693909	Email: envlab.ryg.thailand@sgs.com
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Additional Remarks & Recommendations		Engineer Details	
		Date:	18-Mar-2022
		Name:	Sirasit Kositcharoenkul
		Signature:	<i>Sirasit K</i>

This is not a certificate.

It should not be used to interpret final results for the testing of these devices.

Legend: ✓ Good/Pass ⚠ Needs Attention ✗ Bad/Fail — Not Applicable



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.: C24220063
Issued Date: 15 March 2022
Job No.: KSPR2202782
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, SPC RT Co., Ltd.
 1194 Soi Wachirathamsathit 57, Sukhumvit 101/1 Rd.,
 Bangchak, Prakhonong, Bangkok 10260 Thailand

Calibration By: Mr. Wasan Nuchnabee

Calibration Date: 9 March 2022

The Method used: In house method, SPCC-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. 794135, 794136, 794137

(Mr. Wasan Nuchnabee)

Person in charge

บริษัท เอสพีซี อาร์ที จำกัด
SPC RT Co., Ltd.

(Mr. Dumrong Boonsopon)

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 SPC RT Co., Ltd.

Certificate No.: C24220063

Page: 2 of 2

Calibration Results:**Before Adjustment**

Standard Conductivity Solution	Unit Under Calibration Reading	Correction	Coverage Factor (k)	Uncertainty (±)
25.000 $\mu\text{S/cm}$	25.4 $\mu\text{S/cm}$	-0.400 $\mu\text{S/cm}$	2.00	0.22 $\mu\text{S/cm}$
1413.0 $\mu\text{S/cm}$	1397 $\mu\text{S/cm}$	16.0 $\mu\text{S/cm}$	2.00	8.9 $\mu\text{S/cm}$
111.3 mS/cm	107.5 mS/cm	3.80 mS/cm	2.00	0.66 mS/cm

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

Standard Conductivity Solution	Unit Under Calibration Reading	Correction	Coverage Factor (k)	Uncertainty (±)
25.000 $\mu\text{S/cm}$	28.5 $\mu\text{S/cm}$	-3.500 $\mu\text{S/cm}$	2.00	0.22 $\mu\text{S/cm}$
1413.0 $\mu\text{S/cm}$	1413 $\mu\text{S/cm}$	0.0 $\mu\text{S/cm}$	2.00	8.9 $\mu\text{S/cm}$
111.3 mS/cm	109.5 mS/cm	1.80 mS/cm	2.00	0.67 mS/cm

The End of Certificate

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: KSPR2202782

ชนิดเครื่องมือ: CONDUCTIVITY METER

รุ่น: HQ14d

หมายเลขเครื่อง: 141200015083

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
09 Mar 2022			09 Mar 2022		
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. สวิทช์ 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 ไม่เกิน 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 25.1 °C โดย Control Waterbath ที่ 25.0 \pm 0.1 °C

Mr. Wasan Nuchnabee

Service Engineer



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.: 22LM108

Page.: 1 of 2

Certificate of Calibration

Equipment : DO Meter with Sensor
Manufacturer : YSI
Model : 5000
Serial No. : 17E101765
ID No. : D2017006
Submitted by : SGS (Thailand) Limited
1/209, 1/211 Moo 1 T. Ban Chang,
A. Ban Chang,
Rayong 21130
Location : TPA Onsite Calibration Laboratory
Received Order : 26 July 2022
Calibrated Date : 4 August 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V

Calibrated by : Man Pattanapongpaiboon

Approved by :

Approved Signatory

() Pornthippa Tameyakul

(☒) Malee Butkruea

() Suwit Imjai

Issue Date : 9 August 2022

The Uncertainties are for a confidence probability of approximately 95%

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

A 0043379



Equipment : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2207-0794WSC-4

Cert. No.: 22LM108

Page.: 2 of 2

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Digital Thermometer	1502A	A52847	21I1144	20 Oct 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 : Temperature measurement.

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

<u>Calibration Point</u> (°C)	<u>Immersion Depth</u> (mm)	<u>Standard Temperature</u> (°C)	<u>UUC* Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty</u> (± °C)	<u>Coverage Factor</u> <i>k</i>
20.00	60	20.002	19.97	-0.032	0.15	2.00

UUC* : Unit Under Calibration

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

-o0o-

Malu



CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022

Cert No. 22/2279

Site Calibration

Order No. 22060270

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, 2022

Date of Calibration Jun 21, 2022

Environment

Temperature (Min) 22.8 °C (Max) 24.6 °C

Relative Humidity (Min) 64.1 %RH (Max) 71.5 %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. MY49013906, Certificate No. QR22-0228, Calibrated by Quality Reborn Co., Ltd., ONAC Calibration No. 0292.

This certificate is traceable to SI unit.



CALIBRATION CERTIFICATE

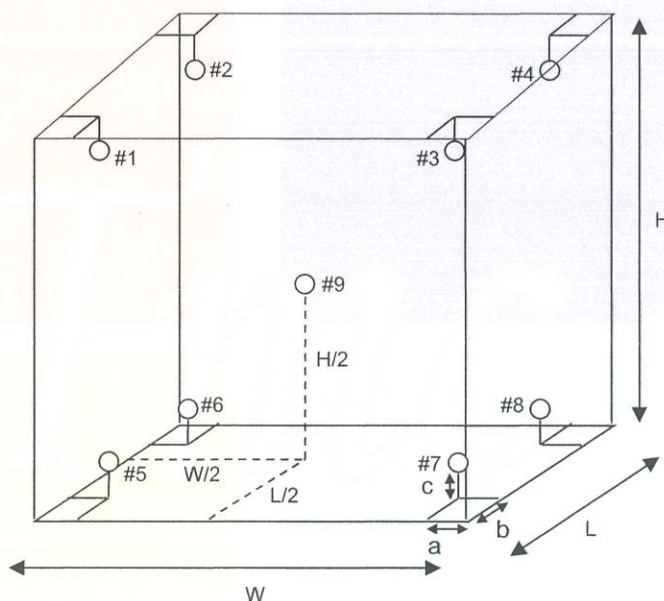
Date of Issue Jun 29, 2022

Site Calibration

Cert No. 22/2279

Order No. 22060270

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.



CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022

Cert No. 22/2279

Site Calibration

Order No. 22060270

Results (without adjustment)

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability \pm (°C)	Uniformity (°C)	Uncertainty \pm (°C)
20.0	19.8	Position 1	20.184	0.377	0.323	0.67
		Position 2	20.144			
		Position 3	20.279			
		Position 4	20.013			
		Position 5	20.079			
		Position 6	20.075			
		Position 7	19.983			
		Position 8	20.075			
		Position 9	20.050			

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.

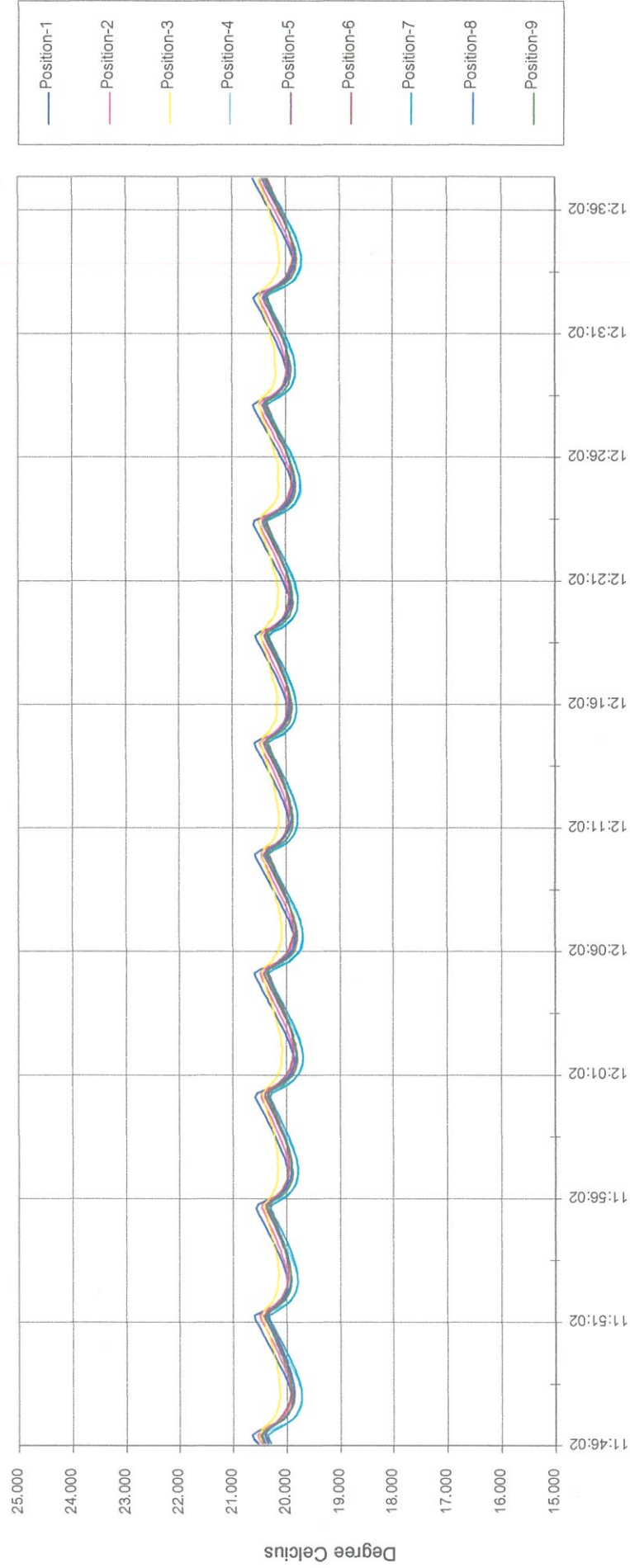
APPROVED SIGNATORY :


(MR. JATURAPAT THONGSOOKCHOTE)

Cert.No. 22/2279

Incubator

Model. i250DS S/N. 12S0402-0810-0319 ID.No. I2010004



Time

Handwritten signature and initials.

PlasmaQuant® MS (Elite) ICP-MS



1 Customer and service data

Customer data

Company	SGS Rayong
Department	Lab Environment
Name	
Address (Street, Number, ZIP code, City)	1/209 Moo1 Tambon Ban Chang, A. Muang 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 Far East Thailand
Date of the Maintenance	9 Sep 2022

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

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)

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 dismounted. 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>2.74</i>
<input checked="" type="checkbox"/>	Clean entrance lens and entrance plate Detector voltage is: <i>3087</i>

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.
<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.
<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 100 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 ₂ ~100 kPa (16 psi)

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

Comments and recommendations:

—

Somchai Noomfak

Authorized Person Analytik Jena AG
(Name in bloc letters)

Analytik Jena Far East Thailand

Company

Somchai N.

Signature authorized person

9 Sep 2022

Place, date (DD/MM/YYYY)

Sirirat Saelim

Customer (name in bloc letters)

Sirirat S.

Signature Customer

09/09/2022

Place, date (DD/MM/YYYY)

Service Report

Customer's address : SGS Rayong		Customer's Ref. No.	
Lab Environment			
1/209 Moo1 Tambon Ban Chang, A. Muang Rayong			
E-mail :	Phone :	Fax :	
Job No. 2209403 PM	User: PHXSN	Service Engineer: Samchai N.	Date: 8-9/09/2022 Page: 1/1
Instrument model: PQMSElite		Serial No. 10-5000-030-26-AR 109	Software Version No. 4.3.1
<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 : PM 2/2			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Error Code
Action taken : - Clean chiller - replace water, clean water filter, pressure = 4.1 bar. - adjust water conductivity = 100 µS - clean cones and lens 1, lens 2 - clean exhaust sensor - Replace vacuum oil trap - Replace sampler cone's o-ring, skimmer cone's o-ring. - Replace spray chamber's o-rings. - Replace water tubing for spray chamber - perform -plasma alignment H2V, Resolution & trim, Mass calibration, detector setup = 30 - Performance test with 1 ppb tuning standard, instrument working properly.			
Action Pending / Recommendation : * use soap cleaning powder			
<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 Sirivat S. 09/09/2022	Date / Signature of Service Engineer Samchai N.
		Work completed? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

SGS (Thailand) limited Rayong

Automatic Mercury Analyzer

Model RA-4500

Preventive Maintenance Report

Serial No. : 14780131

Soft version : Ver 1.4.0

ROM version : Ver 1.4.0

Date : February 08 2022

PM by : Pradit mayong
(Pradit M.)

Approved by : [Signature]
(Pathom S.)



Coax Group Corporation Ltd.

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

Kwang Thanon Nakornchaisri, Dusit, Bangkok 10300 Thailand

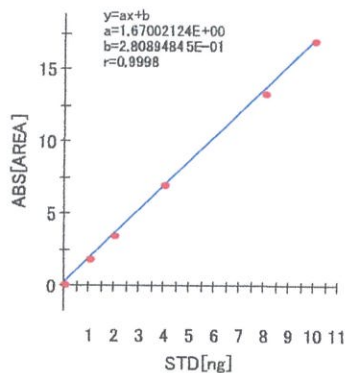
Tel. 02-2435263, 02-6682436 Fax. 02-2437386

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	0.9998	OK
		(r) \geq 0.9990		
3. Repeatability(AREA)				
	3.1 No Pretreatment 10ppb, n=3		1. 9.62 ppb	
			2. 9.20 ppb	
			3. 9.19 ppb	
		C.V. \leq 5%	2.59%	OK
4. Blank				
		Below 1.0(AREA)	0.257	OK

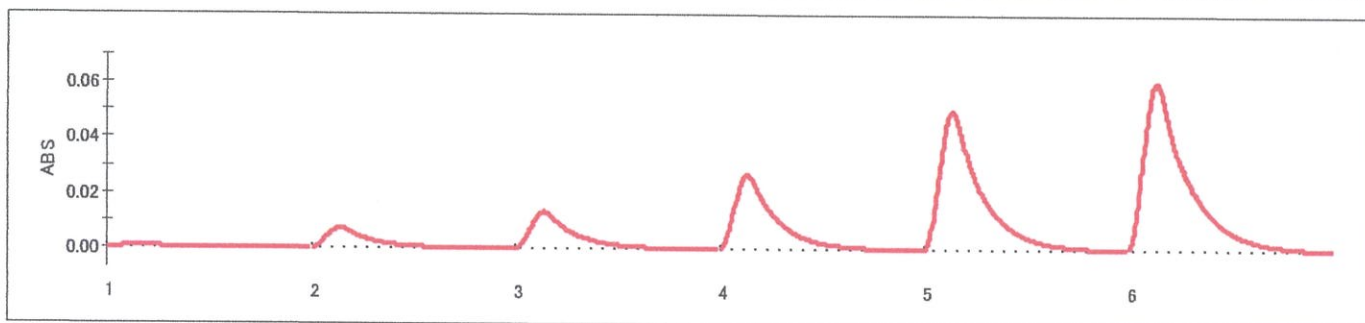
Title : Preventive Maintenance RA-4500 Sn:14780131
 Date : 2/8/2022
 Name : Coax Group
 Memo : Calibration Curve 0-10 ng

Calib



STD

No.	STD [ug/L]	SVOL [mL]	CVOL [mL]	DVOL [mL]	STD [ng]	AREA [ON]	MEAS [ng]	Dev [%]	Note
1	10.000	0.000	5.000	5.000	0.000	0.2398	-0.0246	-	
2	10.000	0.100	5.000	5.000	1.000	1.9539	1.0018	0.2	
3	10.000	0.200	5.000	5.000	2.000	3.6151	1.9965	0.2	
4	10.000	0.400	5.000	5.000	4.000	7.0990	4.0826	2.1	
5	10.000	0.800	5.000	5.000	8.000	13.4424	7.8810	1.5	
6	10.000	1.000	5.000	5.000	10.000	17.0857	10.0626	0.6	

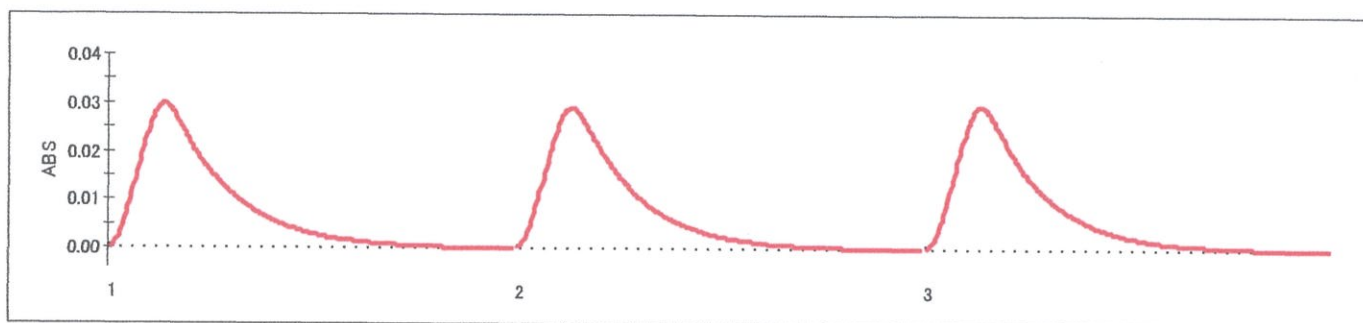


SMP

No.	NAME	SVOL [mL]	CVOL [mL]	DVOL [mL]	AREA [ON]	MEAS [ng]	CONC [ug/L]	Note
1	hg 10ppb	0.500	5.000	5.000	8.3092	4.8073	9.615	
2	hg 10ppb	0.500	5.000	5.000	7.9634	4.6002	9.200	
3	hg 10ppb	0.500	5.000	5.000	7.9569	4.5964	9.193	

Statistics

No.	NAME	TRY	AV [ug/L]	SD [ug/L]	Cv [%]
1	hg 10ppb	3	9.3360	0.241646	2.59



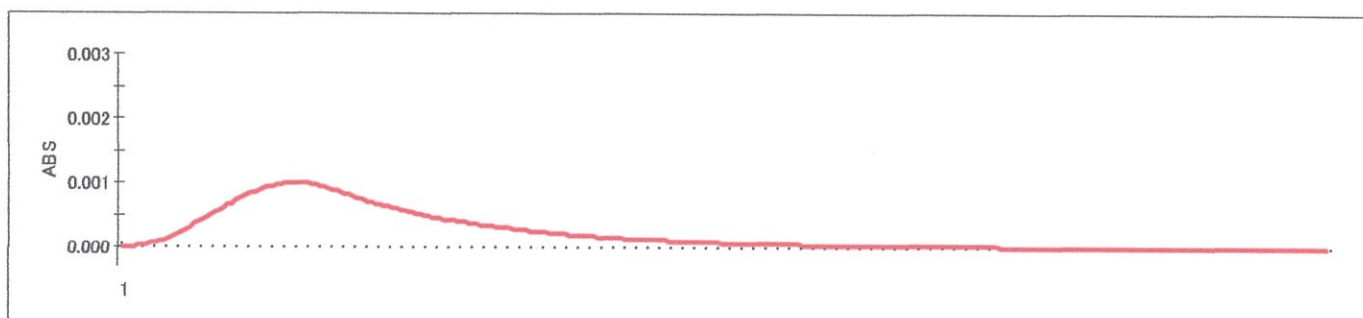
Self Check

Heat check:PASS!! (28.9degC[05:00] -> 33.0degC[02:50])
Sensor check:PASS!! (155- 20= 135)
Leak check:PASS!! (0.18L/min)
Sig/Ref check:PASS!! (Sig:3.72V, Ref:3.91V)
Drift check:PASS!! (-0.0000009 - -0.0000612 = 0.0000603)

Title : Preventive Maintenance RA-4500 Sn:14780131
 Date : 2/8/2022
 Name : Coax Group
 Memo : Blank

SMP

No.	NAME	SVOL [mL]	CVOL [mL]	DVOL [mL]	AREA [ON]	MEAS [ng]	CONC [ug/L]	Note
1	blank	0.000	0.000	0.000	0.2578	-0.0138	0.000	



Self Check

Heat check:PASS!! (28.9degC[05:00] -> 33.0degC[02:50])
 Sensor check:PASS!! (155- 20= 135)
 Leak check:PASS!! (0.18L/min)
 Sig/Ref check:PASS!! (Sig:3.72V, Ref:3.91V)
 Drift check:PASS!! (-0.0000009 - -0.0000612 = 0.0000603)



CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022

Cert No. 22/2280

Site Calibration

Order No. 22060270

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, 2022

Date of Calibration Jun 21, 2022

Environment

Temperature	(Min)	23.3	°C	(Max)	28.7	°C
Relative Humidity	(Min)	42.5	%RH	(Max)	69.7	%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. QR22-1088, Calibrated by Quality Reborn Co., Ltd., ONAC Calibration No. 0292.

This certificate is traceable to SI unit.



CALIBRATION CERTIFICATE

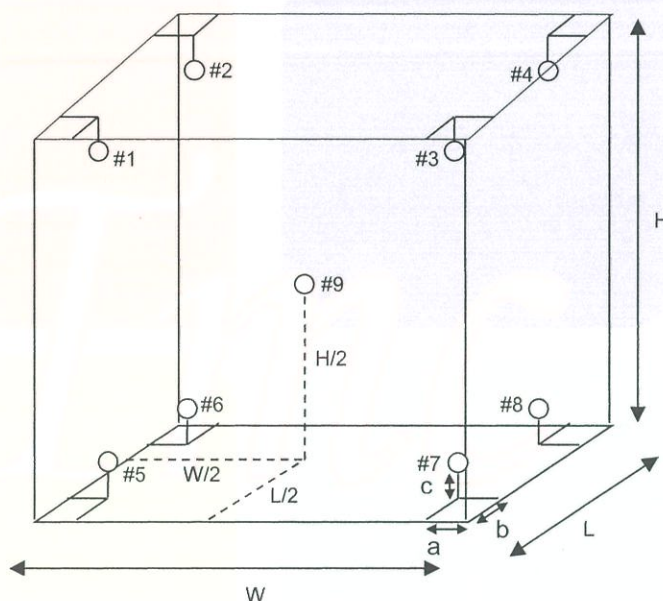
Date of Issue Jun 29, 2022

Cert No. 22/2280

Site Calibration

Order No. 22060270

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.



CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022

Cert No. 22/2280

Site Calibration

Order No. 22060270

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	85.635	0.075	1.415	0.45
		Position 2	85.580			
		Position 3	84.985			
		Position 4	85.222			
		Position 5	85.231			
		Position 6	85.297			
		Position 7	83.795			
		Position 8	84.736			
		Position 9	85.137			

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability \pm (°C)	Uniformity (°C)	Uncertainty \pm (°C)
104.0	104.0	Position 1	104.701	0.094	1.692	0.57
		Position 2	104.648			
		Position 3	103.856			
		Position 4	104.127			
		Position 5	104.250			
		Position 6	104.371			
		Position 7	102.575			
		Position 8	103.731			
		Position 9	104.137			



CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022

Cert No. 22/2280

Site Calibration

Order No. 22060270

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	151.078	0.160	2.300	0.70
		Position 2	151.176			
		Position 3	149.441			
		Position 4	150.079			
		Position 5	150.558			
		Position 6	150.878			
		Position 7	148.111			
		Position 8	150.052			
		Position 9	150.278			

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability \pm (°C)	Uniformity (°C)	Uncertainty \pm (°C)
180.0	180.0	Position 1	181.137	0.207	2.541	0.76
		Position 2	181.344			
		Position 3	179.363			
		Position 4	179.921			
		Position 5	180.564			
		Position 6	181.059			
		Position 7	177.811			
		Position 8	180.259			
		Position 9	180.175			



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.th



CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022

Cert No. 22/2280

Site Calibration

Order No. 22060270

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.

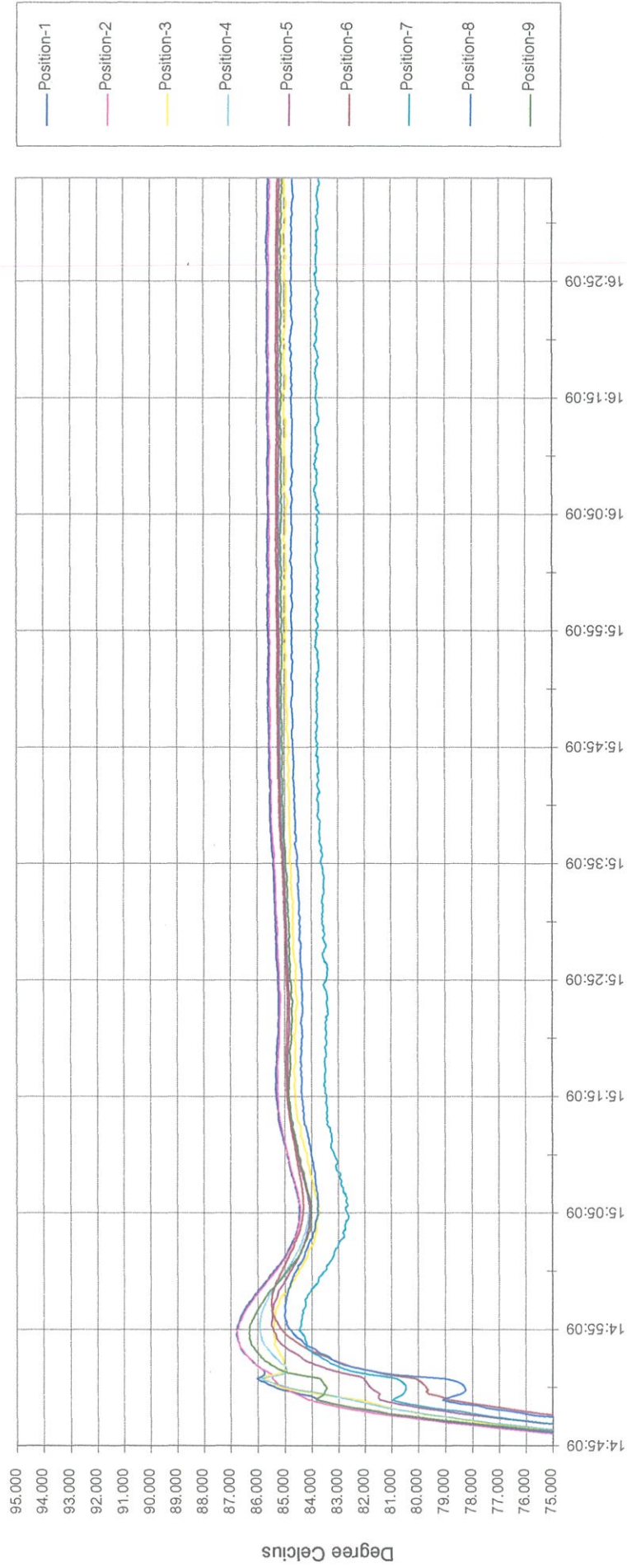
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with ONAC requirements.

APPROVED SIGNATORY :


(MR. JATURAPAT THONGSOOKCHOTE)

Cert.No. 22/2280

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



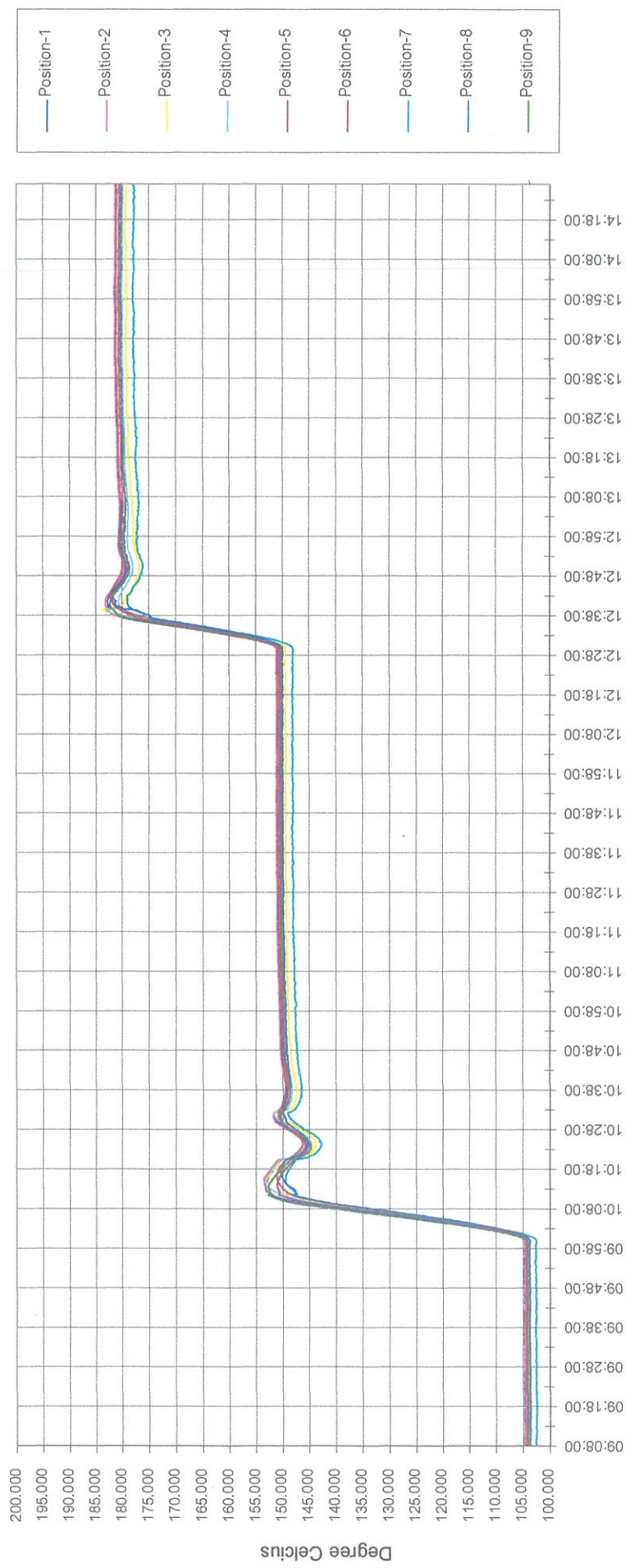
Time

Handwritten signature

Cert.No. 22/2280

Oven

Model. UFE400 S/N. G410.0833 ID.No. O2010002



Time

Handwritten signature



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.: 22CH125
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 : 25 January 2022
Calibration Date : 26 January 2022
Reference : 2201-0788WSC-1
Submitted by : SGS (Thailand) Limited
1/209, 1/211 Moo 1, T.Ban Chang,
A.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 Lernagtrakul

Approved by : 
Approved Signatory

- (☒) Malee Butkruea
() Saithip Meangmai
() Warakorn Lernagtrakul

Issue Date : 3 February 2022

The Uncertainties are for a confidence probability of approximately 95%

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

A 0037374



Cert.No.: 22CH125

Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument : -

<u>Instrument</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	54030049	130RC116	21E2682	25 Aug 2022
2) Ref. Standard Thermometer	4982054	110RC044	21I1201	26 Oct 2022

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	766820	23 Sep 2023
pH 6.983	CPA chem	766822	04 Sep 2022
pH 10.015	CPA chem	766824	04 Sep 2022

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 (±mV)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter S/N.: 1231235141	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

Malu



Cert.No.: 22CH125

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.: 8446396	4.008	4.009	173.5	0.0042	2.00
	6.983	6.983	-1.5	0.0084	2.00
	10.015	10.014	-177.2	0.0068	2.00

Function : Temperature Measurement**(*) Without adjustment**

This equipment was connected with Temperature Probe;

- Model : InLab Expert Pro
- Serial No. : 8446396

Dimension of probe;

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

Calibration Point ($^{\circ}\text{C}$)	Standard Temperature ($^{\circ}\text{C}$)	UUC* Reading ($^{\circ}\text{C}$)	Error ($^{\circ}\text{C}$)	Uncertainty of measurement (\pm $^{\circ}\text{C}$)	Coverage factor k
25.0	25.003	24.9	-0.103	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-

Make.

7890 GC**Preventive Maintenance Checklist – Standard**

Agilent Preventive Maintenance provides factory recommended service for your analytical systems 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 everything you need to reduce unplanned downtime and keep your systems operating at their peak.

For more information about Agilent Technologies GC Support please visit our web site using the following URL:

<http://www.agilent.com/en-us/products/gas-chromatography/gc-systems/7890b-gc#support>

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.
- 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 additional or special procedures and/or parts for the instrument service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Service Engineer's Responsibilities

- Only complete sections that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using a "X" or tick mark "✓" in the checkbox.
- Complete Not Applicable check boxes to indicate services not delivered, as needed.
- Complete the PM Service in the order of the tasks listed.
- Complete the Service Review section together with the customer.

Additional Instruction Notes

- Check for any active service notes for this unit. If there are any applicable "Safety" or "Modification Recommended" Service notes, plan to implement the changes on this unit before doing any qualification service.
- Do not implement firmware updates, unless you get approval from the customer and are sure that they are compatible with the instrument control software.

7890 GC
Preventive Maintenance Checklist – Standard

System Information

Guidance

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

Instrument system name and ID	CN17493064
Instrument system site and location	Laboratory
List system component product numbers	List the serial numbers of each component
1. G3440B	1. CN17493064
2. G4513A	2. CN17490204
3. G4514A	3. CN17480003
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

Preparation

- ☒ Discuss any specific issues with the customer prior to starting.
- ☒ Review the instrument logbook.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform general inspection of system for cleanliness
- ☒ Check for proper installation of safety-related parts, assemblies, sensors etc.
- ☒ Check for required firmware updates and verify with customers if they would like it installed.
- ☐ Before starting the following procedures, record the Detector Signal Output(s) in the results table. If the GC is turned OFF or in a service mode, comparing the detector outputs before and after the service is not possible.

7890 GC Preventive Maintenance Checklist – Standard

Clean and inspect GC

- ☒ Unplug power cord from the power source.
- ☒ Open GC covers and vacuum/remove any dust/debris. Pay particular attention to cooling fans.
- ☒ Inspect internal connectors for proper contact and placement.
- ☒ Reconnect Power to the GC. Power the GC on and verify the power on self-test passed.
- ☒ Verify oven motor spins freely and turns on with the oven door closed; off when the door is opened.
- ☒ Verify operation of all other fans - the inlet and EPC cooling fans.
- ☒ Verify oven intake/outlet flap assembly is operating smoothly while heating and cooling the oven

Inlet and detector consumable replacement

- ☒ For the inlets installed, perform inlet maintenance as defined in the 7890 manual – “Maintaining Your GC” - for the inlet(s) installed.
- ☒ Replace the split vent trap cartridge filter on units with these inlets: Split/Splitless Capillary (SSL), Multi-Mode Inlet (MMI), Programmed Temperature Vaporizer (PTV), Volatiles Interface (VI).
- ☒ If the inlet system is used in Split Mode with viscous samples, inspect and clean the split vent tube on the inlet and flush or replace the tubing between the inlet and the split vent trap.
- ☐ If the GC includes a Flame Ionization Detector (FID), replace the jet. If the ignitor shows any buildup of sample or corrosion, replace the ignitor. Examine the FID collector and castle assemblies for contamination – clean as necessary.

Zero Sensors and Leak test

- ☒ Zero all pressure sensors per the procedure in the 7890 “Advanced User Guide”.
- ☒ Perform inlet pressure decay test(s) as defined in the 7890 “Troubleshooting Manual”.
If the PM is done in preparation for an Operational Qualification, then the pressure decay test defined within that protocol can be used for the PM.
- ☒ Record if test passed or failed in the results table.

ALS Maintenance

- ☐ **Section NOT applicable**
- ☒ Check all cabling and configuration settings between GC, tray, and injectors.
- ☒ Vacuum or removed any dust, especially around fans.
- ☒ Check operation of all fans.
- ☒ Check syringe for smooth plunger operation.
- ☒ Check for smooth operation of the needle support – clean if necessary
- ☒ Check for correct operation of syringe volume settings.

7890 GC
Preventive Maintenance Checklist – Standard**Restore Instrument**

- ☒ Restore the normal operating conditions or customer method using the Keyboard or Data System.
- ☒ Purge the system with carrier flow for 15 minutes
- ☒ Bake out the system, then restore the normal operating conditions
- ☒ After equilibration, check and record the post PM detector signal output values.
Results should be similar or lower than the detector outputs recorded prior to PM.
- ☐ Perform a chemical checkout. If this is a routine PM, inject the customer's sample using the ALS if applicable. This will act as a final checkout of both the ALS and the GC.

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.

7890 GC Preventive Maintenance Checklist – Standard

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the PM service activity in the customer's instrument records/logbook
- ☒ 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 Review Comments section below if there are additional comments
- ☒ Review the service and any test results with the customer.
- ☐ If the Instrument firmware was updated, record the details of the change in the Service Engineer's Comments box below or if necessary, in the customer's IQ records.
- ☐ Please ask the customer if they would like to have Smart Alerts installed on their computer.

7890 GC Test Results Table

Detector Signal Outputs	Before PM service	After PM service
Front detector output	NA	10.3
Back detector output	NA	NA
AUX detector output	NA	NA
Pressure decay test	Expected result	Actual result or N/A
Front inlet pressure decay test	Pass	Pass
Back inlet pressure decay test	Pass	Pass

7890 GC
Preventive Maintenance Checklist – Standard
7890 GC Parts List Table

The following kits are recommended for capillary and purged packed inlets. If this is a general PM and the customer has a preferred set of consumables, you may use the customer's consumables.

Part Description	Part Number	Model# where used	Quantity Consumed
SSL Capillary Inlet PM kit, Splitless	5188-6497	7890A/B	1
SSL Capillary Inlet PM kit, split	5188-6496	7890A/B	1
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	
SSL Capillary Ultra Inert Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	7890A/B	
PP Inlet PM kit	5188-6498	7890A/B	
Split vent trap PM kit, single cartridge (for MMI, PTV & VI)	5188-6495	7890A/B	
MMI Cleaning Kit	G3510-60820	7890A/B	
PTV Septumless Head Rebuild Kit	5182-9747	7890A/B	
PTV Septumless Head Teflon Guide	5182-9748	7890A/B	
Ignitor (glow plug) assembly with O-ring	19231-60680	7890A/B	
FID Collector Rebuild/Cleaning Kit	G1531-67000	7890A/B	
FID Collector Replacement Kit	G1531-67001	7890A/B	
Standard .011-inch FID Jet for capillary FID base	G1531-80560*	7890A/B	
High Temperature .018-inch FID Jet for capillary FID base	G1531-80620*	7890A/B	
Standard .018-inch FID Jet for packed column with packed FID base	18710-20119*	7890A/B	
Standard .011-inch FID Jet for capillary column with packed/adaptable FID base	19244-80560*	7890A/B	
High Temperature .018-inch FID Jet for capillary column with packed/adaptable FID base	19244-80620*	7890A/B	

* The jets (G1531-80560, G1531-80620, 18710-20119, 19244-80560 and 19244-80620) are recommended for 7890A/B PM. Please refer to the service note "COLUMNS/SUPPLIES-197A" for detailed information.

7890 GC
Preventive Maintenance Checklist – Standard**Service Engineer Comments (optional)**

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

Other Important Customer Web Links

- ☐ 7890 GC manual "Maintaining Your GC" - http://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B_Maintaining%20Guide.pdf
- ☐ Need to know more? - <http://www.agilent.com/crosslab/university/>
- ☐ Need supplies? - www.agilent.com/chem/supplies

Service Completion

Service request number 6005427981 Date service completed 27 June 2022

Agilent signature Edmaria P. Customer signature _____

Document part number: G3430-90004



CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022

Cert No. 22/2282

Site Calibration

Order No. 22060270

Customer SGS (THAILAND) Limited
1/209,1/211 Moo1, T.Ban Chang, A.Ban Chan, Rayong 21130 Thailand.

Place of Calibration Hot Lab

Description Water Bath

Model WNB29

Serial No. L611.0546

ID.No. W2012002

Date of Receipt Jun 21, 2022

Date of Calibration Jun 21, 2022

Environment

Temperature	(Min)	23.3	°C	(Max)	28.7	°C
Relative Humidity	(Min)	42.5	%RH	(Max)	69.7	%RH
Line Voltage	(Min)	227.4	Vac	(Max)	230.1	Vac

Calibration Method

WI-18 : The reference thermometers were placed into the bath and the measurement was based on ASTM E715-80.

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. QR22-1088, Calibrated by Quality Reborn Co., Ltd., ONAC Calibration No. 0292.

This certificate is traceable to SI unit.



CALIBRATION CERTIFICATE

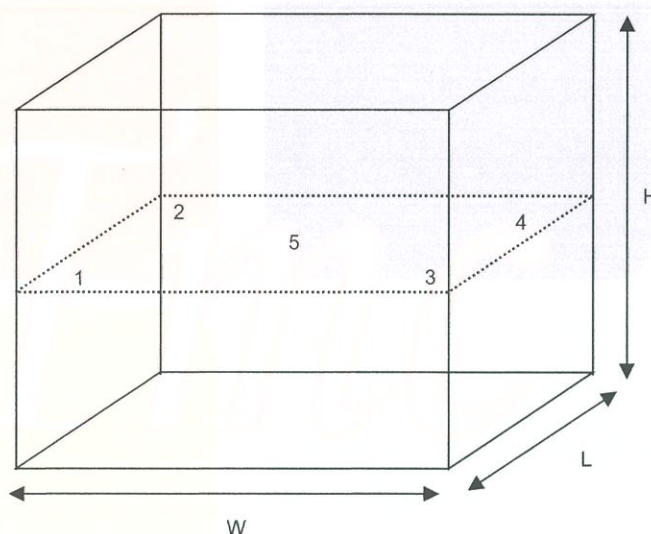
Date of Issue Jun 29, 2022

Cert No. 22/2282

Site Calibration

Order No. 22060270

Results (without adjustment)



Position of reference thermometers were placed

Note.

- 1). Dimension (W x L x H) is 35 x 29 x 16 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.



CALIBRATION CERTIFICATE

Date of Issue Jun 29, 2022

Cert No. 22/2282

Site Calibration

Order No. 22060270

Results (without adjustment)

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability \pm (°C)	Uniformity (°C)	Uncertainty \pm (°C)
60.0	60.0	Position 1	60.037	0.059	0.141	0.16
		Position 2	60.059			
		Position 3	60.024			
		Position 4	60.108			
		Position 5	60.068			

UUC Setting (°C)	UUC Reading (°C)	Reference Thermometer (°C)		Stability \pm (°C)	Uniformity (°C)	Uncertainty \pm (°C)
[[[101.2	Position 1	100.590	0.197	0.482	0.31
		Position 2	100.584			
		Position 3	100.639			
		Position 4	100.773			
		Position 5	100.508			

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. JATURAPAT THONGSOOKCHOTE)

Water Bath

Cert.No. 22/2282

Model. WNB29 S/N. L611.0546 ID.No. W2012002



Time

Handwritten signature and initials.