

# ภาคผนวก ฎ

## เอกสารสอบเทียบเครื่องมือ

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## List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
<b>Ambient</b>									
1	Mass Flow Meter	BTEXs	Alicat Scientific, Inc.	MB-5SCCM-D/5M 57730	Miracle International Technology Co.,Ltd.	L202210260-001	5 Nov 22	4 Nov 23	-
2	Aneroid Barometer	BTEXs	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	23P1855	2 Jun 23	1 Jun 24	-
3	Dial Thermo-Hygrometer	BTEXs	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	23H1200	5 Jun 23	5 Jun 24	-
4	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Scientific	42i 1201778110	UAE Consultant Co.,Ltd.	07042023	7 Apr 23	6 Apr 24	-
5	Standard Gases (Mixture)	Nitrogen Dioxide	Airgas	EB0143262 2015PSIG	Airgas an Air Liquide company	E04NI99E15A01D3	21 Jun 21	21 Jun 24	-
6	Sulphur Dioxide Analyzer	Sulphur Dioxide	Thermo Scientific	43i CM22387062	UAE Consultant Co.,Ltd.	07032023	7 Mar 23	6 Mar 24	-
7	Standard Gases (Mixture)	Sulphur Dioxide	Airgas	EB0143262 2015PSIG	Airgas an Air Liquide company	E04NI99E15A01D3	21 Jun 21	21 Jun 24	-

List of Instruments Certification for Water Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Water									
1	pH Meter	pH	Horiba	LAQUA-PH210 HA0D0078	Technology Promotion Association (Thailand-Japan)	23CH281	1 Mar 23	28 Feb 24	-
2	Conductivity Meter	Conductivity	YSI	Pro30 17B101802	Technology Promotion Association (Thailand-Japan)	23CH809	27 Jun 23	26 Jun 24	-



## CALIBRATION CERTIFICATE

Certificate No. : L202210260-001  
Date Issued : 07-Nov-22

**Customer** : United Analyst and Engineering Consultant Co.,Ltd.  
81 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

**Equipment** : Mass Flow Meter

**Manufacturer** : Alicat Scientific  
**Model** : MB-5SCCM-D/5M  
**Serial No.** : 57730  
**ID No./Tag No.** : UAE.EMA2.169/2553  
**Date Received** : 31-Oct-22  
**Date Calibrated** : 05-Nov-22

**Calibrated by** : Mr. Jame Khaothong

### Calibration Method or Calibration Procedure Used

In-house method : CP-34 by comparison against mass flow calibrator.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

### Result of Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level confidence approximately 95 percent.

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by:   
( Mr. Sarayuth Tochuai )



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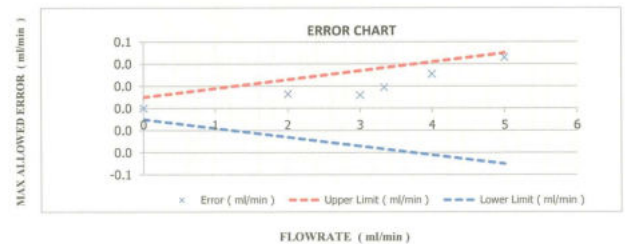
Certificate No. : L202210260-001

**Environment** : Ambient temperature : ( 23 ± 2 ) °C  
Relative humidity : ( 50 ± 15 ) % RH  
**Capacity Range** : 5 ml/min  
**Calibration Media** : Air  
**Type** : Mass Flowmeter

Unit Under Calibration Reference Condition : Pressure 101.325 kPa(abs) , 25 °C , Air					
Temperature ( °C )	Pressure ( kPa )	UUC Reading ( ml/min )	STD Reading ( ml/min )	Error ( ml/min )	Uncertainty ( ± ml/min )
25.73	101.45	0.000	0.000 *	0.000	0.063
25.37	104.90	2.001	1.988	0.013	0.068
25.12	106.63	3.001	2.989	0.012	0.11
24.66	107.15	3.330	3.311	0.019	0.12
24.23	108.36	4.001	3.970	0.031	0.14
24.17	110.09	5.00	4.954	0.046	0.17

Error = Unit Under Calibration - Standard

Marked \* are not included in the NSC-ONSC accreditation schedule for our laboratory.



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Certificate No. : L202210260-001

Note : The actual flow rate is determined by the equation :

$$Q_{Meas} = Q_{Ref} \times \frac{P_{Ref}}{P_{Meas}} \times \frac{T_{Meas}}{T_{Ref}}$$

; Q = Flow rate  
 ; P = Absolute pressure  
 ; T = Absolute temperature  
 ; Subscript "Meas" = Measurement condition  
 ; Subscript "Ref" = Reference condition

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Traceability of Certificate :

The International System of Units (SI) through

NIMT Certificate No. MW-0013-22 for Mass Flow Calibrator (20 SCCM) Serial No. G500971G20, Due 22-Feb-24

End of Certificate

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เอกสารไม่ควบคุม

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/1 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250  
TEL. 0-2717-3000-24 FAX. 0-2719-9484

NAC-MRA  
NISC-TS1611222  
CALIBRATION 1005

Certificate No. : 23P1855  
Page : 1 of 2

### Certificate of Calibration

**Equipment** : Aneroid Barometer  
**Manufacturer** : Barigo  
**Model** : -  
**Serial No.** : -  
**ID No.** : UAE.ANV.122/2550  
**Condition As-Received** : Used Item  
**Received Date** : 26 May 2023  
**Calibration Date** : 02 June 2023

**Reference** : 2305-0919WSC  
**Ambient Temperature** : ( 23 ± 2 ) °C  
**Relative Humidity** : ( 50 ± 15 ) %  
**Atmospheric Pressure** : 1007 mbar

**Submitted by** : United Analyst and Engineering Consultant Co.,Ltd.  
81 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260

**Procedure used** : The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard according to in-house calibration procedure CP-P10, using " DKD-R 6-1 ; Calibration of Pressure Gauges, Edition 03/2014 " as a guidelines.

**Condition of this result of calibration**

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Barometer	DPI142	1422505046	MP-0094-23	03 May 2024

2.This instrument was installed in vertical orientation and center of the dial was used as the reference level.

3.This result of calibration was made on requested at the point specified by customer.

4.This result of calibration instrument was in absolute pressure.

5.This instrument was used clean air as pressure media.

6.The certificate is valid only to the item calibrated on date and place of calibration.

7.This Certification is traceable to the International System of Unit maintained through:-  
-National Institute of Metrology Thailand (NIMT)

**Calibrated by** : Suksan Khankaew  
**Issue Date** : 08 June 2023

**Approved Signatory** :

| Phatinee Pratsapal  
| Sura Suwannasri  
| Attapol Panurach

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# 0316955



Cert.No.: 23P1855  
Page: 2 of 2

Result of calibration:- Without adjustment

Range: 960 hPa to 1030 hPa

Function:- Absolute Pressure Measurement

Scale Interval: 1 hPa (The Fifth Estimate)

Increasing Pressure

Applied Pressure (hPa)	958.50	969.59	980.35	990.39	1001.01	1011.15	1020.94	1031.45
UUC* Indication (hPa)	960.0	970.0	980.0	990.0	1000.0	1010.0	1020.0	1030.0
Error (hPa)	1.50	0.41	-0.35	-0.39	-1.01	-1.15	-0.94	-1.45

Decreasing Pressure

Applied Pressure (hPa)	1031.45	1021.61	1012.16	1002.38	992.17	982.20	970.69	959.32
UUC* Indication (hPa)	1030.0	1020.0	1010.0	1000.0	990.0	980.0	970.0	960.0
Error (hPa)	-1.45	-1.61	-2.16	-2.38	-2.17	-2.20	-0.69	0.68

The uncertainty of measurement was  $\pm 0.30$  hPa

\* UUC = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k = 2$ , providing a level of confidence of approximately 95 %.

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Attaporn R.  
a 1165504

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250  
TEL. 0-2717-3000-24 FAX. 0-2719-9484



## Certificate of Calibration

Certificate No.: 23H1200  
Page: 1 of 2

Equipment: Dial Thermo-Hygrometer

Manufacturer: Barigo

Model: -

Serial No.: -

ID No.: UAE.ANV.130/2550

Condition As-Received: Used Item

Received Date: 26 May 2023

Calibration Date: 30 May 2023

Reference: 2305-0919WSC

Ambient Temperature: (  $25 \pm 3$  ) °C

Relative Humidity: (  $50 \pm 20$  ) %

Submitted by: United Analyst and Engineering Consultant Co., Ltd.

81 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260

Procedure used: Calibration were conducted using in-house calibration procedure CP-H02 according to comparison with standard chilled mirror sensor for humidity measurement function and comparison with standard temperature probe for temperature measurement function into humidity / temperature chamber.

Condition of this result of calibration

1. Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Hygro-M2 Dew Point Monitor	5112	2360195	20703	02 Aug 2023
2) Handheld Thermometer With Sensor	1523	3240076	23105	15 Mar 2024

2. The 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 maintained through:-

-National Institute of Standards and Technology (NIST), The United States of America

-Technology Promotion Association (Thailand-Japan), NSC-ONSC Accredited No. Calibration 0008

Calibrated by: Somchai Dumwor  
Issue Date: 07 June 2023

Approved Signatory: [Signature]  
[ ] Chakrit Waeewangjan  
[ ] Ponthippa Tameyakul  
[ ] Viporn Tantiyawutti

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B 0316274



Cert. No.: 23H1200  
Page: 2 of 2

Result of Calibration:-

Before Adjustment

Function: Humidity Measurement

Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	Error (%R.H.)	Uncertainty of Measurement (±%R.H.)
25.0	40.1	48	7.9	1.8
25.0	60.0	63	3.0	1.7
25.0	80.0	76	-4.0	1.9

Result of Calibration:-

After Adjustment

Function: Humidity Measurement

Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	Error (%R.H.)	Uncertainty of Measurement (±%R.H.)
25.0	40.1	44	3.9	1.6
25.0	60.0	60	0.0	1.7
25.0	80.0	75	-5.0	1.9

Result of Calibration:-

Without Adjustment

Function: Temperature Measurement

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
19.987	20.0	0.013	0.72
30.016	30.0	-0.016	0.72
39.944	39.5	-0.444	0.72

UUC\* : Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor  $k = 2.00$ , providing confidence level approximately 95%.

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3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Tel. 0 2763 2828 Fax 0 2763 2800 www.uaeconsultant.com E-mail: uae@uaeconsultant.com

## MULTI-POINT GAS TEST REPORT

Test Date: Apr 7, 2023

Equipment: Gas Analyzer (NO<sub>2</sub>) Model: 421  
Manufacturer: Thermo Scientific Serial Number: 1201497726

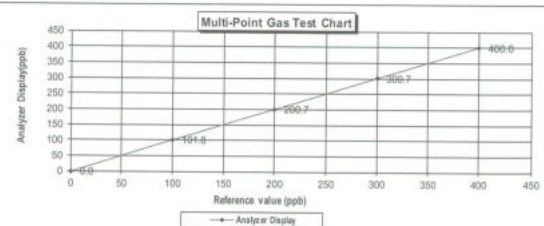
### Standard Gas Concentration

Sulphur Dioxide (SO <sub>2</sub> )	44.68	PPM	Manufacturer:	Thermo Scientific
Nitric Oxide (NO)	45.94	PPM	Model:	1461
Methane (CH <sub>4</sub> )	-	PPM	Serial Number:	1180540071
Carbon Monoxide (CO)	984.8			
Cylinder No.:	EB0143262			
Expiration Date:	Jun 21, 2024			

### Multi-point gas test data

	Reference Value (ppb)	Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	101.8	1.77	1.77
Level 3	40.00%	200.0	200.7	0.35	0.35
Level 4	60.00%	300.0	300.7	0.23	0.23
Level 5	80.00%	400.0	400.0	0.00	0.00

Remark: Measuring Range 500.0 ppb  
Acceptable Limit  $\pm 5\%$



Calculate by

Aphwat K.  
21/4/2023

Approve by

Pakorn U.  
21/4/2023

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Cert.No.: 23CH281  
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	22E2769	24 Aug 2023
2) Ref. Standard Thermometer	4982054	110RC044	22I1306	27 Oct 2023

This certification is traceable to the International System of Unit maintained at:-  
- Traceable to National Institute of Metrology (Thailand), NIMT

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

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	826588	09 July 2024
pH 6.987	CPA chem	826589	09 July 2023
pH 10.010	CPA chem	863835	28 Dec 2023

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

#### Calibration Results

##### Function : mV Measurement

##### Performing standard curve by Fluke at pH (4,7)(7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (mV)	Coverage factor k
			mV	pH		
pH Meter S/N.: HA0D0078	pH	mV	mV	pH		
	4.00	177.48	177.4	4.01	0.058	2.00
	7.00	0.00	0.0	7.00	0.058	2.00
	7.00	0.00	0.0	7.00	0.058	2.00
	10.00	-177.48	-177.5	10.01	0.058	2.00

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Cert.No.: 23CH281  
Page.: 3 of 3

#### Calibration Results

##### Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (±)	Coverage factor k
pH Electrode S/N.: 992H0385	4.008	4.01	166.8	0.0079	2.00
	6.987	6.99	-7.1	0.011	2.00
	6.987	6.99	-6.5	0.011	2.00
	10.010	10.02	-185.4	0.0096	2.00

##### Function : Temperature Measurement

##### (\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model :	9652
- Serial No. :	992H0385
Dimension of probe;	
- Length :	110 mm.
- Diameter :	16 mm.
- Immersion Depth :	100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.004	25.0	-0.004	0.13	2.00
30.0	30.001	30.0	-0.001	0.13	2.00
35.0	35.001	35.0	-0.001	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 %.

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a 1150711



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND/JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
3041 PATTANAKARN ROAD, SOI 18, SUKHUMVIT 21, BANGKOK 10250  
TEL: 02-217 6002 FAX: 02-219 9181



Cert.No.: 23CH809  
Page.: 1 of 3

## Certificate of Calibration

Equipment : Conductivity Meter  
Manufacturer : YSI  
Model : Pro 30  
Serial No. : 17B101902  
ID No. : UAE EFM 122/2580(ENV.SCT. 02/60)  
Condition As-Received: Used Item  
Received Date : 28 June 2023  
Calibration Date : 27 June 2023  
Reference : 2306 D829WSC-1  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
2 Soi Udomsak 41, Sukhumvit Road, Bangkok,  
Prakhanong, Bangkok 10260  
Ambient Temperature : (25 ± 2.5) °C  
Relative Humidity : (50 ± 15) %  
Calibration Procedure: In-house method :  
- CP-CH6 by direct measurement  
with certified reference material (CRM)  
- CP-CH9 by comparison with standard thermometer

Calibrated by : Wialak Srithean

Approved by :  
Approved Signatory

( / ) Muea Buksua  
( / ) Saitip Moongmai  
( / ) Warakorn Loringagatrakul

Issue Date : 28 June 2023

The Uncertainty are for a confidence probability of approximately 95%

This certificate may not be reproduced or further used for any purpose without the prior written  
Approval of the Issuer or Corporate Services & Equipment Calibration and Testing Services

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Cert.No.: 23CH809  
Page.: 2 of 3

#### Condition of this result of calibration

##### 1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Certificate No.	Due date
1) Thermometer	1963878	130RC095	22I1140	12 Sep 2023
2) Ref. Std. Thermometer	4982054	110RC044	22I1306	27 Oct 2023

This certification is traceable to the International System of Unit maintained at:-  
- Traceable to National Institute of Metrology (Thailand), NIMT

##### 2. Certified Reference Materials :-

- Conductivity calibration solution, CPA chem Ltd., The measurement results are traceable to SI  
through CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Conductivity Solution	Manufacturer	Lot No.	Exp. date
1413.0 µS/cm	CPA Chem	885122	28 Mar 2024
12.880 mS/cm	CPA Chem	885123	28 Mar 2024

- Control Conductivity calibration solution temperature by Water bath (25.0.1) °C  
3. This certificate is valid only to the item calibrated on date and place of calibration.

#### Calibration results

##### Function : Conductivity Measurement

##### (\*) After Adjustment at 1413.0 µS/cm

##### Conductivity Electrode Serial No.: 18L100003

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement (±)	Coverage factor k
1413.0 µS/cm	1420 µS/cm	1413 µS/cm	9.2 µS/cm	2.00
12.880 mS/cm	12.70 mS/cm	12.63 mS/cm	0.066 mS/cm	2.00

Remark : - UUC\* = Unit Under Calibration

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Cert.No.: 23CH809

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**Calibration Results**

Function : Temperature Measurement

( \* ) Without adjustment

This equipment was connected with Temperature Probe;

- Model : PRO 30 COND-T

- Serial No. : 1BL100008

Dimension of probe;

- Length : 8 mm

- Diameter : 2 mm

- Immersion Depth : 90 mm

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement ( $\pm$ °C)	Coverage factor <i>k</i>
25.0	25.001	24.7	-0.301	0.13	2.00
30.0	30.000	29.7	-0.300	0.13	2.00
35.0	35.001	34.7	-0.301	0.13	2.00

**Remark :** - UUC\* = Unit Under CalibrationThe reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %.

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ใบรับรองสอบเทียบเครื่องมือประจำห้องปฏิบัติการ สำหรับตรวจวัดคุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือประจำห้องปฏิบัติการวิเคราะห์ สำหรับวิเคราะห์คุณภาพดิน น้ำผิวดิน และน้ำใต้ดิน									
1	Gas Chromatography (GC)	PAHs :Benzo (a) Pyrene	Agilent	System ID:CN13113001 7890 / CN13113001	Agilent Technologies (Thailand) Co.,Ltd.	Certificate of System Qualification GC-OQ	19 Apr 23	17 Apr 24	-
2	Gas Chromatography (GC)		Agilent	System ID:CN11021007 7890 / CN11021007	Agilent Technologies (Thailand) Co.,Ltd.	Certificate of System Qualification GC-OQ	23 Feb 23	22 Feb 24	-
3	Inductively Coupled Plasma- Optical Emission Spectrometer (ICP-OES)	ธาตุโลหะหนัก : ตะกั่ว (Pb), นิกเกิล (Ni), ปรอท (Hg), โครเมียม (Cr),	Agilent	System ID:G8015A G8015AA / MY18030001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	30 Nov 22	29 Nov 23	-
4	Atomic Absorption Spectrometer (AAS)	ทองแดง (Cu),แมงกานีส (Mn),สังกะสี (Zn), เหล็ก (Fe), สารหนู (As), แคดเมียม (Cd),	GBC	Savant AA / A7394	Sithiporn Associates Co.,Ltd.	61020	14 Apr 18	13 Apr 19	-
5	Atomic Absorption Spectrometer (AAS)		Agilent	System ID:G8432A AA240FS / MY13160001	Thailand Institute of Scientific and Technological Research(TISTR)	MTACL.No. 387/66	2 Feb 23	1 Feb 24	-
6	UV-VIS Spectrophotometer	ซัลเฟต ( $SO_4^{2-}$ )	Hitachi	U-1900 / 2021-064	DQE Services Co.,Ltd.	SP23-007	6 Jan 23	5 Jan 24	-
7	Conductivity Meter	การนำไฟฟ้า (EC)	SI Analytics	Lab955 / 16300356	DKSH Technology Limited	C24230059	16 Mar 23	14 Mar 24	-
8	pH Meter	ค่าความเป็นกรด-ด่าง (pH) อุณหภูมิ (Temperature)	Mettler-Toledo	Seven Easy S20 / 1231155210	National Food Institute, Ministry of Industry, Thailand	2301846-001-01	24 Feb 23	23 Feb 24	-
9	Analytical Balance (Repeatability 0.1 mg)	ปิโตรเลียมไฮโดรคาร์บอนทั้งหมด (TPH)	Mettler-Toledo	AB-2045/FACT / 1129361010	National Food Institute, Ministry of Industry, Thailand	2303074-001-01	26 May 23	24 May 24	-

Due Date of Calibration\* : กำหนดตามแผนการสอบเทียบประจำปี อย่างน้อยปีละ 1 ครั้ง

## Certificate of System Qualification

GC-DQ

System ID: CN13113001  
Organization Name: United Analyst and Engineering Consultant Co., Ltd.  
Organization Location: 3 Soi Uthorns, 441, Sukhumvit Road, Bangchak, Phraekhong, Bangkok 10780  
Date: April 19, 2023 10:36:30 AM  
EOP Name: AgilentRecommended  
EOP Revision: GC-DQ-5  
Overall Qualification Status: Pass

## System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

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

Pass

## Inlet Pressure Decay

Name: 7890

Front SSL

Setpoint Status: Pass

Pressure: 25.0 psi

Pressure Change: -0.1 psi / 5 minutes

Agilent Recommended:  $\leq -2.0$  and  $\leq -0.5$ 

## Overall Inlet Pressure Decay Test Status

Pass

## Inlet Pressure Accuracy

Name: 7890

Front SSL

Date: April 19, 2023 10:36:30 AM

System ID: CN13113001

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## Setpoint Status:

Pass  
Setpoint: 25.0 psi  
Actual: 25.1 psi  
Accuracy: 0.1 psi  
Agilent Recommended:  $\leq 0.2$

## Overall Inlet Pressure Accuracy Test Status

Pass

## Detector Flow Accuracy

Name: 7890

Front FID

Setpoint Status: Pass

Flow Type: Fuel

Setpoint: 30.0 mL/min Measured Flow: 30.2 mL/min

Accuracy: 0.2 mL/min

Agilent Recommended:  $\leq 10.0$  % setpoint (3.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

Setpoint Status: Pass

Flow Type: Oxidizer

Setpoint: 400.0 mL/min Measured Flow: 393.4 mL/min

Accuracy: 3.8 mL/min

Agilent Recommended:  $\leq 10.0$  % setpoint (40.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

Setpoint Status: Pass

Flow Type: Makeup

Setpoint: 25.0 mL/min Measured Flow: 24.9 mL/min

Accuracy: 0.1 mL/min

Agilent Recommended:  $\leq 10.0$  % setpoint (2.5 mL/min)

Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

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## Overall Detector Flow Accuracy Test Status

Pass

## Detector Flow Accuracy

Name: 7890

Back FPD

Setpoint Status: Pass

Flow Type: Fuel

Setpoint: 60.0 mL/min Measured Flow: 60.1 mL/min

Accuracy: 0.1 mL/min

Agilent Recommended:  $\leq 10.0$  % setpoint (6.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

Setpoint Status: Pass

Flow Type: Oxidizer

Setpoint: 60.0 mL/min Measured Flow: 60.2 mL/min

Accuracy: 0.2 mL/min

Agilent Recommended:  $\leq 10.0$  % setpoint (6.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

Setpoint Status: Pass

Flow Type: Makeup

Setpoint: 60.0 mL/min Measured Flow: 65.1 mL/min

Purge Offset: 20 % setpoint

Adjusted Setpoint: 72.00 mL/min

Accuracy: 5.8 mL/min

Agilent Recommended:  $\leq 10.0$  % setpoint (7.2 mL/min)

Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

## Overall Detector Flow Accuracy Test Status

Pass

## GC Oven Temperature Accuracy

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Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual: 230.0 / 230.2 °C

Temperature: 230.0 °C

Accuracy: 0.2 °C

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

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual: 100.0 / 100.3 °C

Temperature: 100.0 °C

Accuracy: 0.3 °C

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

## Overall GC Oven Temperature Accuracy Test Status

Pass

## GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average: 100.0 / 100.5833 °C

Temperature: 100.0 °C

Stability: 0.1 °C

Agilent Recommended:  $\leq 0.5$ 

## Overall GC Oven Temperature Stability Test Status

Pass

## Scouting Run

Tested Combination: Front SSL / Front FID

Injection Tower

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Name: 7693A

Setpoint Status: Completed

Injection Volume on Column: 1.0 uL

Overall Scouting Run Status: Completed

Noise and Drift

Tested Combination1	Front	SSL	/ Front	FID
Name:	7690			
Setpoint Status:	Pass			
Base Signal:	14.2 pA			
	AS. W Noise			Drift
	pA			pA/Hr
	0.07			0.34
Agilent Recommended:	≤ 0.10			≤ 2.50
Status:	Pass			Pass

Overall Noise and Drift Test Status: Pass

Injection Precision

Tested Combination1	Front	SSL	/ Front	FID
Name:	7693A			
Setpoint Status:	Pass			
Injection Volume on Column:	1.0 uL			
Area RSD:	0.83 %			Retention Time RSD: 0.61 %
Agilent Recommended:	≤ 3.00			≤ 1.00

Overall Injection Precision Test Status: Pass

Date: April 19, 2023 10:36:30 AM  
System ID: C:\13113061

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Signal to Noise

Tested Combination1: Front SSL / Front FID

Injection Tower

Name: 7690

Setpoint Status: Pass

Signal to Noise: 2239578

Agilent Recommended: ≥ 300000

Overall Signal to Noise Test Status: Pass

Scouting Run

Tested Combination2	Front	SSL	/ Back	FID+
Name:	7693A			
Setpoint Status:	Completed			
Injection Volume on Column:	1.0 uL			
Mode:	P-Mode			

Overall Scouting Run Status: Completed

Noise and Drift

Tested Combination2	Front	SSL	/ Back	FID+
Name:	7690			

Date: April 19, 2023 10:36:50 AM  
System ID: C:\13113061

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Setpoint Status: Pass

Mode: P-Mode

Base Signal: 7.2 150 pA

ASTM Noise

DU	Drift
1.38	0.18

Agilent Recommended: ≤ 2.00 ≤ 1.50

Status: Pass Pass

Overall Noise and Drift Test Status: Pass

Injection Precision

Tested Combination2	Front	SSL	/ Back	FID+
Name:	7693A			
Setpoint Status:	Pass			
Injection Volume on Column:	1.0 uL			
Mode:	P-Mode			
Area RSD:	0.77 %			Retention Time RSD: 0.35 %
Agilent Recommended:	≤ 3.00			≤ 1.00

Overall Injection Precision Test Status: Pass

Signal to Noise

Tested Combination2	Front	SSL	/ Back	FID+
Name:	7690			
Mode:	P-Mode			
Setpoint Status:	Pass			
Signal to Noise:	4502			
Agilent Recommended:	≥ 2400			

Date: April 19, 2023 10:36:30 AM  
System ID: C:\13113061

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Overall Signal to Noise Test Status: Pass

Date: April 19, 2023 10:36:30 AM  
System ID: C:\13113061

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Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	CN13113001
Manufacturer	Agilent Technologies
Name	7690
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

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

Tested Combination2

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

Sampler 1

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN1320018
Firmware Revision	A.10.05
Usage	Sample Injection
Location	Front
Syringe Volume (uL)	10

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Sampler 2

Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN1320019
Firmware Revision	A.10.16
Vial Hester	Not installed

Mainframe

Manufacturer	Agilent Technologies
Name	i830
Model Number	G3443B
Serial Number	CN13113001
Firmware Revision	B.02.03.2
Oven Type	Standard

Inlet 1

Manufacturer	Agilent Technologies
Name	7690
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

Manufacturer	Agilent Technologies
Name	7690
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen

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System ID: CN13113001

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Detector 2

Manufacturer	Agilent Technologies
Name	7690
Type	FID+
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Rack
Makeup Gas	Nitrogen
First Filter Tested	P-Mode

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System ID: CN13113001

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Electronic Signature

Purpose

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

Details

Full Name of Signor:	Saenguchai Lertk
Logged On User Name:	saenguchai.lertk@agilent.com
Signature Creation Date:	April 19, 2023
Reason for Signature:	Executed protocol and published this official version of document.

Regulatory Disclaimer

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

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Date: April 19, 2023 10:36:30 AM  
System ID: CN13113001

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System Id: CN12172021

[illegible]

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## เอกสารไม่ควบคุม

System ID: CN1311301

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
Apr 19, 2023 02:01:00 AM	End	Location	Distance From Accuracy: Back 1-Mile, type: Move (r=0) 66.6 m/s/m L=to 10.0% no add	Ran Count: 1
Apr 19, 2023 02:01:00 AM	Start	Location	GC Over Temperature Accuracy: 7500 - Temperature Over: 8, 250 °C, L=to: 1.0 AND no: 1.0% repeat r=K	None
Apr 19, 2023 02:01:34 AM	Auto	Data	GC Over Temperature Accuracy: 7500 - Temperature Over: 5, 250 °C, L=to: 1.0 AND no: 1.0% repeat r=K	Volume Data Entry
Apr 19, 2023 02:01:46 AM	End	Execution	GC Over Temperature Accuracy: 7500 - Temperature Over: 8, 250 °C, L=to: 1.0 AND no: 1.0% repeat r=K	Ran Count: 1
Apr 19, 2023 02:01:00 AM	Start	Location	GC Over Temperature Accuracy: 7500 - Temperature Over: 8, 250 °C, L=to: 1.0 AND no: 1.0% repeat r=K	None
Apr 19, 2023 02:02:00 AM	Auto	Data	GC Over Temperature Accuracy: 7500 - Temperature Over: 8, 250 °C, L=to: 1.0 AND no: 1.0% repeat r=K	Manual Data Entry
Apr 19, 2023 02:02:17 AM	End	Execution	GC Over Temperature Accuracy: 7500 - Temperature Over: 8, 250 °C, L=to: 1.0 AND no: 1.0% repeat r=K	Ran Count: 1
Apr 19, 2023 02:02:59 AM	Start	Execution	GC Over Temperature Accuracy: 7500 - Temperature Over: 8, 250 °C, L=to: 1.0 AND no: 1.0% repeat r=K	None
Apr 19, 2023 02:02:59 AM	Auto	Data	GC Over Temperature Accuracy: 7500 - Temperature Over: 8, 250 °C, L=to: 1.0 AND no: 1.0% repeat r=K	Manual Data Entry

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## เอกสารไม่ควบคุม

System Id.: CV13112001  
Print Date: Aug. 19, 2023 12:25:32 AM

CN6546054 UAE Degradation Log

Time	Transaction Start	Amenity Performed	Type of Transaction	Optional Information
Apr 4 10 10:05:03 AM	Start	Execution	Injection Pre-Scan - Injector Tool: Front SSL, Front FID GC - L (99%) == 3.61% (Ret. Time) == 1.005	None
Apr 4 10 10:05:08 AM	Start	Execution	Injection Pre-Scan - Injector Tool: Front SSL, Front FID GC - L (99%) == 3.00% (Ret. Time) == 1.005	None
Apr 10 2023 02:57:59 PM	Start	Data	Injection Pre-Scan - Injector Tool: Front SSL, Front FID GC - L (99%) == 3.00% (Ret. Time) == 1.025	Data Files Path: F:\Data GC\2023\02\57_59_FID 2023 04 10 10:46:16 FID Proc == OK FID16 ok
Apr 10 10:05:03 AM	Start	Data	Injection Pre-Scan - Injector Tool: Front SSL, Front FID GC - L (99%) == 3.33% (Ret. Time) == 1.035	Data Files Path: F:\Data GC\2023\02\57_59_FID 2023 04 10 10:46:16 FID Proc == OK FID16 ok
Apr 10 2023 02:58:30 PM	Start	Data	Injection Pre-Scan - Injector Tool: Front SSL, Front FID GC - L (99%) == 3.00% (Ret. Time) == 1.035	Data Files Path: F:\Data GC\2023\02\58_30_FID 2023 04 10 10:46:16 FID Proc == OK FID16 ok
Apr 10 10:05:08 AM	Start	Data	Injection Pre-Scan - Injector Tool: Front SSL, Front FID GC - L (99%) == 3.02% (Ret. Time) == 1.035	Data Files Path: F:\Data GC\2023\02\58_30_FID 2023 04 10 10:46:16 FID Proc == OK FID16 ok
Apr 10 2023 02:58:59 PM	Start	Data	Injection Pre-Scan - Injector Tool: Front SSL, Front FID GC - L (99%) == 3.02% (Ret. Time) == 1.035	Data Files Path: F:\Data GC\2023\02\58_59_FID 2023 04 10 10:46:16 FID Proc == OK FID16 ok
April 13, 2023 9:56:36 PM	Start	Data	Injection Pre-Scan - Injector Tool: Front SSL, Front FID GC - L (99%) == 3.02% (Ret. Time) == 1.035	Data Files Path: F:\Data GC\2023\02\56_36_FID 2023 04 13 10:46:16 FID Proc == OK FID16 ok

Table 3.2.3f

Date: Apr 19, 2023 10:36:30 AM  
System ID: CN-3:13061

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## เอกสารไม่ควบคุม

System ID: CN151-3031  
Print Date: April 10, 2022 10:38:17 AM

CH1313021 UAE -resequencing box

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 18 2025 10:21:01 AM Start	Preaction	GD Resulting Run - Preaction Trans: Fault FRI, Run: FPD - Part of system Preaction - No links associated		Run Count: 1
April 18 2025 10:22:07 AM Start	Preaction	Notice and Dm: Back FPD - Detector I P - F mode - (Noise) == 2.00 "50.56 - L (DT) == -50 "50 setpoint		None
April 19 2025 10:22:25 AM Start	Location	Notice and Dm: Back FPD - Detector FPD - F mode - (Noise) == 2.00 "50.56 - L (DT) == -50 "50 setpoint		None
April 19 2025 10:22:46 AM Act 1	Data	Notice and Dm: Back FPD - Detector FPD - F mode - (Noise) == 2.00 "50.56 - L (DT) == -50 "50 setpoint		Data from Path 1: Noise DC2025/10/22/25 2025-04- 15 05:06:49 FPD - 17001-038 Dr: MS 128
April 19 2025 10:25:53 AM Act 2	Preaction	Notice and Dm: Back FPD - Detector FPD - F mode - (Noise) == 2.00 "50.56 - L (DT) == -50 "50 setpoint		Run Count: 1
April 19 2025 10:27:55 AM Start	Preaction	Preaction Preaction - In case of Trans: I port SSL, Loc: I PWD - RD: I (Noise) == 3.0000 - RD: I (md) == 1.00%		None
April 19 2025 10:28:29 AM Start	Location	Preaction Preaction - In case of Trans: I port SSL, Loc: I PWD - RD: I (Noise) == 3.0000 - L (md) == 1.00%		None
April 19 2025 10:24:08 AM Start	Data	Preaction Preaction - In case of Trans: I port SSL, Back FPD - RD: I (Noise) == 3.0000 - L (md) == 1.00%		Data from Path 1: F Data DC2025/10/22/25 2025-04- 15 05:07:06 FPD - 17001-038 Dr: MS 128

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Date: Aug 19, 2023 10:38:30 AM  
System ID: CN313101

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## เอกสารไม่ควบคุม

```

user Name: saengtha-farak
osName: LAPTOP-QSSKOWV

```

System Id: CN-21180D1  
Print Date: Apr 10, 2023 10:58:22 AM

CN13:12001\_UAE Transaction log :

[illegible]

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Date: April 19, 2023 12:26:20 AM  
System ID: CH131-3034

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## เอกสารไม่ควบคุม

— 2001 年 11 月 10 日 / 2001 年 11 月 10 日

System: d:\A13113C01  
 Print Date: April 16, 2023 10:25:52 AM

ON1311300: UAE Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 18, 2023 10:25:10 AM PST	Pending	Successful	System	DB
April 18, 2023 10:25:10 AM PST	Pending	Successful	System	None
April 18, 2023 10:25:10 AM PST	Pending	Successful	System	Record Created:

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Date: Apr 19, 2023 10:36:33 AM  
System ID: CN:3113001

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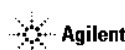
## เอกสารไม่ควบคุม



Agilent CrossLab Start Up Services  
**Agilent 7890 Gas Chromatograph**  
**Preventive Maintenance Checklist**

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

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak. This check list will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.



## เอกสารไม่ควบคุม

## Agilent 7890 GC Preventive Maintenance Checklist

## Introduction

## Customer Information

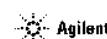
- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the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

### Important Customer Web Links

- For more information about **Agilent Technologies services**, please visit our website using the following URL: <https://www.agilent.com/en-us/products/crosslab/instrument-services/service-repair>
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>.
- To access **Agilent University**, visit <https://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful **Agilent Resource Center** web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>.
- Need technical support, FAQs, supplies? – visit our **Support Home page** <http://www.agilent.com/search/support>.
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>.
- **7890B Manuals** are also available on Agilent.com:
  - **Safety**  
[https://www.agilent.com/cs/library/usermanuals/public/7890B\\_Safety.pdf](https://www.agilent.com/cs/library/usermanuals/public/7890B_Safety.pdf)
  - **Installation and First Startup**  
[https://www.agilent.com/cs/library/usermanuals/public/7890B\\_installation.pdf](https://www.agilent.com/cs/library/usermanuals/public/7890B_installation.pdf)
  - **Operation Manual**  
[https://www.agilent.com/cs/library/usermanuals/public/7890B\\_Operation.pdf](https://www.agilent.com/cs/library/usermanuals/public/7890B_Operation.pdf)
  - **Maintaining Your GC**  
[https://www.agilent.com/cs/library/usermanuals/public/C87522-900026287890B\\_Maintenance.pdf](https://www.agilent.com/cs/library/usermanuals/public/C87522-900026287890B_Maintenance.pdf)

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## เอกสารไม่ควบคุม

## Service Engineer's Responsibilities

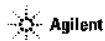
- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist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

## 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.

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## System Information

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

Instrument System Name and ID	UAE-TEX.02/2556	CN1313001
Instrument System Site and Location	UAE	Laboratory room

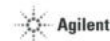
List System Component Product Numbers	List the Serial Numbers of each Component
1. 6440B	CN1313001
2. 6451A	CN1326008
3. 64514A	CN1320069
4.	
5.	
6.	
7.	
8.	
9.	
10.	

## Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☐ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components, settings as defined by current Service Notes.
- ☒ Check for required firmware updates and verify with customers if they would like them 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.

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## Preventive Maintenance Procedure

## 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.

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## ALS Maintenance

- ☐ Section NOT applicable
- ☒ Check all cabling and configuration settings between GC, tray, and injectors.
- ☒ Vacuum or remove 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

## Restore Instrument

- ☒ Restore the normal operating conditions or customer method using the 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.

Note: 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.

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## Signature Page

## Service Review

- ☐ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's 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 Engineer Comments section if there are additional comments.
- ☒ Review with the customer this service, parts replaced, and test results obtained.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.
- ☒ Supply the customer with a copy of the Smart Alerts flyer.
- ☒ Describe Smart Alerts to the customer.
- ☒ Install Smart Alerts if requested.

## 7890 GC Test Results Table

Detector Signal Outputs	Before PM Service	After PM Service
Front detector output	N/A	10.7
Back detector output	N/A	12.6
AUX detector output	N/A	N/A
Pressure decay test	Expected test result	Actual test result
Front inlet pressure decay test	Pass	Pass
Back inlet pressure decay test	Pass	N/A

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## 7890 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	Product or model# where used	Quantity consumed
SSL Capillary Inlet PM kit, Splitless	5188-6497	7890A/B	2
SSL Capillary Inlet PM kit, split	5188-6496	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	7890A/B	N/A
PP Inlet PM kit	5188-6498	7890A/B	N/A
Split vent trap PM kit, single cartridge (for MMI, PTV & VI)	5188-6495	7890A/B	N/A
MMI Cleaning Kit	G3510-60820	7890A/B	N/A
PTV Septumless Head Rebuild Kit	5182-9747	7890A/B	N/A
PTV Septumless Head Teflon Guide	5182-9748	7890A/B	N/A
Ignitor (glow plug) assembly with O-ring	19231-60680	7890A/B	1
FID Collector Rebuild/Cleaning Kit	G1531-67000	7890A/B	N/A
Standard .011-inch FID Jet for capillary FID base	G1531-80560	7890A/B	1
High Temperature .018-inch FID Jet for capillary FID base	G1531-80620	7890A/B	N/A
Standard .018-inch FID Jet for packed column with packed FID base	18710-20119	7890A/B	N/A
Standard .011-inch FID Jet for capillary column with packed/adaptable FID base	19244-80560	7890A/B	N/A
High Temperature .018-inch FID Jet for capillary column with packed/adaptable FID base	19244-80620	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID	G1534-80580	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID Extended tip	G1534-80590	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
**FID Collector Replacement Kit, if needed	G1531-67001	7890A/B	N/A

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## Service Engineer Comments

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 include them in this box.

## Service Completion

Service request number 600604570 Date service completed 19 April 2023  
 Agilent signature [Signature] Customer signature \_\_\_\_\_  
 Total number of pages in this document 10 pages

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## Document Control Logs

## Revision Log

Revision	Date	Author	Reason for update
Revision of document	Date of issuance	Author of document	Author to describe main features/changes made for this specific revision
1.0 Draft	4-Mar-2011	Dave Park	Migrated the content of revision A.01.05 to the new Agilent template. Reviewed by subject matter expert, Dave Park.
1.1 Draft	20-Jan-2015	Dave Park	Added Split Vent trap to MMI, PTV and VE - also PTV and FID PM Parts
1.2 Draft	31-March-2015	Dave Park	Added Ultra Inert Gold Seal and Liner to SS Consumables
A.01.11	10-Dec-2015	Dave Park	Added step to perform maintenance on the Split Vent Tube and .018" FID Jet part numbers - Fixed broken web links
2.00	30-Dec-2020	Gary Boardman	Updated New Template and terminology change: Familiarization to Introduction Create New Agile Document Number: D0307063

## Approval Log

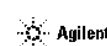
Revision	Approver	Title of approver
Add revision number	Add approver name here	Add approver's function or title here
A.01.06	Don Gage	Product support manager
A.01.05	Kai Meng	Product support manager
A.01.10	Suneetha Tippireddy	Product support manager
A.01.11	Suneetha Tippireddy	Product support manager
2.00	Josh Roark	GC Product Support Manager

## Designated Evaluation Log

Revision	Designated Evaluator (DE)	Title of DE	DE Number
Add revision number	Add name	Add function or title	Add DE number here
2.00	Michael Zumwalt	CrossLab Start Up Services Application Consulting Lead	44166-759722222

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EQP Name: AgilentRecommended

Service Type: QQ

Company Name: United Analyst and Engineering Consultant Co., Ltd.

Customer Name/Title: Min Pongwan Vinyuthai / Laboratory Manager

EQP Filename: G0032 51 eqp

EQP Release Date: November 2, 2020

Print Date: November 2, 2020 8:00:29 PM

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## Scope and Purpose

## Overview

The Equipment Qualification Plan (EQP) documents the activity program that is performed during the qualification services for the applicable systems. A complete description of the test specifications is provided for the supported services, including setpoints and acceptance criteria (or limits) for each test. The test specification section of this document is created directly from the EQP file name listed on the cover. This document is an abstraction of the ECP file used to perform the service and is generated directly from the electronic Agilent Equipment Qualification Plan (eEQP) Editor. The purpose of this document is to allow the user to review and record approval of the EQP that guides the delivery of compliance services provided by the Agilent Automated Compliance Engine.

## CDS Software Pre-requisite for Hardware Qualifications

(Applies to hardware qualifications only) Agilent recommends that the customer data system (CDS) software used during the qualification has been qualified within the qualification period specified by the customer's software qualification SOP.

## Statement of Intent

Unless otherwise requested, the qualification is delivered according to the standard test program described in the Agilent Recommended EQP. Agilent defines variances as changes to the default recommended values (as stated in the Agilent Recommended EQP) that is within a well-defined range. These changes are considered to be within the intended use range of the system under test.

Customizations are values that (a) subject the system to limits that exceed the typical operational range or (b) additional tests that are not considered part of the core program required for completion of the selected service. Because custom setpoints and limits may exceed the operational envelope of the equipment, Agilent reserves the right to warrant conformance only to the closest variance value. The user is notified of this stipulation in EQP setup time and the qualification report (EQR) will reflect this situation.

A set of ink signature fields, as determined by the creator of this document, can be included at the end of this document. All fields should be completed or a single set of fields, tabled by an appropriate approver, run through any signature fields that are not to be used. This is an optional process that allows a paper record of sign-off by the appropriate reviewers where a hybrid (electronic/ink) signature SOP is followed. If this document will be saved electronically and digitally signed in a document management system, it should be generated without ink signature fields. The customer must sign the EQP review documents and return an electronic copy to Agilent prior to qualification delivery. The delivery of the services is done according to the terms and conditions stated in the corresponding service exhibit. It is recommended that after approval, this EQP be archived with the electronic EQP file.

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## Understanding the Test Specification Section in Tabular Review Documents

(Applies to hardware qualifications only) For Agilent recommended setpoints and limits, the range of allowable values (L for low, H for high) is included. As applicable, variances, customizations, and additional setpoints are listed beneath the Agilent recommended values and marked W (within range) or O (outside of range) in the left margin; values for added setpoints are also marked W or O and displayed after all configurations values. Dual limits are marked DW or DO. Agilent is NOT responsible for test failures for out of range setpoints and limits. Optional tests that are enabled are included and marked as such, required tests that are disabled by the customer are included and marked as such.

NOTE: Limit ranges must be more tightly managed than setpoint ranges because they often reflect physical measurement limits and are directly linked to the testing method. Therefore "within range" user limits are subject to best effort repairs if they cannot be met. In particular, Agilent will not be responsible for test failures for limits tighter (more demanding or challenging) than the recommended values.

## Customer Responsibilities

If Agilent representatives use a customer CDS account to acquire test data, they log off from the CDS account at the end of test acquisition. Agilent Technologies has no responsibility for those account credentials. It is up to the customer to protect their CDS from misuse.

- o (As applicable) Disable the account used by the Agilent representative to acquire CDS data
- o Safely store and archive this EQP
- o Maintain change control and revision history

- o Review and optionally sign the EQP, making sure the service delivery is what was approved
- o Review and approve any of the following variances from the Agilent recommended:

- Within Variance Range: changes to the Agilent recommended that are identified by Agilent as within the operation ranges determined in our test development
- Outside of Variance Range: changes to the Agilent recommended that Agilent identifies as outside of the operational ranges determined in our test development. Agilent is not under any obligation to make the instrument pass the more stringent limits that fall in this range and this detail is called out in the EQP Test Specification
- Optional Tests: additional tests that are available but not part of the core testing suite and cost extra
- Disabled Tests: test for which all possible configurations have been disabled (tests are flagged in the test specification)

## Agilent Responsibilities

- o Deliver the services following the test programs described in the customer EQP
- o Provide a locked and e-signed Qualification Report (EQR) upon completion of the service
- o If requested, provide an optional ink signed EQR CD to the customer

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## General Statements on the Testing Program

The recommended set of hardware OQ tests described in this EQP derives from Agilent's interpretation of authoritative export literature issued by the FDA, USP, GAMP, ASTM 2500, and others. The OQ test design incorporates both modular and holistic testing, which is a proven approach acceptable to regulators. As prescribed by the 4Q qualification methodology for Analytical Instrument Qualification (AIQ), the OQ step is separated from the PQ as recommended by the regulatory guidelines.

Agilent CrossLab Compliance uses a balanced selection of metrology and chemical tests to directly determine the performance of the systems without unnecessary reliance on inferred or derived results. For example, direct metrology is used to test pump flow rates and thermal-stored column compartment and autosampler modules. Holistic chemical testing is used for the evaluation of the following critical instrument characteristics: linearity, precision, signal-to-noise, and carry-over.

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## Agilent CrossLab Compliance Services

Agilent CrossLab is designed to fit traditional quality systems used by firms and recognized by regulatory agencies worldwide.

**Note:** Enterprise Edition has been renamed Agilent CrossLab Compliance; all functionality remains the same.

## How Agilent CrossLab aligns with a traditional, paper-based methodology:

- Policy documents dictate the need for validation and qualification of GMP/GLP systems and usually mention the OQ, IQ, PQ, PMA, etc. The policy procedures for IQ and OQ for each type of equipment are provided in an approved SOP, perhaps called SOP #123: Qualification of HPLC Systems. In Agilent CrossLab, the equipment qualification plan (EQP) has the same role as the traditional qualification SOP.
- The traditional SOP provides lists of tests and limits for the range of system configurations found in the laboratory. The EQP follows this concept. The inventory of systems covered by an SOP or EQP changes over time, as this is kept as a separate record.
- The traditional qualification SOP typically has blank results forms as attachments to be photocopied for each IQ or OQ event; the results are recorded in ink with manual calculations. In Agilent CrossLab, this calculation process is streamlined and automated by use of Adobe forms and the Agilent Compliance Engine (ACE) delivery tool. It provides reports with no handwriting errors; validated calculations; a stored pass/fail report; traceability to raw data and the number of times a test was run. This automation provides efficiency and enforces compliance to procedure.
- The traditional qualification SOP is approved and released only once—requiring the need to author individual protocols for each chromatography system. This is the same concept for the EQP. The appropriate tests for each individual configuration are automatically selected by ACE from the list in the approved EQP—at time of delivery. The final reports are unique for each system and each qualification event—but the single approved EQP can cover a lab, department, or as wide a scope as desired.
- In the traditional qualification methodology, there is no convenient provision to record the actual workflow of the tests execution and results. In the event that a test is repeated during the Agilent CrossLab delivery, ACE maintains a counter per test which is automatically incremented for GxP compliant work, and the engineer generates a deviation note within the ADP report.



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## Design Qualification (DQ)

DQ for commercial lab instruments is recommended by some, but not all, guidelines and procedures. Definitions of DQ found in guidelines and firm-specific design procedures vary widely by qualitative work. Some firms require nothing more than a record (such as verification) from the instrument manufacturer demonstrating that the system has been designed for purposes and manufactured to a quality standard. Others treat DQ as the development of a user requirement specification document (URS) which can be matched to the IQ and OQ specifications for a manufacturer. Other firms consider DQ as including the vendor selection activities.

USP Chapter 101, section 101.1, defines DQ.

*Design qualification (DQ) is the documented collection of activities that define the functional and operational specifications of the instrument and criteria for selection of the vendor, based on the intended purpose of the instrument. Design qualification (DQ) may be performed not only by the instrument developer or manufacturer but also may be performed by the user. The manufacturer is generally responsible for robust design and maintaining information describing how the analytical instrument is manufactured (design specifications, functional requirements, etc.) and tested before shipment to users. Nonetheless, the user should ensure that commercial off-the-shelf (COTS) instruments are suitable for their intended application and that the manufacturer has adopted a quality system that provides for reliable equipment. Users should also determine suitability of the manufacturer for support, installation, services, and training.*

For your reference, Agilent provides the following statements for DQ purposes:

1. All Agilent hardware and software laboratory products including the ACE software used to deliver qualification services are designed, manufactured, and tested according to Agilent internal Quality Life Cycle Development Procedures.
2. Certificates of Agilent testing, validation, and conformance to standards are provided with new Agilent hardware and software. Certification is provided for ACE software. These documents are checked and recorded in Agilent CrossLab Compliance Services IQ.
3. Agilent has extensive information describing how products are manufactured and implemented as a problem and bug reporting program as required by international software quality guidelines.
4. The QC specifications in this EQP can be used, as appropriate, by the user to prepare URS. The DQ specifications in this EQP represent the levels of performance acceptable to regulatory agencies for the techniques, configurations, and/or specifications found in the literature. They are equally suitable for OQ at installation and on-going OQ throughout operational lifetime, and equivalent to the OQ specifications published in the legacy Agilent Classic CDP protocols; and are suitable for most user requirements.
5. Agilent Technologies is capable of installation, support, preventive maintenance, on-going qualification, and re-qualification after repair and user training worldwide.

## Installation Qualification (IQ)

IQ checks and tests for Agilent hardware and software products include the following:

1. Purchase Order Details: Allows the customer to verify that their instrument design specification matches their design requirements (if available) and purchase order.
2. Preparation and Installation Details: Gathers and records information about preparation and installation documents.
3. Documentation: Gathers and records information about reference and user manuals for initial installations.
4. Product Quality Assurance Details: Collects and records certificates and other forms that verify that the vendor has developed and built the product according to internal standards.
5. Status: Verifies that all modules are set up properly.
6. Inspection: Check (hardware only): Demonstrates that all modules of the instrument are correctly installed and connected. It does not test instrument performance as fully as OQ. This test is not necessary and therefore skipped. The IQ is to be performed by Agilent personnel at installation with IQ.
7. Installation Verification (software only): Verifies the correctness of all installation-related files.

## Operational Qualification (OQ)

Refer to the appropriate test definitions document for a detailed description of the testing program, endpoints, and acceptance limits for each system technique, category, and instrument configuration.

## Dual-Acceptance Limits

(Applies to hardware qualification only)

With the FQP at Agilent CrossLab, each of the tests (final result) can be compared against two different limits as required. The software automatically configured OQ to report against a User Limit (Limit 1) and the Agilent Recommended Limit (Limit 2) automatically.

In the standard EQP documents, Limit 1 and 2 values are the same—effectively re-creating the feature. Custom EQPs can also be prepared on request, making effective use of the two-limit feature of the Agilent Compliance Engine (ACE). In those cases, Limit 2 will always be the Agilent Recommended Limit, and Limit 1 will be the limit requested by the user.

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Agilent will not be under any obligation regarding the DQ testing results against user-requested limits that are more stringent than the Agilent Recommended ones.

## Re-qualification after Repair (RQ) Hardware

(Applies to hardware qualifications only)

In the event of a hardware breakdown followed by an engineering repair of a qualified instrument, it is necessary to re-qualify the system to an appropriate level before release back into operation.

For some of the instrument techniques, Agilent offers a service contract to repair and re-qualify an instrument during the period between scheduled annual OQs.

The level of re-testing is prescribed in the OQ section of ACE; a form is displayed for the operator showing all types of repair possible and the re-testing required. Part of an example form is shown below.

Re-qualification After Repair			
Pump Strategies	Modules	Flow Accuracy & Precision	Flow Accuracy & Precision
Isocratic pump head pump, active inlet valve (or ADV) assembly, limits of check valves, reference valves, inlet manifold in pump drive, or taking pump head apart to clean (www.agilent.com)	Any pump	Flow Accuracy & Precision	Flow Accuracy & Precision
Pulse damp, pressure transducer	Any pump	Flow Accuracy & Precision	Flow Accuracy & Precision
Mix-format, gradient valve	Any pump	Flow Accuracy & Precision	Flow Accuracy & Precision

The full set of paper and re-test guidance is available for review by customers of the RQ service.

The RQ form in ACE prescribes which tests the operator must perform for each repair circumstance. The test procedure, setup, and limits will be an exact repeat of the previous OQ test in regression testing strategy.

Updated: November 2019

www.agilent.com/chem/qualification

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## Report and Delivery Options

(For hyphenated system types only; if different options are chosen for the primary and supported system types, the primary system options are used for both techniques in the QCR.

- Show chromatograms
- Show header and footer on cover
- Include repeated run logs
- Include 1 lane section logo

## Selected Signature Options

Status: EOP is not signed

- Reporting variance is allowed in this EOP

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## Customer Approval

Name: Miss Pongwan Nitgethai  
Title: Laboratory Manager  
Date: Feb 2, 2021  
Signature: Pongwan N.

Name:  
Title:  
Date:  
Signature:

Name:  
Title:  
Date:  
Signature:

Name:  
Title:  
Date:  
Signature:

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## Legal Notice

Agilent CrossLab Compliance and its primary components (ACE software tool, procedures, test design, methodology tools, chemicals, reference standards, and operator training materials) have been designed, tested, validated, and released for commercial use following Agilent's Life-Cycle Development Quality Assurance methodology.

Agilent CrossLab Group R&D VP and Director of Technology: Neil Cook, Santa Clara, California USA.  
Agilent CrossLab Group Quality Manager: Julio Hector, Santa Clara, California USA.

Agilent CrossLab Compliance is endorsed by Dr. Ludwig Huber on behalf of labcompliance.com.

ACE software is patented. Copyright is claimed by this statement for all original work comprising Agilent CrossLab Compliance. Any unauthorized use, reproduction, or translation will be prosecuted to the maximum extent possible by law. All customer copies of EOP approval, final qualification reports, and raw data provided to customer at delivery of the service become the property of the customer.

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## Protocol Details

Protocol Revision Used for this Document

Protocol Revision Release Date

QC.02.51

November 2020

NOTE: The Revision History - EQ\* Editor document includes details for above and other systematic revisions.

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## Agilent CrossLab Compliance

Qualification Type:	GC-OQ
System ID:	CN13113001
EQP Name:	AgilentRecommended
EQP Revision:	GC-02.51
EQP Publish Date:	November 2020
Date:	April 19, 2023 10:39:28 AM
Report Type:	Report
Org. Name:	United Analyst and Engineering Consultant Co., Ltd.
Org. Location:	3 Soi Udomsuk 41, Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10260

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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System ID: CN13113001

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## Test Summary

## Purpose

This section includes the Overall Qualification Status and details for each test that meets at least one of the following criteria: (1) was not scheduled; (2) was scheduled but not run; (3) was processed more than once; (4) passed recommended limits only when dual limits were selected; (5) required deviation(s) or comment(s); (6) required integration event change(s). Tests that pass and do not meet any criteria above are not included.

For a complete list of scheduled tests, see the table of contents. For supporting documentation, refer to the Attachments section.

NOTE: A Pass for the Overall Qualification Status indicates that all scheduled tests were run and passed. R, I, U, and C are blank if not applicable for that specific test.

## R: runs

I: integration event changes

D: number of deviations submitted

C: number of comments submitted

Status: NS (not scheduled), NR (scheduled but not run), NC (unlocked but not completed)

## Details

Test	Status			
	R	I	D	C
GC Scouting Run - Injection Tower, Front SSL, Front FID	Pass			
	1	1		
Injection Precision - Injection Tower, Front SSL, Front FID	Pass			
	1	1		
Signal to Noise - Injection Tower, Front SSL, Front FID	Pass			
	1	1		
GC Scouting Run - Injection Tower, Front SSL, Back FPD+	Pass			
	1	1		
Injection Precision - Injection Tower, Front SSL, Back FPD+	Pass			
	1	1		

## Overall Qualification Status

Pass

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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Service Details

Purpose  
This section includes local contact and delivery details for this service.

General Details	
Service Order No./Request	6006064510
EQP Name:	Agilent-Recommended
EQP Revision:	GC.C2.51
Report Type:	Report
Organization Details	
Name:	United Analyst and Engineering Consultant Co., Ltd
Location:	3 Soi Udomsak 41, Sukhumvit Road, Bangna-Phra Khanong Bangkok 10260
Local Contact Details	
Name	Borjawan Viriyachai
Job Title:	Manager
Qualification Location:	Analytical Laboratory: Re
Operator Details	
Name:	Saengchai Tanrak
Job Title:	Field Service Engineer
Data Acquisition Details	
Acquisition Software Name:	ChemStation
Acquisition Software Revision:	C.01.10 Update 03
Customer Data System (CDS):	Go: OpenLAB CDS

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Instrument Details

Purpose  
This section describes the as found system configuration.

Details	
System	
System ID	CN13113001
Manufacturer	Agilent Technologies
Name	i890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging
Tested Combination1	
Injection Technique	Injection Tower
Inlet	Front
Detector	Front
LTM Included?	No
Tested Combination2	
Injection Technique	Injection Tower
Inlet	Front
Detector	Rack
LTM Included?	No
Sampler	
Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7893A
Model Number	G4513A
Serial Number	CN13250018
Firmware Revision	A.10.05
Usage	Sample Injection
Location	Front
Syringe Volume (uL)	10

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Sampler 2	
Manufacturer	Agilent Technologies
Type	Tray
Name	7893A
Model Number	G4514A
Serial Number	CN13700169
Firmware Revision	A.10.10
Vial Heater	Not installed
Mainframe 1	
Manufacturer	Agilent Technologies
Name	7890
Model Number	C8440B
Serial Number	CN13113001
Firmware Revision	B.02.03.2
Oven Type	Standard
Inlet 1	
Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes
Detector 1	
Manufacturer	Agilent Technologies
Name	i890
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen

เอกสารไม่ควบคุม

Detector 2	
Manufacturer	Agilent Technologies
Name	7890
Type	FID+
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Back
Makeup Gas	Nitrogen
Filter Tested	P-Mode

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## Calculation Formulas

### Purpose

This section includes calculation formulas for all available tests. Depending upon which tests are scheduled, all or some apply to your qualification.

$$\begin{aligned} \text{Accuracy} &= (X_{\text{ref}} - X_{\text{ref}}) \\ X_{\text{ref}} &= \text{Mean value} \\ X_{\text{ref}} &= \text{Setpoint} \\ \text{Absolute Accuracy} &= [(X_{\text{ref}} - X_{\text{ref}})] \\ X_{\text{ref}} &= \text{Mean value} \\ X_{\text{ref}} &= \text{Setpoint} \\ \text{Average} &= \left( \text{mean value of } n \text{ observations} \right) = \frac{1}{n} \sum_{i=1}^n X_i \\ X_i &= \text{Value, } i^{\text{th}} \text{ observation} \\ n &= \text{Total number of observations} \\ \% \text{ Carry Over} &= \frac{X_0}{X_1} \times 100 \\ X_0 &= \text{Response of blank injection} \\ X_1 &= \text{Response of final standard injection} \\ \text{Drift} &= \text{slope of the regression} = \frac{1}{\Delta X} \left( n \sum_{i=1}^n X_i Y_i - \sum_{i=1}^n X_i \sum_{i=1}^n Y_i \right) \\ \Delta X &= n \sum_{i=1}^n X_i^2 - \left( \sum_{i=1}^n X_i \right)^2 \\ n &= \text{Number of data points} \\ X_i &= \text{Time, } i^{\text{th}} \text{ observation} \\ Y_i &= \text{Response, } i^{\text{th}} \text{ observation} \\ \text{Coefficient of Determination} &= r^2 \\ \text{ASTM Noise} &= \frac{\sum_{i=1}^n X_{\text{Peak}}}{n} \\ X_{\text{Peak}} &= \text{Peak to peak noise in sequence } n \\ n &= \text{Number of sequences} \\ \text{Peak Noise} &= \sqrt{\frac{\sum_{i=1}^n (E_i - \bar{E})^2}{(n-1)}} \\ E_i &= \text{Individual voltage readings} \\ \bar{E} &= \text{Average of } n \text{ measurements} \\ \text{Six Sigma Noise} &= 6 \times SD \\ \text{Response Factor} &= \frac{Y}{X} \\ Y &= \text{Amount} \\ X &= \text{Response} \\ \text{Parts Per Million (ppm)} &= \frac{(M_r - M_t)}{M_t} \times 1,000,000 \\ M_r &= \text{Reported mass} \\ M_t &= \text{Theoretical mass} \\ \text{Stability} &= [(Y_{\text{max}} - Y_{\text{min}})] \\ Y_{\text{max}} &= \text{Maximum value} \\ Y_{\text{min}} &= \text{Minimum value} \\ \text{Standard Deviation (SD)} &= \sqrt{\frac{1}{(n-1)} \sum_{i=1}^n (X_i - X_{\text{ref}})^2} \\ X_i &= \text{Value, } i^{\text{th}} \text{ observation} \\ X_{\text{ref}} &= \text{Mean value in } n \text{ observations} \\ n &= \text{Total number of observations} \\ \text{Relative Standard Deviation (\% RSD)} &= \frac{SD}{X_{\text{ref}}} \times 100 \\ SD &= \text{Standard deviation} \\ X_{\text{ref}} &= \text{Mean value of observations} \end{aligned}$$

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NOTE: For many tests performed by the Automated Compliance Engine multi-step calculations are employed to reduce the raw data to a report-ready form. These calculations retain the full precision of each intermediate result as the algorithm progresses through the required reduction. Where intermediate or metadata is displayed, those values must be rounded or truncated to provide the proper display values. Attempting to calculate the final value based on those display modified intermediate values can result in a small difference in the final result. These intermediate values presented, are simply used to show algorithmic progress through the calculation and not intended to act as a means of algorithmic validation. Beginning with GC.01.88, results are rounded to use the same number of decimal places as defined in the limit, which must be less than or equal to the resolution provided by the measuring equipment.

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## Protocol Details

### Purpose

This section lists the revisions for all test units used in this report. For complete test-specific and high-level change details, refer to the Revision History document.

Test Revision	Test
GC.02.51	Detector Flow Accuracy
GC.02.51	GC Oven Temperature Accuracy
GC.02.51	GC Oven Temperature Stability
GC.02.50	GC Sequencing Run
GC.02.50	Injection Precision
GC.02.50	Inlet Pressure Accuracy
GC.02.50	Inlet Pressure Drift
GC.02.50	Noise and Drift
GC.02.50	Signal to Noise
GC.02.50	System Inspection and Basic Safety and Operation

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## System Inspection and Basic Safety and Operation

### Purpose

This test verifies that the GC is correctly installed and connected.

### Configuration Details

Name: 7850

### Setpoint

Criteria	Observed Result	Expected Result	Status
Is the system in good operating condition (no physical damage)?	Yes	Yes	Pass
Are there apparent instrument or environmental safety concerns?	No	No	Pass
Are required gases present and of appropriate pressure?	Yes	Yes	Pass
Is there continuity between the GC chassis and the ground pin?	Yes	Yes	Pass
Does the power-cycled GC complete the self test without errors (a "not ready" status is considered to be without errors)?	Yes	Yes	Pass
Does the system reject cooler only of over setpoint, of 90°C?	Yes	Yes	Pass
Does a (hydrogen) safety shutdown start in approximately 4 - 10 minutes?	Yes	Yes	Pass

Setpoint Status: Pass Run: 1

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

Pass

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## Inlet Pressure Decay

### Purpose

This test demonstrates the pressure integrity of the GC inlet (with a valve controlled injection system, if applicable) and all flows controlled by the GC inlet pneumatics.

### Configuration Details

Name: 7850C Front SSL

Setpoint Inlet Pressure: 25.0 psi

### Measurements

Initial Pressure: 25.2 psi

Final Pressure: 25.1 psi

### Results

Pressure Change: 0.1 psi / 5 minutes

Agilent Recommended:  $\geq -2.0$  and  $\leq 0.5$

Setpoint Status: Pass Runs: 1

### Overall Inlet Pressure Decay Test Status

Pass

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## Inlet Pressure Accuracy

### Purpose

This test uses a digital calibrated manometer to demonstrate the ability of the system to provide accurate pressure to the head of the column. Accuracy is calculated as the absolute difference between the measured pressure and setpoint.

### Configuration Details

Name: 7890 Front SSL

Setpoint Inlet Pressure: 25.0 psi

### Measurements

Reading: 26.1 psi

### Results

Accuracy: 0.1 psi

Agilent Recommended:  $\leq 1.7$

Setpoint Status: Pass Runs: 1

### Overall Inlet Pressure Accuracy Test Status

Pass

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## Detector Flow Accuracy

### Purpose

Detector flow accuracy is determined by measuring the flows with a calibrated mass flowmeter and comparing them to the test setpoints and the values displayed by the GC (FID/SSC).

### Configuration Details

Name: 7890 Front FID

Setpoint Flow Type Fuel 30.0 mL/min

### Measurements and Results

Time Flow  
00:36 30.2 mL/min

Accuracy: 0.2 mL/min

Agilent Recommended:  $\leq 10.0$  % setpoint (3.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

Setpoint Status: Pass Runs: 1

Setpoint Flow Type Oxidizer 400.0 mL/min

### Measurements and Results

Time Flow  
00:36 398.4 mL/min

Accuracy: 3.6 mL/min

Agilent Recommended:  $\leq 10.0$  % setpoint (40.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

Setpoint Status: Pass Runs: 1

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Setpoint Flow Type Makeup 25.0 mL/min

### Measurements and Results

Time Flow  
00:36 24.9 mL/min

Accuracy: 0.1 mL/min

Agilent Recommended:  $\leq 10.0$  % setpoint (2.5 mL/min)

Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

Setpoint Status: Pass Runs: 1

### Overall Detector Flow Accuracy Test Status

Pass

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## Detector Flow Accuracy

### Purpose

Detector flow accuracy is determined by measuring the flows with a calibrated mass flowmeter and comparing them to the test setpoints and the values displayed by the GC (if applicable).

### Configuration Details

Name: 7890  
Back FPD+

Setpoint: Flow Type: Fuel 60.0 mL/min

### Measurements and Results

Time: 09:40 Flow: 60.1 mL/min

Accuracy: 0.1 mL/min  
Agilent Recommended:  $\leq 10.0$  % setpoint ( 6.0 mL/min )  
Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

Setpoint Status: Pass Runs: 1

Setpoint: Flow Type: Oxidizer 60.0 mL/min

### Measurements and Results

Time: 09:44 Flow: 60.2 mL/min

Accuracy: 0.2 mL/min  
Agilent Recommended:  $\leq 10.0$  % setpoint ( 6.0 mL/min )  
Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

Setpoint Status: Pass Runs: 1

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Setpoint: Flow Type: Makeup 60.0 mL/min  
Purge Offset: 20 % setpoint  
Adjusted Flow Setpoint: 72.00 mL/min

### Measurements and Results

Time: 09:48 Flow: 65.1 mL/min

Accuracy: 6.9 mL/min  
Agilent Recommended:  $\leq 10.0$  % setpoint ( 7.2 mL/min )  
Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

Setpoint Status: Pass Runs: 1

### Overall Detector Flow Accuracy Test Status

Pass

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## GC Oven Temperature Accuracy

### Purpose

This test uses a calibrated digital thermocouple to determine the accuracy of the GC oven. Accuracy is calculated as the absolute difference between the measured temperature and setpoint.

### Configuration Details

Name: 7890

Setpoint: Temperature: 230.0 °C  
Zone: Oven

### Measurements and Results

Probe: A single probe is used for this service.

Time: 09:50 Temperature: 230.2 °C

Accuracy: 0.2 °C  
Agilent Recommended:  $\geq -1.0$  % setpoint in K ( -5.0 °C )  
 $\leq 1.0$  % setpoint in K ( 5.0 °C )

Setpoint Status: Pass Runs: 1

Setpoint: Temperature: 100.0 °C  
Zone: Oven

### Measurements and Results

Probe: A single probe is used for this service.

Time: 09:55 Temperature: 100.8 °C

Accuracy: 0.8 °C  
Agilent Recommended:  $\geq -1.0$  % setpoint in K ( -3.7 °C )  
 $\leq 1.0$  % setpoint in K ( 3.7 °C )

Setpoint Status: Pass Runs: 1

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### Overall GC Oven Temperature Accuracy Test Status

Pass

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## GC Oven Temperature Stability

## Purpose

This test is used to determine the stability of the oven temperature. Stability is expressed as the delta between the highest and lowest measured temperatures.

## Configuration Details

Name: 7890

Setpoint: Temperature 100.0 °C  
Zone: Oven

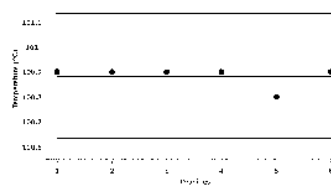
## Measurements Results

Probe: A single probe is used for this service.

Time	Temperature	Average
1. 10:01	100.8 °C	100.8833 °C
2. 10:03	100.9 °C	High: 100.9 °C
3. 10:05	100.8 °C	Low: 100.8 °C
4. 10:07	100.9 °C	Stability: 0.1 °C
5. 10:08	100.8 °C	Agilent Recommended 0.5
6. 10:11	100.5 °C	

Setpoint Status: Pass Run: 1

GC Oven Temperature Stability Test Summary



## Overall GC Oven Temperature Stability Test Status

Pass

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## Scouting Run

## Purpose

This test is used to determine the chromatogram for presence of expected peaks, sufficient run time, and proper integration events prior to the start of the qualification runs.

## Sequence

The sequence has one line to perform a single injection of the evaluation standard.

Evaluation standard: 1 injection

## Configuration Details

Tested Combination: Front SSL / Front FID

Injection Tower: 7893A

Name: 7893A

Setpoint: Injection Volume on Column: 1.0 µL

Conditions: Y Axis Unit: A

Configuration: Sample: FID MCL Sto Kic, 5198-0372

Evaluated Compound: Sample Peak

Evaluation Standard Concentration: 100 % (from Certificate of Analysis)

Measurements: Does the run induce sufficient flat baseline for the S/N test? Yes

Noise start time for Signal to Noise (minutes): 4

Run time for Signal to Noise (minutes): 5.5

Run time for tests not requiring extra noise interval (minutes): 1

Setpoint Status: Completed Run: 1

Data Audit Log

Host name: LAPTOP-CO3SKOMY

Origin Data Path: F:\Data\002023\002023\_FID\_2023\_04\_18\10\_48\_18

Analyzed Data Path: SDS:\SessionData\002023\002023\_FID\_2023\_04\_18\10\_48\_18\PreviousRun\Run1

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## Integration Parameters:

Type of Integration: injection

Integration Count: 1

Options Values:

Baseline Correction Mode: Advanced

Initial Slope Sensitivity: 10

Initial Peak Width: 0.05

Initial Area Reject: 0

Initial Height Reject: 100

Timed Event Table:

Integration Type: Value Time

Integration: Off C

Integration: On C 0.15

Integration: Off C 5

Acquisition operator: Saenguthai Tanak

Acquisition method: 00\_GC7890B\_SC.M

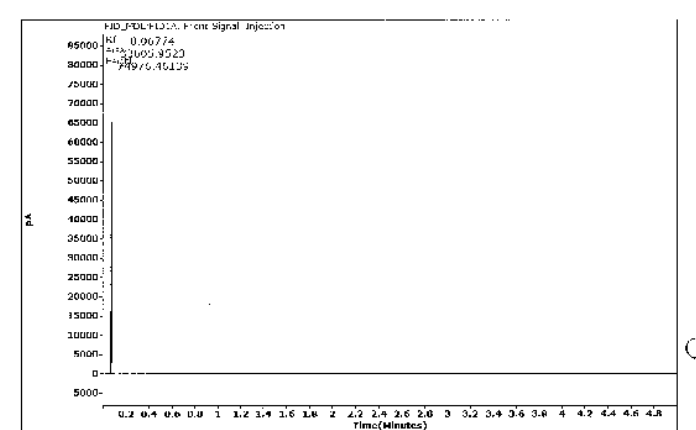
Data file analyzed for this test: FID\_SC00112.D

Acquisition Date: 18-Apr-23 10:55:04

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Overall Scouting Run Status

Completed

(Completed is expressed as Pass in the Test Summary section.)

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## Noise and Drift

### Purpose

This test determines the noise and drift of the detector signal. The base signal is recorded at the beginning of the test, noise is calculated as the average peak-to-peak noise in a number of signal segments, and drift is calculated as the slope of the linear regression for the signal.

### Sequence

Line 1: Blank run, 1 injection

### Configuration Details

Tested Combination	Front	SSL	Front	FD
Name	7890			

Setpoint	Base Signal:	14.2	pA
Base signal is not evaluated and for recording purposes only			

### Conditions

Noise Evaluation Start Time	3.0	min
Noise Evaluation Duration	20.0	min
Sample	Blank run	
Oven Temperature	100 C	°C

### Configuration

Y-Axis Unit	pA
-------------	----

### Results

	ASTM Noise	Drift
	pA	pA/hr
Agilent Recommended:	0.07	0.50
Status:	Pass	Pass

After data is processed, test-specification limits on this form are rescaled for the CDS used to collect data.

Setpoint Status:	Pass	Run: 1
------------------	------	--------

### Data Audit Log

Host Name	LAPTOP-CQ3SKOMV
Original Data Path	F:\Data\002023\002023_1\10 2023\04-18 10:48-18
Analyzed Data Path	SDS:\SessionData\QC\tests\GC\0_0_0\GC_0_0_0\PreviousRun\Run:1

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### Acquisition operator

Saengutai Iarak

### Acquisition method

CQ\_GC7890S\_ND.M

### Data file analyzed for this test

FID\_ND0012.D

### Acquisition Date

18-Apr-23, 11:25:49

### Noise Type

ASTM

### Noise Value

0.06783

### Noise start time

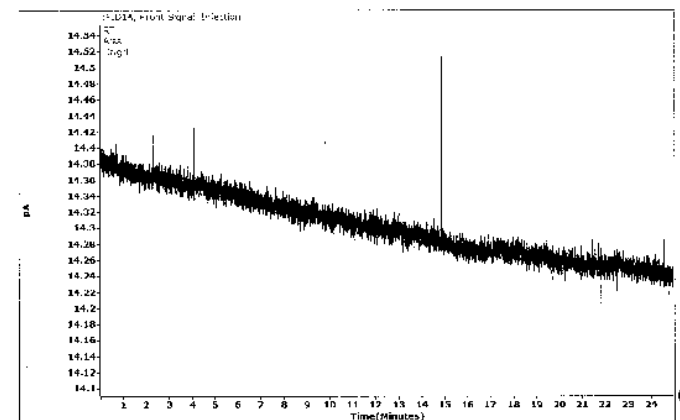
3.0

### Noise duration

20.0

### Drift Value

0.34202



### Overall Noise and Drift Test Status

Pass

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## Injection Precision

### Purpose

This test uses a traceable standard to determine injection precision. The mean, standard deviation, and % RSD of six standard injections are calculated.

### Sequence

This sequence has two or eight lines depending upon whether you inject 7 times from the same vial or use 7 separate vials.

Evaluation standard, 1 injection (system evaluation)

Traceable standard, 1 injection (6 of 1000)

Sample blank, 1 injection (applies only if carry over is run immediately after precision)

### Configuration Details

Tested Combination	Front	SSL	Front	FD
Name	7893A			

Setpoint	Injection Volume on COL: min:	1.0	µL
----------	-------------------------------	-----	----

### Conditions

Y-Axis Unit	pA
-------------	----

### Configuration

Sample:	FID MDL Std Kit 5-68-58/2
Evaluation Compound:	Sample Peak
Evaluation Standard Concentration:	100 % (from Certificate of Analysis)

Measurements	Area	Retention Time
	pA*s	minutes
	33536.70	0.0680
	33786.11	0.06743
	33793.58	0.0672
	33634.05	0.06827
	34025.55	0.06738
	33688.55	0.06753

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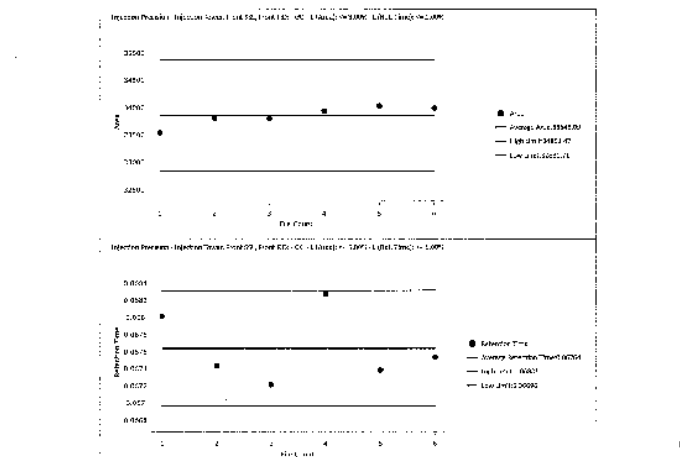
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### Results

	Area	Retention Time
Average:	33848.00	0.06794 minutes
STD Deviation	180.0584	0.00041 minutes
RSD:	0.53 %	0.6 %
Agilent Recommended	≤ 3.00 %	≤ 1.00 %
Status:	Pass	Pass

Setpoint Status:	Pass	Run: 1
------------------	------	--------



### Data Audit Log

Host Name	LAPTOP-CQ3SKOMV
Original Data Path	F:\Data\002023\002023_1\10 2023\04-18 10:48-18
Analyzed Data Path	SDS:\SessionData\QC\tests\GC\0_0_0\GC_0_0_0\PreviousRun\Run:1

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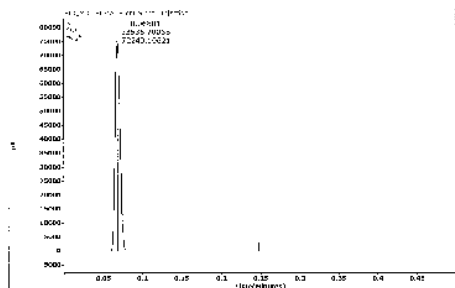
## Integration Parameters:

Type of Integration: Inject-Off  
Integration Count: 1  
Optional Variables:  
Baseline Correction Mode: Advanced  
Initial Slope Sensitivity: 1G  
Initial Peak Width: 0.05  
Initial Area Reject: 0  
Initial Height Reject: 100

## Time/Event Table

Integration Type	Value	Time
Integration	Off	0
Integration	On	0.015
Integration	Off	0.5

Acquisition operator: Saengutai Tarak  
Acquisition method: OQ\_GC7890B\_Pre.M  
Data file analyzed for this test: FID\_Pre01-009F.D  
Acquisition Date: 18-Apr-23, 12:10:52

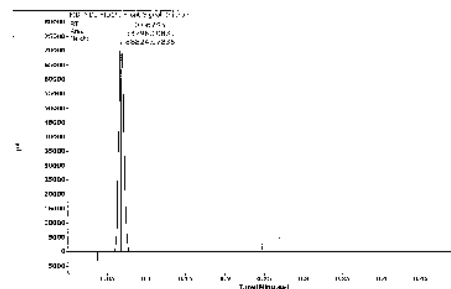


Date: April 19, 2023 10:39:23 AM  
System ID: CN13113001

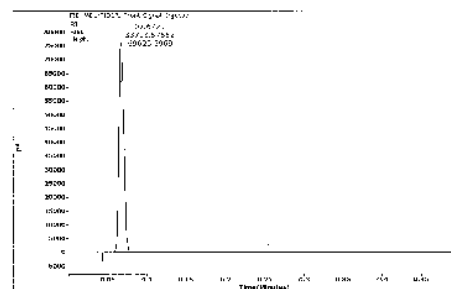
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Acquisition operator: Saengutai Tarak  
Acquisition method: OQ\_GC7890B\_Pre.M  
Data file analyzed for this test: FID\_Pre01-009F.D  
Acquisition Date: 18-Apr-23, 12:21:12



Acquisition operator: Saengutai Tarak  
Acquisition method: OQ\_GC7890B\_Pre.M  
Data file analyzed for this test: FID\_Pre01-009F.D  
Acquisition Date: 18-Apr-23, 12:22:35

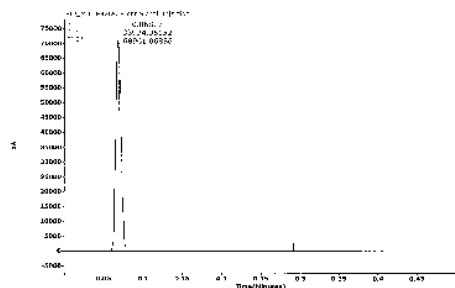


Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

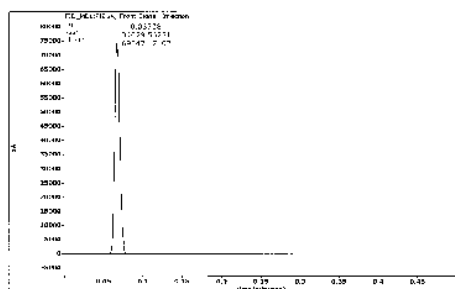
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Acquisition operator: Saengutai Tarak  
Acquisition method: OQ\_GC7890B\_Pre.M  
Data file analyzed for this test: FID\_Pre01-009F.D  
Acquisition Date: 18-Apr-23, 12:23:55



Acquisition operator: Saengutai Tarak  
Acquisition method: OQ\_GC7890B\_Pre.M  
Data file analyzed for this test: FID\_Pre01-009F.D  
Acquisition Date: 18-Apr-23, 12:25:15

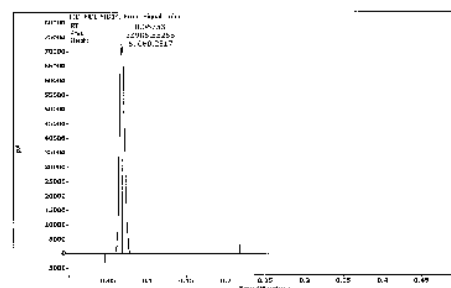


Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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Acquisition operator: Saengutai Tarak  
Acquisition method: OQ\_GC7890B\_Pre.M  
Data file analyzed for this test: FID\_Pre01-010F.D  
Acquisition Date: 18-Apr-23, 12:26:34



## Overall Injection Precision Test Status

Pass

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## Signal to Noise

## Purpose

This test uses a baseline standard to determine signal to noise.

## Sequence:

Line 1: Evaluation standard, 1 injection

## Configuration Details

Tested Combination	Front	SSL	Front	FID
Name	Injection Tower 7890			

## Setpoint

## Conditions

Injection Volume on Column	1.0	µL
Noise Evaluation Start Time/Duration	4	min / 1.0 min

## Configuration

Y-Axis Unit	pA
Sample	FID M.O.L. Std Kit, 6198-5372
Evaluation Compound	Sample Peak
Evaluation Standard Concentration	100 % (Certificate of Analysis)

## Measurements

Noise (Type/Value)	ASTM / 0.03242	pA
Retention Time of Evaluated Peak	0.09807	minutes
Peak Height (Uncorrected/Corrected)	72519.55 / 72519.55	pA

(Corrected for attenuation and differences between nominal and reported concentration; analog data is corrected for the applied signal reduction [range/attenuation].)

## Results

Signal to Noise	2236678
Agilent Recommended	>= 300000
ADF uses unrounded values in its calculations, only the final result is rounded. Therefore, for high signal-to-noise ratios (high peaks/low noise), ACE calculations may appear to differ slightly from your manual calculations using the reported height and noise.	

Setpoint Status: Pass Runs: 1

## Data Audit Log

Date: April 19, 2023 10:39:25 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

## Host Name:

F:\PTQ\2-Q\Q3S40\NV

## Original Data Path:

F:\Data\002023\002023\_FID\2023-04-18\04R18

## Analysis Data Path:

SDS:\SessionData\Q\Q\Tests\GC\Sn 0 GC\Sn 0 0 1\PreviousRun\Run1

Date: April 19, 2023 10:39:26 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

## Integration Parameters:

Type of Integration :	Injection	
Integration Count:	1	
Optional Values :		
Baseline Correction Mode:	Advanced	
Initial Slope Sensitivity:	10	
Initial Peak Width:	0.05	
Initial Area Reject:	0	
Initial Height Reject:	100	
Timed Event Table :		
Integration Type:	Value	Time
Integration	Off	0
Integration	On	0.015
Integration	Off	0.5

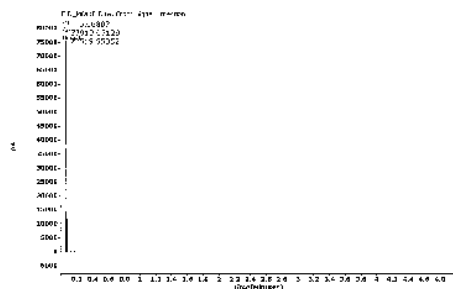
Acquisition operator: Saenguthai Tarak

Acquisition method: OQ\_GC7890B\_SN.M

Data file analyzed for this test:

FID\_SN-D11F1.D

Acquisition Date: 18-Apr-23, 12:28:03



Date: April 19, 2023 10:39:26 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

Acquisition operator:

Saenguthai Tarak

Acquisition method:

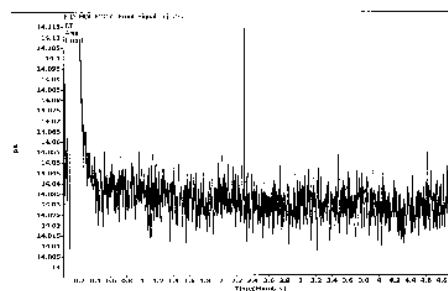
OQ\_GC7890B\_SN.M

Data file analyzed for this test:

FID\_SN-D11F1.D

Acquisition Date:

18-Apr-23, 12:28:03



## Overall Signal to Noise Test Status

Pass

Date: April 19, 2023 10:39:26 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

## Scouting Run

### Purpose

This test is used to determine the chromatogram for presence of expected peaks, sufficient run time, and proper integration events prior to the start of the qualification runs.

### Sequence

The sequence has one line to perform a single injection of the evaluation standard.

Evaluation standard: 1 injection

### Configuration Details

Tested Combination2	Front	SSL	/ Back	FPD+
Injection Tower				
Name:	7593A			
Setpoint	Injection Volume on Column:	1.0	µl	
Mode:	P-Mode			

### Conditions

Y-Axis Unit: 150 pA

### Configuration

Sample: FPD Std Kit 5188-52/G  
Evaluated Compound: Dimethyl phthalate  
Evaluation Standard Concentration: 2.0 mg/L (from Certificate of Analysis)

### Measurements

Does the run include sufficient flat baseline for the SN test? Yes

Noise start time for Signal to Noise (minutes): 12

Run time for Signal to Noise (minutes): 15.2

Run time for tests not requiring extra noise interval (minutes): 1

Setpoint Status: Completed Run: 1

### Data Audit Log

Host name: LAPTOP-CQ3SKOMV  
Original Data Path: \\Data\_OQ2023\OQ2023\_2023-04-18\_13-35-09  
Analyzed Data Path: SDS\Session1\Data\OQ\Tests\GCScout\_1\_0\_1\PreviousRun\Run1

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

### Integration Parameters :

Type of Integration	Injection
Integration Count	1
Optional Values	
Baseline Correction Mode:	Advanced
Initial Slope Sensitivity:	10
Initial Peak Width:	0.01
Initial Area Reject:	0
Initial Height Reject:	100

Integration Type	Value	Time
Integration	Off	0
Integration	On	9

Acquisition operator: Saengutai Tarak

Acquisition method: OQ2023\_FPD.M

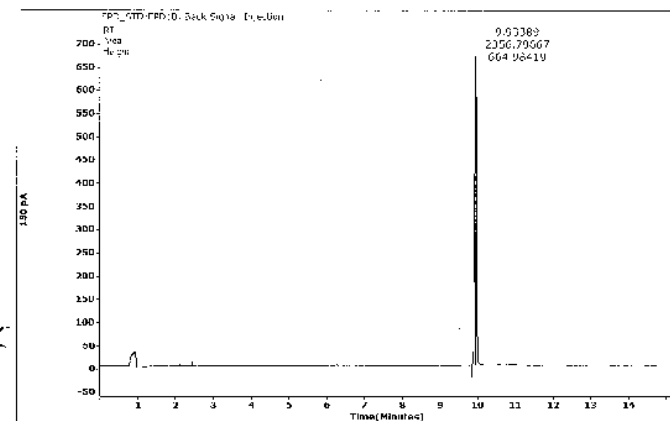
Data file analyzed for this test: FPD\_S0301.D

Acquisition Date: 18 Apr 23, 13:37:30

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม



### Overall Scouting Run Status

Completed  
(Completed is expressed as Pass in the Test Summary section.)

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

## Noise and Drift

### Purpose

This test determines the noise and drift of the detector signal. The base signal is recorded at the beginning of the last, noise is calculated as the average peak-to-peak noise in a number of signal segments, and drift is calculated as the slope of the linear regression for the signal.

### Sequence

Line 1: Blank run, 1 injection

### Configuration Details

Tested Combination2	From:	SSL	/ Back	FPD+
Name	rs90			
Setpoint	Mode	P-Mode		
Base Signal:	7.5	150 pA		
Base signal is not evaluated and for recording purposes only				

### Conditions

Noise Evaluation Start Time: 3.0 min  
Noise Evaluation Duration: 20.0 min  
Sample: Blank  
Oven Temperature: 100.0 °C

### Configuration

Y-Axis Unit: 150 pA

### Results

ASTM Noise		Drift	
DU	DU/Hr	DU/Hr	
1.38	0.18		
≤ 12.00	≤ 1.50		
Status:	Pass	Status:	Pass

After data is processed, test specification limits on this form are rescaled for the CDS used to collect data.

Setpoint Status: Pass Run: 1

### Data Audit Log

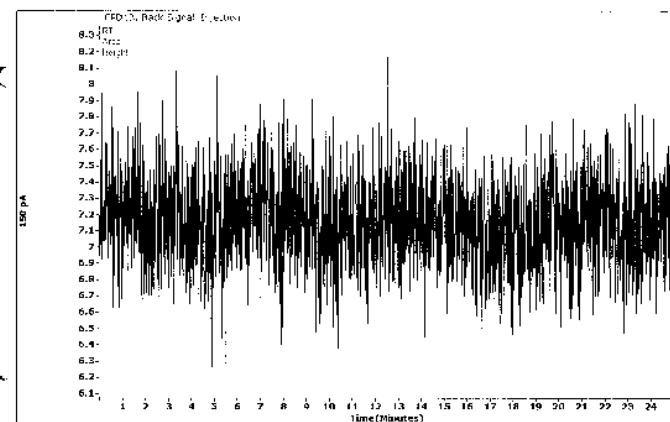
Host name: LAPTOP-CQ3SKOMV  
Original Data Path: \\Data\_OQ2023\OQ2023\_2023-04-18\_13-35-09

Date: April 19, 2023 10:36:25 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

Analytic Data Path: SDS:/SessionData/OQ/Tests/Gcdp\_1\_0/Gcdp\_1\_0\_1/PreviousRun/Run1  
Acquisition operator: Saenguthai Tanak  
Acquisition method: OQ2022\_HP\_3\_ND.M  
Data file analyzed for this test: FPD\_ND001-008.FD  
Acquisition Date: 18-Apr-23, 15:36:45  
Noise Type: ASTM  
Noise Value: 1.37671  
Noise start time: 3.0  
Noise duration: 23.0  
Drift Value: 0.18733



Overall Noise and Drift Test Status

Pass

Date: April 19, 2023 10:36:28 AM  
System ID: CN1313001

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เอกสารไม่ควบคุม

## Injection Precision

## Purpose

This test uses a traceable standard to determine injection precision. The mean, standard deviation, and % RSD of six standard injections are calculated.

## Sequence

The sequence has two or eight lines depending upon whether you inject 7 times from the same vial or use 7 separate vials.

Evaluation standard: 1 injection (system equilibration)

Evaluation standard: 7 injection (6 of these)

Sample blank: 1 injection (applies only if carry over is run immediately after precision)

## Configuration Details

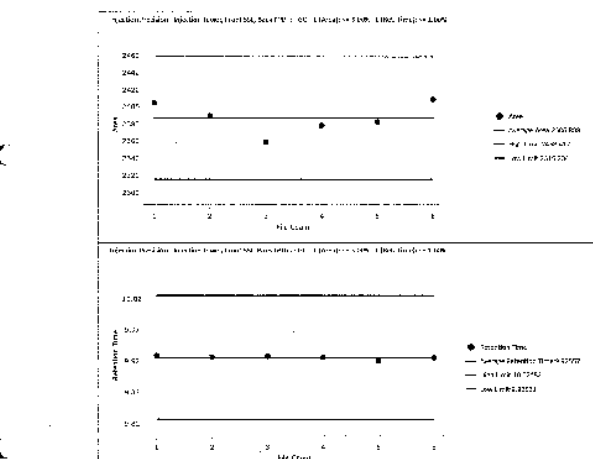
Tested Combination	2	Front	SSL	7 Reel	FPD+
Name:	Injection Tower				
Setpoint	Injection Volume on Column				
Mode:	P-Mode				
Conditions	150 pA				
Configuration	Sample: FPD Std Kit 5785 5245				
Evaluated Component:	tributylphosphate				
Evaluation Standard Concentration:	2.0 mg/L (from Certificate of Analysis)				
Measurements	Area	DU's	Retention Time		
	2424.431		9.92836	minutes	
	2589.328		9.92816		
	2805.828		9.92743		
	2877.773		9.92686		
	2882.212		9.92050		
	2405.573		9.92608		

Date: April 19, 2023 10:36:28 AM  
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เอกสารไม่ควบคุม

Results	Area	Retention Time
Average	2386.808 DU's	9.92557 minutes
STD Deviation:	16.40185 DU's	0.00274 minutes
RSD:	0.69 %	0.03 %
Agilent Recommended:	≤ 3.00	≤ 0.05
Status:	Pass	Pass
Setpoint Status:	Pass	Runs: 1



## Data Audit Log

Host name: LSP10P-CQ3SKOMV  
Original Data Path: F:\Data\_OQ2023\OQ2023 2023-04-18 15:35:09  
Analyzed Data Path: SDS:/SessionData/OQ/Tests/Gcdp\_1\_0/Gcdp\_1\_0\_1/PreviousRun/Run1

Date: April 19, 2023 10:36:28 AM  
System ID: CN1313001

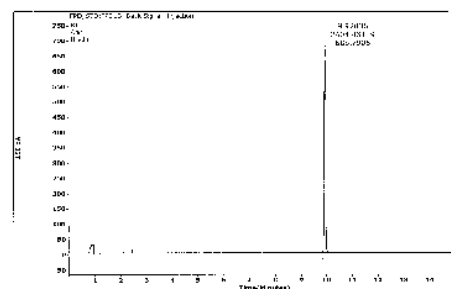
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เอกสารไม่ควบคุม

## Integration Parameters:

Type of Integration :	Injection
Integration Count	1
Optional Values :	
Baseline Correction Mode	Advanced
Initial Slope Sensitivity:	10
Initial Peak Width:	0.01
Initial Area Reject:	0
Initial Height Reject:	100
Timed Event Table :	
Integration Type	Value
Integration	Off
Integration	On

Acquisition operator: Saenguthai Tanak  
Acquisition method: OQ2023\_FPD.M  
Data file analyzed for this test: FPD\_Pre001-011.FD  
Acquisition Date: 18 Apr 23, 17:24:10

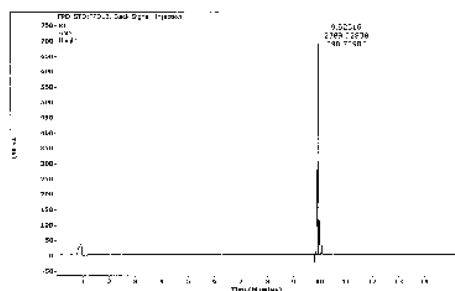


Date: April 19, 2023 10:36:28 AM  
System ID: CN1313001

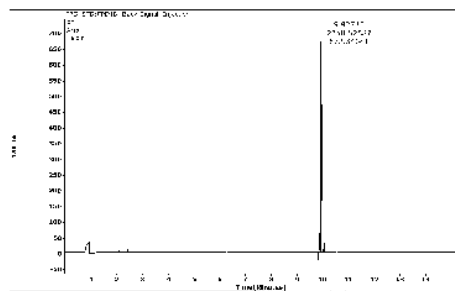
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เอกสารไม่ควบคุม

Acquisition operator: Saenguthai Tarak  
Acquisition method: OQ2023\_FPD.M  
Data file analyzed for this test: FPD\_Pre001-C12F.D  
Acquisition Date: 18-Apr-23, 17:42:24



Acquisition operator: Saenguthai Tarak  
Acquisition method: OQ2023\_FPD.M  
Data file analyzed for this test: FPD\_Pre001-C13F.D  
Acquisition Date: 18-Apr-23, 18:00:34

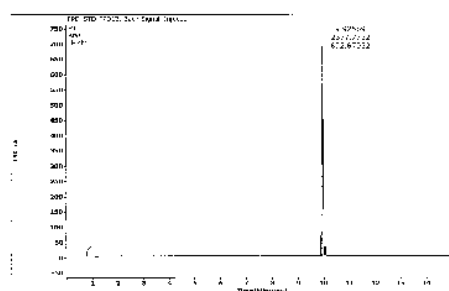


Date: April 13, 2023 10:35:25 AM  
System ID: CN13113001

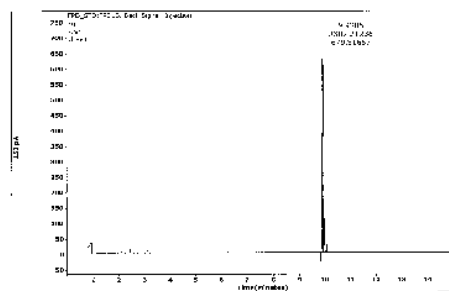
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เอกสารไม่ควบคุม

Acquisition operator: Saenguthai Tarak  
Acquisition method: OQ2023\_FPD.M  
Data file analyzed for this test: FPD\_Pre001-C14F.D  
Acquisition Date: 18-Apr-23, 18:18:42



Acquisition operator: Saenguthai Tarak  
Acquisition method: OQ2023\_FPD.M  
Data file analyzed for this test: FPD\_Pre001-C15F.D  
Acquisition Date: 18-Apr-23, 18:38:51

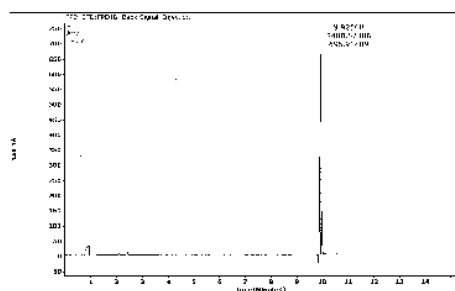


Date: April 13, 2023 10:35:26 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

Acquisition operator: Saenguthai Tarak  
Acquisition method: OQ2023\_FPD.M  
Data file analyzed for this test: FPD\_Pre001-C16F.D  
Acquisition Date: 18-Apr-23, 18:55:04



## Overall Injection Precision Test Status

Pass

Date: April 13, 2023 10:35:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

## Signal to Noise

## Purpose

This test uses a traceable standard to determine signal to noise.

## Sequence

Line 1: Evaluation standard 1 injection

## Configuration Details

Tested Combination	2	Front	SSL	/	Back	FPD+
Name:	Injector Tower					
	1880					

Setpoint Mode: P Inlet

## Conditions

Injection Volume on Column: 0.01 µL  
Noise Evaluation Start Time/Duration: 12 min. / 1.0 min.

## Configuration

Y-Axis (U): 150 pA  
Sample: FPD Std Kit 5185-5245  
Evaluated Compound: tributylphosphate  
Evaluator Standard Concentration: 2.0 mg/L (Certificate of Analysis)

## Measurements

Noise (Typical): ASTM 0.77938 DU  
Retention Time of Evaluated Peak: 9.03813 min. (DU)  
Peak Height (U-corrected/Corrected): 3508.613 DU (Corrected for attenuation and differences between nominal and reported concentration; analog data is corrected for the applied gain reduction (range/attenuation))

## Results

Signal to Noise: 4502  
Agilent Recommended: >= 2400  
AGC uses rounded values in its calculations; only the final result is rounded. Therefore, for high signal-to-noise ratios (high peaks/low noise), AGC calculations may appear to differ slightly from your manual calculations using the reported height and noise.

Setpoint Status: Pass Runs: 1

## Data Audit Log

Date: April 13, 2023 10:35:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

Host name: LAPTOP-QQ3SKOMV

Original Data Path: F:\Data\_QQ2023

Analytic Data Path: S:\S\session Data\QC\Tools\GoS...\_2\GoS...\_1\_C\_1\PreviousRun\...

## Integration Parameters:

Type of Integration: Injection

Integration Count: 0

## Optional Values:

Baseline Correction Mode: Advanced

Initial Slope Sensitivity: 10

Initial Peak Width: 0.01

Initial Area Reject: 0

Initial Height Reject: 1000

## Timed Event Table:

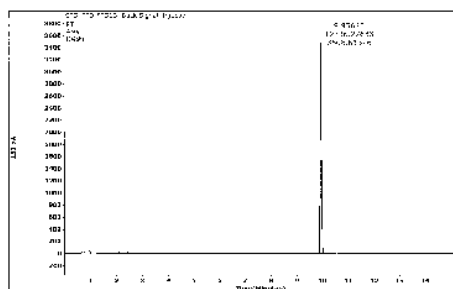
Integration Type	Value	Time
Integration	OFF	0
Integration	ON	6

Acquisition operator: Saenguthai Tarak

Acquisition method: QO2023\_FPD.M

Data file analyzed for this test: SN\_FPD2.D

Acquisition Date: 18-Apr-23, 10:04:30

Date: April 19, 2023 10:59:28 AM  
System ID: CN12113001

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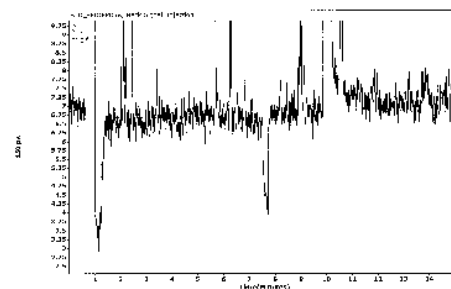
เอกสารไม่ควบคุม

Acquisition operator: Saenguthai Tarak

Acquisition method: QO2023\_FPD.M

Data file analyzed for this test: SN\_FPD2.D

Acquisition Date: 18-Apr-23, 10:04:30



## Overall Signal to Noise Test Status

Pass

Date: April 19, 2023 12:35:25 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

## Declaration of Change Control

This document is under change control. Revision history is maintained and printed on each document. Access to the master documents is limited to process owners. Documents receive periodic review and cannot be assigned an assigned status. The qualification performed according to this document refers only to the hardware/software configuration in place at the time of the qualification. Agilent Technologies recommends that instrument configuration change management procedures be in place in order to maintain the validation process. Any changes to the analytical or computer hardware or software must be clearly specified. A change management system provides a means for determining the degree of requalification required according to the extent of the changes made. All details of the changes must be thoroughly recorded and documented, together with details of completed tests and their results. Note: Hardware/software configuration management is the customer's responsibility.

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เอกสารไม่ควบคุม

## Attachments

Training requirements note: The delivery engineer attaches an ACE technique-specific training certificate to the Equipment Qualification Report (EQR). Obtaining ACE technique-specific certification includes pre-requisite trainings for Data Integrity, General Compliance topics (GMP, GUP, ALCOA, etc.), instrument hardware and software components, and the ACE technique itself. The attached certificate encompasses all pre-requisite trainings as documented in the Agilent Learning Management System, called Success Factors.

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EQR	Material	Certificate of Analysis FPD std kit, 5188-5045 (Japan Only)	82
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เอกสารไม่ควบคุม

## General

Document Name: ACE Self Qualification Certificate



## Agilent Compliance Engine Self Qualification

Date: January 25, 2023 9:25:10 AM

Device Serial #: 01 U0004L

Platform Revision:

AGE 3.1.2.06

Individual self-qualification reports for each specific technique installed are also available upon request. They provide additional details on the general reports' file contents, summary and are also unique to this actual system. Disregard the copy for previous. There were not a one-to-one relationship between a given test and program sets because some algorithms are used by several tests and across multiple similar hardware components of the actual test systems.

Technique Type	Tests Completed	Result
Gas Preparation Chromatography	9	Pass/Fail
Capillary Electrophoresis	10	Pass/Fail
Gas Chromatography - GC/MS	17	Pass/Fail
Emission Spectroscopy	5	Pass/Fail
Disinfection	6	Pass/Fail
Atomic Absorption	7	Pass/Fail
CP/DS	6	Pass/Fail
Gas Chromatography	20	Pass/Fail
Infrared Spectroscopy	7	Pass/Fail
Liquid Chromatography	7	Pass/Fail
Liquid Chromatography - LC/MS	8	Pass/Fail
Microfluidics	10	Pass/Fail
Surface Plasmon Resonance - Gas Chromatography	6	Pass/Fail
Surface Plasmon Resonance - Liquid Chromatography	8	Pass/Fail
Supercritical Fluid Chromatography	15	Pass/Fail
Software	6	Pass/Fail
UV-Vis Spectrophotometer	3	Pass/Fail

Overall Qualification Status

Pass/Fail

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

## General

Document Name: Operator's training certificate and qualifications



## Certificate of Completion

Learner Name: Saengchai Saeng Tark

Title Of Course: AN-CE-GL-402-A-CE Specific Training

Completion Date: November 23, 2021

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations:

A certificate for Service and Support training is only valid when completed by Agilent Technologies while working as an Agilent employee and is not transferable. It is not valid when completed by Agilent's Safety Alerts, Service and Support training center. Completion of training does not guarantee that the learner will be able to perform the tasks required for the job. Completion of training does not guarantee that the learner will be able to perform the tasks required for the job. Completion of training does not guarantee that the learner will be able to perform the tasks required for the job.

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

## General

Document Name: Operator's training certificate and qualifications



## Certificate of Completion

Learner Name: Saengchai Saeng Tark

Title Of Course: AN-CE-GL-402-A-CE Specific Training

Completion Date: July 23, 2021

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations:

A certificate for Service and Support training is only valid when completed by Agilent Technologies while working as an Agilent employee and is not transferable. It is not valid when completed by Agilent's Safety Alerts, Service and Support training center. Completion of training does not guarantee that the learner will be able to perform the tasks required for the job. Completion of training does not guarantee that the learner will be able to perform the tasks required for the job. Completion of training does not guarantee that the learner will be able to perform the tasks required for the job.

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

## General

Document Name: Operator's training certificate and qualifications



## Certificate of Completion

Learner Name: Saengchai Saeng Tark

Title Of Course: AN-CE-GL-402-A-Advanced GC Detector Application and Troubleshooting Lab

Completion Date: November 23, 2021

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations:

A certificate for Service and Support training is only valid when completed by Agilent Technologies while working as an Agilent employee and is not transferable. It is not valid when completed by Agilent's Safety Alerts, Service and Support training center. Completion of training does not guarantee that the learner will be able to perform the tasks required for the job. Completion of training does not guarantee that the learner will be able to perform the tasks required for the job. Completion of training does not guarantee that the learner will be able to perform the tasks required for the job.

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

## General

Document Name: Operator's training certificate and qualifications

Agilent Technologies

## Certificate of Completion

Learner Name: Saengathai Nong Tank

Title Of Course: AN-ASPCXK3D-CC-1-001-M, 78907820 GC and GC/MS/MS Chromatography MSF Service

Completion Date: November 23, 2024

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations:

All Service and Support training certificates are only valid while employed by Agilent Technologies or while working as an Agilent authorized service provider through which the service employee is engaged under a Agilent's Safety Alert, Service Alert, Internal authorized supplier, supplier training, internal documentation, technical support, contract plan, and performance. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

Date: April '19, 2025 10:58:28 AM  
System ID: CN1311300

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เอกสารไม่ควบคุม

## General

Document Name: Operator's training certificate and qualifications

Agilent Technologies

## Certificate of Completion

Learner Name: Saengathai Nong Tank

Title Of Course: AN-ASPCXK3D-CC-1-001-M, 78907820 GC and GC/MS/MS Chromatography MSF Service

Completion Date: November 23, 2024

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations:

All Service and Support training certificates are only valid while employed by Agilent Technologies or while working as an Agilent authorized service provider through which the service employee is engaged under a Agilent's Safety Alert, Service Alert, Internal authorized supplier, supplier training, internal documentation, technical support, contract plan, and performance. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

Date: April '19, 2025 10:58:28 AM  
System ID: CN1311300

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เอกสารไม่ควบคุม

## General

Document Name: Operator's training certificate and qualifications

Agilent Technologies

## Certificate of Completion

Learner Name: Saengathai Nong Tank

Title Of Course: AN-ASPCXK3D-CC-1-001-M, 78907820 GC and GC/MS/MS Chromatography MSF Service

Completion Date: February 19, 2025

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations:

All Service and Support training certificates are only valid while employed by Agilent Technologies or while working as an Agilent authorized service provider through which the service employee is engaged under a Agilent's Safety Alert, Service Alert, Internal authorized supplier, supplier training, internal documentation, technical support, contract plan, and performance. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

Date: April '19, 2025 10:58:28 AM  
System ID: CN1311300

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เอกสารไม่ควบคุม

## Tools

Document Name: Certificate of Calibration for Gas Flowmeter

Trescal  
— Certificate of Calibration

Reference No. P12289721  
Date of Issue 26 Nov 2022  
Customer AGT PNT TECHNOLOGY (THAILAND) LTD.  
117/1, LAMPUNG RD, 2ND FLOOR, BANGKOK, THAILAND  
ID: 037081

Instrument A-24 / Gas Meter  
Model AGT PNT ADM 2880A (Model) / 10842A (Flow rate)  
Serial No. MY2121A34 (Model) / MY2121A34 (Calibration)  
Control No. C00001C  
Equipment ID N/A  
Capacity/Range 0 to 100 L/min  
Date of Recalibration 26 Nov 2022  
Date of Calibration 24 Nov 2022  
Recalibration Date (Specified by Customer)  
Condition of Instrument Good / Instrument Condition  
After Calibration Calibrated as Requested by Customer  
Location of Calibration Trescal Laboratory  
Calibration Environment (23 ± 0.5 °C, (55 ± 1) % RH)  
Calibration Method LCP 1000

Cart. No. PSYP-22079181  
Page 1 of 2

Reference Standard Used	Calibration ID	Control No.	Certificate No.	Traceable to	Exp. Date
New Calibrator	114-01-007	130001	210404010	12075	12 Apr 2025
New Flowmeter	114-01-007	130001	210404010	12075	12 Apr 2025
New Gas Flow	114-01-007	130001	210404010	12075	12 Apr 2025

Authorized by

Anich Aziz Bin Soliman

Approved Signature

Kwan Yee Hong

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Date: April '19, 2025 10:58:28 AM  
System ID: CN1311300

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เอกสารไม่ควบคุม



Document Name: Calibration of Calibration Manometer

### CERTIFICATE OF CALIBRATION

No: C5226070  
Date of issue: 22<sup>nd</sup> November 2022

Page : 2 of 2  
Calibration Start Date : 11 November 2021  
Calibration End Date : 11 November 2021

**Results of Calibration**  
The results of the calibration are shown in Table 5(a)-(c). The typical uncertainties of the measurements are at a level of approximately 0.5% with a coverage factor  $k=2$  as confirmed below.

Calibration Results (As Found)				
Applied Pressure (psi)	INDC Indicated Value (psi)	Correction (psi)	Uncertainty (psi)	k=Hazen
0.03	0.00	0.00	N/A	NA
25.0	23.1	-1.9	0.	2.30
100.0	100.1	-0.1	0.	2.30
25.0	23.1	-1.9	0.	2.30
0.01	0.00	0.00	N/A	N/A

Applied Pressure (psi)	LUT Indicated Values (psi)	Corrections (psi)	Uncertainty (psi)	k-Factor
0.00	0.00	0.00	NA	NA
33.0	25.7	-0.1	0.1	2.00
100.0	100.0	-0.1	0.1	2.00
25.0	25.7	0.1	0.1	2.00
0.00	0.00	0.00	NA	NA

- \* The user score of the pressure instrument was found to be within  $\pm 1.1\%$  of instrument scale.

## Remarks:

Remarks:

1. No Adjustments were made during calibration.
2. Although there was an adjustment was made to the UUT, customer instructed to reflect "As Found and "As Left" results on calibration certificate

100-100  
California Office

Date: Apr 19, 2023 10:39:28 AM  
System ID: CN13113001

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## เอกสารไม่ควบคุม

## Tools

Tools

### CERTIFICATE OF CALIBRATION

No : CS226073  
Date of Issue: 08<sup>th</sup> November 2022

Issue By: ISOLAR (SINGAPORE) PTE. LTD.

Requested by : Agilent Technologies (Thailand) Ltd.  
11/Case Jang Hu Iding, 22/F Hrc. A/J  
965 Rama IV Road, Silom, Bangkok,  
Bangkok 10500 Thailand.

Job Order No : 222471  
Ambient Temperature : (22 ± 2) °C  
Relative Humidity : (65 ± 10) % relative humidity  
Page : 1 of 3

Description:	Digital Thermometer
Manufacturer:	Fiske
Model:	541 R
Serial No:	44000692WVS
Calibration Range:	0 to 350 °C @ 0.1 °C
Calibration Start Date:	05 November 2022
Calibration End Date:	05 November 2023
Next Due Date:	05 November 2023

Isolde (S) Pte Ltd and its practices are in compliance with ISO/IEC 17025:2017. The Quality System practice is in accordance with the ISO/IEC Standard ISO 9001.

**Method of Calibration**  
The Digital Thermometer has been calibrated at ISOTAR's laboratory with respect to above ambient conditions and is accurate to  $\pm 0.1$  in the calibration procedure. STC-602-KS, The Digital Thermometer was calibrated by comparison with below mentioned reference standards. The reference standards are traceable to national measurement standards maintained at National Metrology Centre (NMC-Singapore). The calibration was performed in terms of the International Temperature Scale (ITS-90) at 1000, 0°C.

The following reference standards were used during the analysis:

<u>S.S.</u>	<u>Reference Instrument / Equipment</u>	<u>Serial Number</u>	<u>CAT Reference</u>	<u>Next Calibration Due Date</u>
i	Reference Calibrator	8130039	04006988	01 January 2023
ii	Reference Thermocouple type A	25022021	01202045	26 February 2023

Calibrated By	Approved By
---------------	-------------

Gerd Giger

Calibration Officer: \_\_\_\_\_ Approval: \_\_\_\_\_  
 \* The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council.  
 It is specified that this may not be regarded as a full exercise with a written approval of SPCAT AB.

LAB (Singapore) Pte Ltd - Robert Lee/owner  
 8, Koon Sze Circle Singapore 629031 Tel: (65) 6266 6155 Fax: (65) 6266 6674  
 Email: [www.lab.com.sg](mailto:www.lab.com.sg) [lab@lab.com.sg](mailto:lab@lab.com.sg)

Date: April 19, 2023 10:50:28 AM  
System ID: C4131360

2000 53 : 90

## เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Thermoprotector

### CERTIFICATE OF CALIBRATION

### Digital Thermometer

Digital Thermometer  
Serial No: 4411B702385

Page : 2 of 3  
Calibration Start Date : 05<sup>th</sup> November 2022  
Calibration End Date : 05<sup>th</sup> November 2022

### Results at Calibration

**Results at Calibration**  
The results of the calibration are shown in the below table. The model was found to have a good fit at a level of confidence at approximately 95% as the observed fields are close to the predicted values below.

## Chemical Measurements as Reported

Applied Voltage	Derivative Temperature (°C)	Average LUT Indicated Values (°C)	Correction (°C)	Uncertainty (°C)	2-Factor
0.000E	115.0	0.2	-0.3	0.4	2.00
0.001E	130.0	90.2	-0.2	0.4	2.00
0.010E	230.0	230.2	-0.2	0.4	2.00
1.1388E	350.0	350.2	-0.2	0.4	2.00

## (Continued from front cover) (See page 1)

Applied Voltage	Repeatability Temperature	Average UUT Indicated Value (°C)	Coefficient of Variation (%)	Uncertainty (%)	k-Factor
0.000V	110.0	0.2	0.5	0.4	2.00
4.1596V	110.1	100.3	0.2	0.4	2.00
9.343V	233.0	230.2	0.2	0.4	2.00
12.336V	249.0	249.3	0.2	0.4	2.00

\* *or one should determine the sum of the log-likelihood for individual cases*

\* The results reported herein have been performed in accordance with the current use addition under the Ringwood Accreditation Program.

## Remarks

- Remarks:**
1. No Adjustment-Kelley was a sole plan to elimination.
  2. Although there was no adjustment was made in the LIT, it is a good idea to be called "As For ed" and "As Is All" results be called "As Is All" and "As Is All".

David G. ...  
Calibration Officer

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## เอกสารไม่ควบคุม

## เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Thermoprote

### CERTIFICATE OF CALIBRATION

No : CS226073  
Date of Issue: 08<sup>th</sup> November 2023

### Initial Temperature

Digital Thermometer  
Serial No: 4401129234's

Page: 1 of 3  
Calibration Start Date: 05 November 2022  
Calibration End Date: 05 November 2022

### Results of Calibration

**Results of Calibration**

The results of the calibration are shown in the below table. The expanded uncertainties of the concentration and of a series of individual measurements is 30% with a coverage factor  $k=2$  as indicated below.

### Channel 3: Measurement (Ax-Round)

Applied Voltage (mV)	Drift Current Temperature (°C)	Average 11-ft Indicated Values (°C)	Correction (°C)	Linearity (°C)	Factor
0.0000	0.0	0.2	0.2	0.4	2.39
4.9996	100.0	100.2	-0.2	0.4	2.33
9.9410	200.0	200.2	-0.2	0.4	2.30
14.9000	300.0	300.2	-0.2	0.4	2.29

Glenn Feldman, *University of California, Berkeley*

Applied Voltage (mV)	Recurrent Temperature (°C)	Average I/F Induced Values (%)	Correction (%)	Uncertainty (%)	Is-Index
3.0000	0.0	0.7	0.2	0.4	2.93
4.9999	100.0	0.2	-0.2	3.5	2.91
9.9990	233.0	230.2	-0.3	3.5	2.90

142920	751.0	1307	-0.7
--------	-------	------	------

<sup>b</sup> The result is reported in parentheses below the point estimate in accordance with the norms of accreditation, under the Singapore Accreditation Council's (SAC) norms.

## References

- Remarks:**
1. No Adjustments/ODs were made during education.
  2. Although there was no adjustment made to the GUT, a correction was made to reflect "As Found" and "As Left" results on calibration certificate.


 Give a Gift  
 California CPE

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## เอกสารไม่ควบคุม

## เอกสารไม่ควบคุม



Document Name: Certificate of Calibration Thermometer Probe

Date: April 9, 2022 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

Tools

Document Name: Certificate of Calibration Thermometer Probe

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Thermometer Probe

Date: April 9, 2022 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

Document Name: Certificate of Calibration Thermometer Probe

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

## CERTIFICATE OF CALIBRATION

No: CS226888

Date of Issue: 18<sup>th</sup> November 2022

Issued By: ISOLAB (SINGAPORE) PTE LTD

Requested by: Agilent Technologies (Thailand) Ltd  
11/Chulalongkraj Building, 22nd Unit 4/5  
906 Rama IV Road, Silom, Bangkok  
Bangkok 10500 ThailandJob Order No: 220676  
Ambient Temperature: (23 ± 2) °C  
Relative Humidity: (55 ± 10) % relative humidity  
Page: 1 of 2

## Description

Instrument: Type K Thermocouple Needle Probe  
Brand: N/A  
Model: 1401022WS/HZ61N-P2  
Serial No: 1401022WS/HZ61N-P2  
Uncertainty: Approximately 150 mm  
Calibration Range: (0 to 350) °C  
Calibration Start Date: 08<sup>th</sup> November 2022  
Calibration End Date: 11<sup>th</sup> November 2022  
Next Due Date: 11<sup>th</sup> November 2023

Isolab (S) Pte Ltd and its practices are in compliance with ISO/IEC 17025:2017, The Quality Management System for testing laboratories in accordance with the Quality Standard ISO 9001.

## Method of Calibration

The Type K Thermocouple Needle Probe has been calibrated at ISOLAB's laboratory under the ambient conditions and the calibration procedure STC-004-36. The Type K Thermocouple Needle Probe was calibrated by comparison with Reference Source in constant temperature bath. The Reference Source and Reference Indicator are traceable to national measurement standards maintained at National Metrology Centre (NMC-Singapore), National Temperature Fixtures Laboratory (NTFL, UKAS) and National Physical Laboratory (NPL). The calibration was performed in terms of the International Temperature Scale of 1990 (ITS-90).

The following reference standards were used during the calibration:

S/N	Reference Source - Temperature	Serial Number	CAL Reference	Next Calibration Due Date
i.	Reference Source	54622	CD2111-8	18 <sup>th</sup> August 2023
ii.	Reference Source	21436	CD2110-5	18 <sup>th</sup> August 2023
iii.	Reference Source	21437	CD2110-5	04 <sup>th</sup> July 2023
iv.	Reference Source	21438	CD2110-5	04 <sup>th</sup> July 2023
v.	Reference Indicator	11-4496-TL313870	21436-17	18 <sup>th</sup> August 2023
vi.	Reference Indicator	154062	21436-17	18 <sup>th</sup> August 2023
vii.	Reference Indicator	154063	21436-17	18 <sup>th</sup> August 2023
viii.	Type K Thermocouple Wire	2472022-1	CD2110-5	04 <sup>th</sup> July 2023

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Document Name: Certificate of Calibration Thermocouple Probe

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

Materials

Document Name: Certificate of Analysis FPD std kit, 5188-5245 (Japan Only)

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

Materials

Document Name: Certificate of Analysis FID MDL std kit, 5188-5372

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม

General

Document Name: Certificate of System Qualification

Date: April 19, 2023 10:39:28 AM  
System ID: CN13113001

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เอกสารไม่ควบคุม





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CN131632C1 UAE Transaction log 2

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
Apr 16 2025 8:21:03 AM	Run	Execution	GD Over Temp Accuracy - Back PFD1 - Type - Voltage - S 630 mV/min - L -> 6.75 scipart	Run Count: 1
Apr 16 2025 8:21:06 AM	Start	Power On	GD Over Temperature Accuracy - 7893 - Temperature - Error - S: 250.0°C - L -> 1.0 AND -> 0 % scipart in K	None
Apr 16 2025 8:21:34 AM	Auto	Use	GD Over Temperature Accuracy - 7893 - Temperature - Error - S: 250.0°C - L -> 1.0 AND -> 0 % scipart in K	Manual Data Entry
Apr 16 2025 8:21:35 AM	End	Execution	GD Over Temperature Accuracy - 7893 - Temperature - User - S: 240.0°C - L -> 0 AND -> 0 % scipart in K	Run Count: 1
Apr 16 2025 8:21:56 AM	Start	Execution	GD Over Temperature Accuracy - 7893 - Temperature - User - S: 100.0°C - L -> 0 AND -> 0 % scipart in K	None
Apr 16 2025 8:22:18 AM	Auto	Data	GD Over Temperature Accuracy - 7893 - Temperature - User - S: 100.0°C - L -> 0 AND -> 0 % scipart in K	Manual Data Entry
Apr 16 2025 8:22:18 AM	Auto	Execution	GD Over Temperature Accuracy - 7893 - Temperature - User - S: 100.0°C - L -> 0 AND -> 0 % scipart in K	Run Count: 1
Apr 16 2025 8:22:18 AM	Start	Execution	GD Over Temperature Stability 7852 - Temperature - User S: 100.0°C - L -> 0.5°C	None
Apr 16 2025 8:23:58 AM	Auto	Idle	GD Over Temperature Stability 7852 - Temperature - User S: 100.0°C - L -> 0.5°C	Manual Data Entry

Unsupervised

Date: Apr 11, 2023 10:39:28 AM  
System ID: CN13113001

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## เอกสารไม่ควบคุม

```

User Name: saeng_rh@torak
Host Name: L4PT0R-0008-CON1
Spec: 16 GB 1311360
Print Date: April 29, 2023 12:56:13 PM

```

CN12118021 UAE Transaction log 3

Time	Representation State	Activity Performed	Type of Information	Optional Information
April 19 2025 0:05:42 AM	Alert	Execution	Injection Process - Injection Tower, Front SBL, Flow F.D - GC - (Alarm) -> 3.00% - L (Rel. Time) -> 1.00%	None
April 19 2025 0:06:04 AM	Alert	Execution	Injection Process - Injection Tower, Front SBL, Flow F.D - GC - (Alarm) -> 3.00% - L (Rel. Time) -> 1.00%	None
April 19 2025 0:06:36 AM	Alert	Data	Injection Process - Injection Tower, Front SBL, Flow F.D - GC - (Alarm) -> 3.00% - L (Rel. Time) -> 1.00%	Data File Path: F:\Data\CG20250405_05_00-2025-04-19-10:46-18\FID_2nd1-0025-05-19-05.ch
April 19 2025 0:06:38 AM	Alert	Data	Injection Process - Injection Tower, Front SBL, Flow F.D - GC - (Alarm) -> 3.00% - L (Rel. Time) -> 1.00%	Data File Path: F:\Data\CG20250405_05_00-2025-04-19-10:46-18\FID_2nd1-0025-05-19-05.ch
April 19 2025 0:20:39 AM	Alert	Data	Injection Process - Injection Tower, Front SBL, Flow F.D - GC - (Alarm) -> 3.00% - L (Rel. Time) -> 1.00%	Data File Path: F:\Data\CG20250405_05_00-2025-04-19-10:46-18\FID_2nd1-0025-05-19-05.ch
April 19 2025 0:20:39 AM	Alert	Data	Injection Process - Injection Tower, Front SBL, Flow F.D - GC - (Alarm) -> 3.00% - L (Rel. Time) -> 1.00%	Data File Path: F:\Data\CG20250405_05_00-2025-04-19-10:46-18\FID_2nd1-0025-05-19-05.ch
April 19 2025 0:20:39 AM	Alert	Data	Injection Process - Injection Tower, Front SBL, Flow F.D - GC - (Alarm) -> 3.00% - L (Rel. Time) -> 1.00%	Data File Path: F:\Data\CG20250405_05_00-2025-04-19-10:46-18\FID_2nd1-0025-05-19-05.ch
April 19 2025 0:20:39 AM	Alert	Data	Injection Process - Injection Tower, Front SBL, Flow F.D - GC - (Alarm) -> 3.00% - L (Rel. Time) -> 1.00%	Data File Path: F:\Data\CG20250405_05_00-2025-04-19-10:46-18\FID_2nd1-0025-05-19-05.ch
April 19 2025 0:20:39 AM	Alert	Data	Injection Process - Injection Tower, Front SBL, Flow F.D - GC - (Alarm) -> 3.00% - L (Rel. Time) -> 1.00%	Data File Path: F:\Data\CG20250405_05_00-2025-04-19-10:46-18\FID_2nd1-0025-05-19-05.ch

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Date: Apr 19, 2023 10:38:22 AM  
System ID: CN1313507

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## เอกสารไม่ควบคุม

System: c C:\D113001  
Print Date: April 15, 2023 12:59:28 AM

CN12113051 UAE Transaction Log

Time	Transaction Facts	Activity Performed	Type of Transaction	Optional Information
April 13 2023 16:22:42 AM	End	Finalization	GD Resulting Run - Injection Trans: From SSI, Back FPD - Part of System Preparation - No links associated	Run Count: 1
April 14 2023 16:22:07 AM	Final	Finalization	Noise and Diff: Back FPD - Detector FPDs P-Media - (Noise) == 2.00 % Sd - L (Diff) == .90 % Sd allowed	None
April 19 2023 16:22:06 AM	Start	Initialization	Noise and Diff: Back FPD - Detector FPDs P-Media - (Noise) == 2.00 % Sd - L (Diff) == .90 % Sd allowed	None
April 19 2023 16:22:44 AM	Audio	Data	Noise and Diff: Back FPD - Detector FPDs P-Media - (Noise) == 2.00 % Sd - L (Diff) == .90 % Sd allowed	Data File Path: C:\Data C:\GD\23050203 2023 04 Data - 49 FPDs - 300 Dr - PC - 10
April 19 2023 16:22:59 AM	End	Finalization	Noise and Diff: Back FPD - Detector FPDs P-Media - (Noise) == 2.00 % Sd - L (Diff) == .90 % Sd allowed	Run Count: 1
April 19 2023 16:22:55 AM	Start	Finalization	Injection Process - Injection over 1 Port 50L, 200 % - GD - (Noise) == 2.00% - L (Diff) == .90%	None
April 19 2023 16:23:29 AM	Start	Finalization	Injection Process - Injection over 1 Port 50L, 200 % - GD - L (Noise) == 2.00% - L (Diff) == .90%	None
April 19 2023 16:24:00 AM	Audio	Data	Injection Process - Injection over 1 Port 50L, 200 % - GD - L (Noise) == 2.00% - (Diff) == .90%	Unknown Path: C:\Data C:\GD\23050203 2023 04 Data - 49 FPDs - 300 Dr - PC - 10

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## เอกสารไม่ควบคุม

System: In: CMX112001  
Print Date: April 16, 2023 10:29:33 AM

CN12119001\_UAE Transaction log

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 19, 2023 16:25 : 8 AM	End	Cancellation	Session	OK
April 19, 2023 16:25 : 9 AM	Start	Reporting	Session	View
April 19, 2023 16:35:27 AM	Audit	Reporting	Session	Report Generated : Certificate
April 19, 2023 16:35:49 AM	Audit	Reporting	Session	Report Output: Out.Result PDF Name: C:\MS\13081_AME_20230419_Qualisita_1.pdf User Name: saqualisita@arsaphor.espt.com Full Name of Signer: Saqualisita Tanak Document protocol and path: C:\ms\qualisita\actm\document
April 19, 2023 16:37:53 AM	Audit	Reporting	Session	Report Generated : Report

760816;12

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## เอกสารไม่ควบคุม

## Certificate of System Qualification

GC-QQ

System ID: UAE\_TOX\_007\_CN11021007  
Organization Name: United Analyst and Engineering Consultant Co., Ltd.  
Organization Location: 5 Soi Udomsak 4, Sukhumvit Road, Bangkok, Phrakhanong, Rengak 10282

Date: February 23, 2023 3:13:15 PM  
EQP Name: Agilent Recommended  
EQP Revision: GC.02.51  
Overall Qualification Status: Pass

## System Inspection and Basic Safety and Operation

Name: 7890  
Setpoint Status: Pass

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

Pass

## Inlet Pressure Decay

Name: 7890  
Front SSL  
Setpoint Status: Pass  
Pressure: 25.0 psi  
Pressure Change: -0.1 psi / 5 minutes  
Agilent Recommended:  $\leq -2.0$  and  $\leq -0.5$

## Overall Inlet Pressure Decay Test Status

Pass

## Inlet Pressure Accuracy

Name: 7890  
Front SSL

Date: February 23, 2023 3:13:15 PM  
System ID: UAE\_TOX\_007\_CN11021007

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เอกสารไม่ควบคุม

Setpoint Status: Pass  
Inlet Pressure: 25.0 psi  
Accuracy: 0.0 psi  
Agilent Recommended:  $\leq -1.2$

## Overall Inlet Pressure Accuracy Test Status

Pass

## Detector Flow Accuracy

Name: 7890  
Front UECD  
Setpoint Status: Pass  
Flow Type: Makeup  
Setpoint: 25.0 mL/min Measured Flow: 24.9 mL/min  
Accuracy: 0.1 mL/min  
Agilent Recommended:  $\leq 15.0$  % setpoint ( 2.5 mL/min )  
Limit is percentage of setpoint or 0.5 mL/min, whichever is largest

## Overall Detector Flow Accuracy Test Status

Pass

## Detector Flow Accuracy

Name: 7890  
Back FID  
Setpoint Status: Pass  
Flow Type: Fuel  
Setpoint: 30.0 mL/min Measured Flow: 30.2 mL/min  
Accuracy: 0.2 mL/min  
Agilent Recommended:  $\leq 15.0$  % setpoint ( 2.0 mL/min )  
Limit is percentage of setpoint or 0.5 mL/min, whichever is largest

Date: February 23, 2023 3:19:15 PM  
System ID: UAE\_TOX\_007\_CN11021007

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เอกสารไม่ควบคุม

Setpoint Status: Pass  
Flow Type: Oxidizer  
Setpoint: 400.0 mL/min Measured Flow: 389.6 mL/min  
Accuracy: 10.4 mL/min  
Agilent Recommended:  $\leq 10.0$  % setpoint ( 40.0 mL/min )  
Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

Setpoint Status: Pass  
Flow Type: Makeup  
Setpoint: 25.0 mL/min Measured Flow: 24.9 mL/min  
Accuracy: 0.1 mL/min  
Agilent Recommended:  $\leq 10.0$  % setpoint ( 2.5 mL/min )  
Limit is percentage of setpoint or 0.5 mL/min, whichever is largest.

## Overall Detector Flow Accuracy Test Status

Pass

## GC Oven Temperature Accuracy

Name: 7890  
Setpoint Status: Pass  
Zone: Oven  
Setpoint/Actual: 230.0 / 230.0 °C  
Accuracy: 0.0 °C  
Agilent Recommended:  $\geq -1.0$  % setpoint in K ( -5.0 °C )  
 $\leq 1.0$  % setpoint in K ( 5.0 °C )

Date: February 23, 2023 3:19:15 PM  
System ID: UAE\_TOX\_007\_CN11021007

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Setpoint Status: Pass  
Zone: Oven  
Setpoint/Actual: 100.0 / 100.7833 °C  
Temperature: 100.0 °C  
Accuracy: 0.8 °C  
Agilent Recommended:  $\geq -1.0$  % setpoint in K ( -3.7 °C )  
 $\leq 1.0$  % setpoint in K ( 3.7 °C )

## Overall GC Oven Temperature Accuracy Test Status

Pass

## GC Oven Temperature Stability

Name: 7890  
Setpoint Status: Pass  
Setpoint/Average: 100.0 / 100.7833 °C  
Stability: 0.1 °C  
Agilent Recommended:  $\leq 0.5$

## Overall GC Oven Temperature Stability Test Status

Pass

## Scouting Run

Tested Combination: Front SSL / Front UECD  
Injection Tower  
Name: 7890B  
Setpoint Status: Completed  
Injection Volume on Column: 1.0 µL  
Overall Scouting Run Status: Completed

## Noise and Drift

Tested Combination: Front SSL / Front UECD

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System ID: UAE\_TOX\_007\_CN11021007

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Agilent CrossLab Compliance Services

Name:

7890

Setpoint Status:

Pass

Base Signal:

212

Hz

ASTM Noise

1.24

Hz

Drift

13.32

Hz/Hr

Agilent Recommended:

<=

3.00

<=

15.00

Status:

Pass

Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1

Front

SSL

/ Front

UECD

Name:

7683B

Setpoint Status:

Pass

Injection Volume on Column:

1.0

uL

Area RSD:

2.38

%

Retention Time RSD:

0.03

%

Agilent Recommended:

<=

3.00

<=

1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination1

Front

SSL

/ Front

UECD

Name:

Injection Tower

7890

Setpoint Status:

Pass

Signal to Noise:

4533

Agilent Recommended:

>=

1500

Date:

February 23, 2023 3:19:15 PM

System ID:

UAE.TOX.007\_CN11021007

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Agilent CrossLab Compliance Services

Overall Signal to Noise Test Status

Pass

Scouting Run

Tested Combination2

Front

SSL

/ Back

FID

Name:

Injection Tower

7890R

Setpoint Status:

Completed

Injection Volume on Column:

1.0

uL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination2

Front

SSL

/ Back

FID

Name:

7680

Setpoint Status:

Pass

Base Signal:

12.2

pA

ASTM Noise

0.34

pA

Drift

0.07

pA/Hr

Agilent Recommended:

<=

0.50

<=

2.50

Status:

Pass

Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination2

Front

SSL

/ Back

FID

Name:

7683B

Date:

February 22, 2023 3:19:15 PM

System ID:

UAE.TOX.007\_CN11021007

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Agilent CrossLab Compliance Services

Setpoint Status:

Pass

Injection Volume on Column:

1.0

uL

Area RSD:

0.57

%

Retention Time RSD:

0.74

%

Agilent Recommended:

<=

3.00

<=

1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination2

Front

SSL

/ Back

FID

Name:

Injection Tower

7890

Setpoint Status:

Pass

Signal to Noise:

173500

Agilent Recommended:

>=

350000

Overall Signal to Noise Test Status

Pass

Date:

February 23, 2023 3:19:15 PM

System ID:

UAE.TOX.007\_CN11021007

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Agilent CrossLab Compliance Services

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID

UAE.TOX.007\_CN11021007

Manufacturer

Agilent Technologies

Name

7890

Flow Data Input

Manual Data

Temperature Data Input

Manual Data or Other Data Logging

Tested Combination1

Injection Technique

Injection Tower

Inlet

Front

Detector

Front

LTM Included?

No

Tested Combination2

Injection Technique

Injection Tower

Inlet

Front

Detector

Back

LTM Included?

No

Sampler 1

Manufacturer

Agilent Technologies

Type

Injection Tower

Name

7683B

Model Number

G2813A

Serial Number

CN28140436

Firmware Revision

A.11.02

Usage

Sample Injection

Location

Front

Syringe Volume (uL)

10

Date:

February 24, 2023 3:19:15 PM

System ID:

UAE.TOX.007\_CN11021007

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© 2022 by Agilent Technologies		Agilent CrossLab Compliance Services	
Sampler 2		Detector 2	
Manufacturer	Agilent Technologies	Manufacturer	Agilent Technologies
Type	Trap	Name	7890
Name	7683A	Type	FID
Model Number	G2614A	Adapter	Capillary
Serial Number	CN62246787	Control Type	Electronic Pressure Control (EPC)
Firmware Revision	A.02.01	Location	Back
Mainframe 1		Makeup Gas	Nitrogen
Manufacturer	Agilent Technologies		
Name	7890		
Model Number	G544CA		
Serial Number	CN11021007		
Firmware Revision	A.C1.11		
Open Type	Standard		
Inlet 1			
Manufacturer	Agilent Technologies		
Name	7890		
Type	SSL		
Location	Front		
Carrier Gas	Helium		
Control Type	Electronic Pressure Control (EPC)		
Purged Inlet	Yes		
Detector 1			
Manufacturer	Agilent Technologies		
Name	7890		
Type	UICD		
Serial Number	U16886		
Adapter	Capillary		
Control Type	Electronic Pressure Control (EPC)		
Location	Front		
Makeup Gas	Nitrogen		
Date: February 23, 2023 3:18:15 PM		Date: February 23, 2023 3:18:15 PM	
System ID: UAE.TOX.007_CN11021007		System ID: UAE.TOX.007_CN11021007	
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Electronic Signature		Agilent CrossLab Compliance Services	
Purpose		UAE.TOX.007_CN11021007 Transaction Log	
This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other signatures can be applied to this document using a Document Content Management software suitable method defined in your data access and control procedures.)		System ID: UAE.TOX.007_CN11021007 Print Date: February 23, 2023 3:18:17 PM	
Details		Transaction Log	
Full Name of Signer:	Saengulthal Tarak	Transaction Log	
Logged On User Name:	saengulthal tarak@nion.agilent.com	Transaction Log	
Signature Creation Date:	February 23, 2023	Transaction Log	
Reason for Signature:	Executed protocol and published this original version of document.	Transaction Log	
Regulatory Disclaimer		Transaction Log	
This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no warranty or representations as to its suitability for any specific regulatory requirement.		Transaction Log	
Warranty		Transaction Log	
Agilent Technologies makes no warranty of any kind to this material, including but not limited to, the implied warranty of merchantability and fitness for a particular purpose. Agilent Technologies shall not be liable for errors contained herein or for incidental or consequential damages in connection with this functionality, performance, or use of this material.		Transaction Log	
Date: February 23, 2023 3:18:15 PM		Date: February 23, 2023 3:18:15 PM	
System ID: UAE.TOX.007_CN11021007		System ID: UAE.TOX.007_CN11021007	
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Print Date: February 22, 2022 3:11:17 PM

U4E.TOX.007\_CN11021007 Trace not on line

[illegible]

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Date: February 23, 2023 3:18:15 PM  
System ID: UAE-TOX-007-CV-1321007

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System Id: USC-CYX-CONF-034603  
Print Date: February 25, 2024 3:19:17 PM

UAE.TDX.007\_CN1102100J Transaction log:

Time	Transaction Date	Activity Performed	Type of Transaction	Optional Information
February 22, 2023 8:27:55 AM	Print	None	Debitors Flow Assembly - Back FID - Type: Fund - S: 300 mLibra - L: <= 12.0% request	Manual Debt Entry
February 23, 2023 8:27:07 AM	End AM	Execution	Debitors Flow Assembly - Back FID - Type: Fund - S: 300 mLibra - L: <= 12.0% request	Run Class: 1
February 23, 2023 8:27:50 AM	Start AM	Execution	Debitors Flow Assembly - Back FID - Type: Debitors - S: 400 mLibra - L: <= 10.0% request	None
February 23, 2023 8:28:22 AM	End AM	Data	Debitors Flow Assembly - Back FID - Type: Debitors - S: 400 mLibra - L: <= 10.0% request	Manual Debt Entry
February 23, 2023 8:28:28 AM	End AM	Finalize	Debitors Flow Assembly - Back FID - Type: Debitors - S: 400 mLibra - L: <= 10.0% request	Run Court: 1
February 23, 2023 8:28:29 AM	Start AM	Execution	Debitors Flow Assembly - Back FID - Type: Manual - S: 250 mLibra - L: <= 10.0% request	None
February 23, 2023 8:28:31 AM	End AM	Data	Debitors Flow Assembly - Back FID - Type: Manual - S: 250 mLibra - L: <= 10.0% request	Manual Debt Entry
February 23, 2023 8:28:36 AM	End AM	Finalize	Debitors Flow Assembly - Back FID - Type: Manual - S: 250 mLibra - L: <= 10.0% request	Run Class: 1
February 28, 2023 8:28:58 AM	Start AM	Execution	SC Open Depositors Assembly - BACK - Impediment - Cmp: -9 20230101 - L: <= -11 AND >= -10 K.migrate.in K	None
February 28, 2023 8:30:02 AM	End AM	Data	SC Open Depositors Assembly - BACK - Impediment - Cmp: -9 20230101 - L: <= -11 AND >= -10 K.migrate.in K	Manual Debt Entry

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Date: February 23, 2023 3:19:15 PM  
System ID: JAE TCX 007 CN11021007

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Received: 11 May 2022; Accepted: 22 June 2022; Published: 23 June 2022

U6C.TOX.NET\_CN11021007 Transceiver Inq

[illegible]

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Date: February 23, 2023 3:18:15 PM  
System ID: UAE.FOX.037\_54 1371307

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Print Date: February 28, 2024 5:19:17 PM

DATE: 01/01/2007 CN11021067 Transaction Log

[illegible]

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Date: February 25, 2023 5:15:15 PM  
System ID: JAE-TOX.RDY CN11021007

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[illegible]

System 2: JAF TCP: 002\_122122100  
Print Date: Fri Aug 27 22:25:45.3: 12

ԱՌԲԱՅԱՍՏԱՆԻ ԸՆԴՈՒՄՆԵՐԻ ԴՆԵՐՈՒՄԻ ՄԱՍԻՆ

[illegible]

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Date: February 23, 2023 8:18:15 PM  
System ID: LAF.TOX.067\_CN11021007

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Jose Ramos:  $\text{ramos@math.berkeley.edu}$   
 Inclusion:  $\Gamma \subset \Gamma' \Rightarrow \text{CNS}(\Gamma) \subset \text{CNS}(\Gamma')$

Phil. Soc. Phila. 2019 3: 19.17 P2

dAE.TOX.007 Ch-1521007 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Expected Resultant
February 28, 2023 2:04:23 AM	Start	Initiation	Release and Hold - Back FID - Duration: FID - L (Release) == 0.10 s - L (Hold) == 2.50 s pollout	None
February 28, 2023 2:04:28 AM	Start	Done	Release and Hold - Back FID - Duration: FID - L (Release) == 0.10 s - L (Hold) == 2.50 s pollout	Done FID Poll: 0.00 s - L (Release) == 0.10 s - L (Hold) == 2.50 s
February 28, 2023 2:04:10 PM	End	Lowdown	Release and Hold - Back FID - Duration: FID - L (Release) == 0.10 s - L (Hold) == 2.50 s pollout	Run Control
February 28, 2023 2:04:12 PM	Start	Initiation	Release and Hold - Back FID - Duration: FID - L (Release) == 0.10 s - L (Hold) == 2.50 s pollout	None
February 28, 2023 2:07:04 PM	Start	Initiation	Release and Hold - Back FID - Duration: FID - L (Release) == 0.10 s - L (Hold) == 2.50 s pollout	None
February 28, 2023 2:07:37 PM	Start	Initiation	Release and Hold - Back FID - Duration: FID - L (Release) == 0.10 s - L (Hold) == 2.50 s pollout	None
February 28, 2023 2:09:21 PM	End	Done	Release and Hold - Back FID - Duration: FID - L (Release) == 0.10 s - L (Hold) == 2.50 s pollout	Done FID Poll: 0.00 s - L (Release) == 0.10 s - L (Hold) == 2.50 s
February 28, 2023 2:09:21 AM	Start	Initiation	Release and Hold - Back FID - Duration: FID - L (Release) == 0.10 s - L (Hold) == 2.50 s pollout	None

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Date: February 24, 2023 3:19:15 PM  
System ID: LAC-TOX-007 Ch-1: 02:037

## เอกสารไม่ควบคุม

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User Name: user getmail@red  
Host: 10.10.10.10  
Host: LAPTOP-CG85KQNV

System Id: U4C.TOX.RGT\_C7411071000  
Print Date: February 25, 2021 3:19:52 PM

H4E TOX 007, GM11021007 Transaction log

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 22, 2023 2:48:25 PM	Start	Execution	Signed to None - objective Towers: Front SSL, Front UED Detector: UEDC L1 to L500	None
February 23, 2023 2:48:26 PM	Start	Execution	Signed to None - objective Towers: Front SSL, Front UED Detector: UEDC L1 to L500	None
February 25, 2023 2:46:10 PM	Alert	Alert	Signed to None - objective Towers: Front SSL, Front UED Detector: UEDC L1 to L500	Data File Path: L1-UE Account: CHL_Rail on FRED
February 25, 2023 2:57:37 PM	Alert	Execution	Signed to None - objective Towers: Front SSL, Front UED Detector: UEDC L1 to L500	None
February 25, 2023 2:57:39 PM	Alert	Execution	None to None - objective Towers: Front SSL, Front UED Detector: UEDC L1 to L500	Run Count: 1
February 25, 2023 2:58:03 PM	Alert	Execution	CC Scanning Run - objective Towers: Front SSL, Back FID Part of System Preparation Initial associated	None
February 25, 2023 2:58:09 PM	Alert	None	CC Scanning Run - objective Towers: Front SSL, Back FID Part of System Preparation Initial associated	Data File Path: L1-UE Account: CHL_Rail on FRED
February 25, 2023 2:58:36 PM	Alert	Execution	CC Scanning Run - objective Towers: Front SSL, Back FID Part of System Preparation Initial associated	Run Count: 1
February 25, 2023 2:58:41 PM	Alert	Execution	None to None - Back FID - Towers: FID-1 (None) Detector: L1-UEC L1 to L500 pH3001	None

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Date: February 23, 2023 3:19:15 PM  
System ID: UAE-TOX-007 CN1-C21007

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...and the following conditions:

Style: Id: UAE\_TOX007\_CW 152160  
Print Date: Sunday, 23, 2023 3:49:17 PM

114570X.001.0511501002 Transcription Inhib.

Time	Transaction Source	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 2:08:22 AM	Web	Data	Injection Prevention - Injection Inject: 1981 SQL, Inject ID: 1 DB: 1 (Query) => 0.00% (1) [Ref: 1981] => 0.00%	Injection Path: 1 SQL 23230822023-05-23 12-45-36-00 027898 File P-23-38-D-FID: 0
February 23, 2023 2:08:22 AM	Web	Data	Injection Prevention - Injection Inject: 1981 SQL, Inject ID: 1 DB: 1 (Query) => 0.00% (1) [Ref: 1981] => 0.00%	Injection Path: 1 SQL 23230822023-05-23 12-45-36-00 027898 File P-23-38-D-FID: 0
February 23, 2023 2:08:26 AM	Web	Data	Injection Prevention - Injection Inject: 1981 SQL, Inject ID: 1 DB: 1 (Query) => 0.00% (1) [Ref: 1981] => 0.00%	Injection Path: 1 SQL 23230826023-05-23 12-45-36-00 027898 File P-23-38-D-FID: 0
February 23, 2023 2:08:26 AM	Web	Data	Injection Prevention - Injection Inject: 1981 SQL, Inject ID: 1 DB: 1 (Query) => 0.00% (1) [Ref: 1981] => 0.00%	Injection Path: 1 SQL 23230826023-05-23 12-45-36-00 027898 File P-23-38-D-FID: 0
February 23, 2023 2:30:43 AM	Web	Data	Injection Prevention - Injection Inject: 1981 SQL, Inject ID: 1 DB: 1 (Query) => 0.00% (1) [Ref: 1981] => 0.00%	Injection Path: 1 SQL 23230343023-05-23 12-45-36-00 027898 File P-23-38-D-FID: 0
February 23, 2023 2:30:43 AM	Web	Data	Injection Prevention - Injection Inject: 1981 SQL, Inject ID: 1 DB: 1 (Query) => 0.00% (1) [Ref: 1981] => 0.00%	Injection Path: 1 SQL 23230343023-05-23 12-45-36-00 027898 File P-23-38-D-FID: 0
February 23, 2023 2:30:46 AM	Web	Execution	Injection Prevention - Injection Inject: 1981 SQL, Inject ID: 1 DB: 1 (Query) => 0.00% (1) [Ref: 1981] => 0.00%	Injection Path: 1 SQL 23230346023-05-23 12-45-36-00 027898 File P-23-38-D-FID: 0
February 23, 2023 2:32:10 AM	Web	Execution	Injection Prevention - Injection Inject: 1981 SQL, Inject ID: 1 DB: 1 (Query) => 0.00% (1) [Ref: 1981] => 0.00%	Injection Path: 1 SQL 23230210023-05-23 12-45-36-00 027898 File P-23-38-D-FID: 0
February 23, 2023 2:32:36 AM	Web	Execution	Injection Prevention - Injection Inject: 1981 SQL, Inject ID: 1 DB: 1 (Query) => 0.00% (1) [Ref: 1981] => 0.00%	Injection Path: 1 SQL 23230236023-05-23 12-45-36-00 027898 File P-23-38-D-FID: 0
February 23, 2023 2:32:37 AM	Web	Execution	Injection Prevention - Injection Inject: 1981 SQL, Inject ID: 1 DB: 1 (Query) => 0.00% (1) [Ref: 1981] => 0.00%	Injection Path: 1 SQL 23230237023-05-23 12-45-36-00 027898 File P-23-38-D-FID: 0

**Keywords:** child sexual abuse; disclosure; social support

Date: February 23, 2023 3:15:15 PM  
System ID: UAE-TOX-027-CN11E21607

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Time	Transaction State	Activity Performed	Type of Transaction	Operational Information
January 25, 2023 10:00 AM	End	Processing	Single-Phase Rollback: Transaction ID: 12345, Status: Rollback	Run Commit
February 10, 2023 11:30 AM	End	Commit	Single-Phase Commit: Transaction ID: 67890, Status: Commit	GO
February 28, 2023 09:00 AM	Start	Processing	Single-Phase	Rollback
March 15, 2023 02:15 PM	Audit	Rolling	Single-Phase	Manual Intervention: Rollback

Date: February 23, 2023 3:10:15 PM  
System ID: UAE\_TOX\_037\_124\_132\_1317

## เอกสารไม่ควบคุม

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Agilent CrossLab Start Up Services  
**Agilent 7890 Gas Chromatograph**  
**Preventive Maintenance Checklist**

Agilent 7890 GC Preventive Maintenance Checklist



## Introduction

## Customer Information

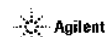
- Customers should provide all necessary operating supplies upon request of the engineer.
  - A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service, nor are the cost of this service.**
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.**

### Important Customer Web Links

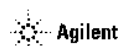
- For more information about **Agilent Technologies services**, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-nature-materials/service-repair>
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/en-us/home>
- To access **Agilent University**, visit <https://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A **Useful Agilent Resource Center** web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilent/resources>.
- Need technical support, FAQs, supplies? – visit our **Support Home page** <http://www.agilent.com/search/support>
- **Videos** about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>.
- **7890B Manuals** are also available on Agilent.com:
  - **Safety**  
[https://www.agilent.com/cs/library/securemanuals/public/7890B\\_Safety.pdf](https://www.agilent.com/cs/library/securemanuals/public/7890B_Safety.pdf)
  - **Installation and First Startup**  
[https://www.agilent.com/cs/library/securemanuals/Public/7890B\\_Installation.pdf](https://www.agilent.com/cs/library/securemanuals/Public/7890B_Installation.pdf)
  - **Operation Manual**  
[https://www.agilent.com/cs/library/securemanuals/Public/7890B\\_Operation.pdf](https://www.agilent.com/cs/library/securemanuals/Public/7890B_Operation.pdf)
  - **Maintaining Your GC**  
[https://www.agilent.com/cs/library/usermanuals/public/7890B\\_900929247890B\\_Maintenance\\_7890B.pdf](https://www.agilent.com/cs/library/usermanuals/public/7890B_900929247890B_Maintenance_7890B.pdf)

Revision: 2.01, Issued: September 15, 2021  
Agile Document Number: D0018616  
DE number: 44166.769722222  
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## เอกสารไม่ควบคุม



## เอกสารไม่ควบคุม

## Service Engineer's Responsibilities

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

## 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.

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## System Information

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

Instrument System Name and ID	UAE.TOX.007	CN 11201007
Instrument System Site and Location	UAE	Analytical Laboratory

List System Component Product Numbers	List the Serial Numbers of each Component
1. 03440A	CN 11201007
2. 8-2917A	CN 82149496
3. 8-2614A	CN 82248792
4.	
5.	
6.	
7.	
8.	
9.	
10.	

## Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☐ Perform a general inspection of the system for cleanliness.
- ☐ Check for proper installation of parts, assemblies, sensors etc.
- ☐ Check system for required installation of components, settings as defined by current Service Notes.
- ☐ Check for required firmware updates and verify with customers if they would like them 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.

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## Preventive Maintenance Procedure

## 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.

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## ALS Maintenance

- ☐ **Section NOT applicable**
- ☒ Check all cabling and configuration settings between GC, tray, and injectors.
- ☒ Vacuum or remove 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

## Restore Instrument

- ☒ Restore the normal operating conditions or customer method using the 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.

Note: 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.

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## Signature Page

## Service Review

- ☐ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's 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 Engineer Comments section if there are additional comments.
- ☒ Review with the customer this service, parts replaced, and test results obtained.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.
- ☐ Supply the customer with a copy of the Smart Alerts flyer.
- ☐ Describe Smart Alerts to the customer.
- ☐ Install Smart Alerts if requested.

## 7890 GC Test Results Table

Detector Signal Outputs	Before PM Service	After PM Service
Front detector output	N/A	220
Back detector output	N/A	12
AUX detector output	N/A	N/A
Pressure decay test	Expected test result	Actual test result
Front inlet pressure decay test	Pass	Pass
Back inlet pressure decay test	N/A	N/A

Revision: 2.01, Issued: September 15, 2021  
Agile Document Number: D0013618  
DE number: 44166.759722222  
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## 7890 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	Product or 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	N/A
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	7890A/B	N/A
PP Inlet PM kit	5188-6498	7890A/B	N/A
Split vent trap PM kit, single cartridge (for MMI, PTV & VI)	5188-6495	7890A/B	N/A
MMI Cleaning Kit	G3510-60820	7890A/B	N/A
PTV Septumless Head Rebuild Kit	5182-9747	7890A/B	N/A
PTV Septumless Head Teflon Guide	5182-9748	7890A/B	N/A
Ignitor (glow plug) assembly with O-ring	19231-60680	7890A/B	1
FID Collector Rebuild/Cleaning Kit	G1531-67000	7890A/B	N/A
Standard .011-inch FID Jet for capillary FID base	G1531-80560	7890A/B	1
High Temperature .018-inch FID Jet for capillary FID base	G1531-80620	7890A/B	N/A
Standard .018-inch FID Jet for packed column with packed FID base	18710-20119	7890A/B	N/A
Standard .011-inch FID Jet for capillary column with packed/adaptable FID base	19244-80560	7890A/B	N/A
High Temperature .018-inch FID Jet for capillary column with packed/adaptable FID base	19244-80620	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID	G1534-80580	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID Extended tip	G1534-80590	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
**FID Collector Replacement Kit, if needed	G1531-67001	7890A/B	N/A

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## Service Engineer Comments

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 include them in this box.

## Service Completion

Service request number 609768732 Date service completed 22 Feb 2023  
Agilent signature [Signature] Customer signature \_\_\_\_\_  
Total number of pages in this document 10 pages

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## Document Control Logs

## Revision Log

Revision	Date	Author	Reason for update
Revision of document	Date of issuance	Author of document	Author to describe main features/changes made for this specific revision
1.0 Draft	4-Mar-2011	Dave Park	Migrated the content of revision A.01.05 to the new Agilent template. Reviewed by subject matter expert Dave Park.
1.1 Draft	20-Jan-2015	Dave Park	Added Split Vent trap to MMI, PTV and VE - also PTV and FID PM Parts
1.2 Draft	31-March-2015	Dave Park	Added Ultra Inert Gold Seal and Liner to SS Consumables
A.01.11	10-Dec-2015	Dave Park	Added step to perform maintenance on the Split Vent Tube and .018" ID inlet part numbers - Fixed broken web links
2.00	30-Dec-2020	Cary Boardman	Updated flow literature and terminology change. Familiarization to Introduction. Create New Agile Document Number: D0073663


## Approval Log

Revision	Approver	Title of approver
Add revision number	Add approver name here	Add approver's function or title here
A.01.06	Dor Cane	Product support manager
A.01.09	Xai Meng	Product support manager
A.01.10	Suneetha Tippireddy	Product support manager
A.01.11	Suneetha Tippireddy	Product support manager
2.00	Josh Roark	GC Product Support Manager

## Designated Evaluation Log

Revision	Designated Evaluator (DE)	Title of DE	DE Number
Add revision number	Add name	Add function or title	Add DE number here
2.00	Michael Zumwalt	CrossLab Start Up Services Application Consulting Lead	44166.759722222

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EQP Name: AgilentRecommended

Service Type: QG

Company Name: United Analytical and Instrumental Consulting Co., Ltd.

Customer Name/Title: Min Thompson, National Laboratory Manager

EQP Filename: QG-02-51.eqp

EQP Release Date: November 2020

Print Date: November 2, 2020 8:00:25 PM

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## Scope and Purpose

## Overview

The Equipment Qualification Plan (EQP) documents the activity program that is performed during the qualification services for the applicable systems. A complete description of the test specifications is provided for the supported services, including scope and acceptance criteria (or limits) for each test. The test specification section of this document is created directly from the EQP File name listed on the cover. This document is an abstraction of the EQP file used to perform the service and is generated directly from the electronic Agilent Equipment Qualification Plan (eEQP) File. The purpose of this document is to allow the user to review and record approval of the EQP that guides the delivery of compliance services provided by the Agilent Automated Compliance Engine.

## CDS Software Prerequisite for Hardware Qualifications

(Applies to hardware qualification only) Agilent recommends that the customer data system (CDS) software used during the qualification has been qualified within the qualification period specified by the customer's software qualification SOP.

## Statement of Intent

Unless otherwise requested, the qualification is delivered according to the standard test program described in the Agilent Recommended EQP. Agilent reserves the right to warrant conformance only to the closest variance value. The user is notified of this stipulation at EQP setup time and the qualification report (EQR) will reflect this situation.

Customizations are as follows: (a) subject the system to limits that exceed the typical operational range or (b) additional tests that are not considered part of the core program required for completion of the selected service. Because custom setpoints and limits may exceed the operational envelope of the equipment, Agilent reserves the right to warrant conformance only to the closest variance value. The user is notified of this stipulation at EQP setup time and the qualification report (EQR) will reflect this situation.

A set of ink signature fields, as determined by the creator of this document, can be included at the end of this document. All fields should be completed on a single set of fields, initiated by an appropriate approver, run through any signature fields that are not to be used. This is an optional process that allows a paper record of sign-off by the appropriate reviewers where a hybrid (electronic/ink) signature SOP is followed. If this document will be saved electronically and digitally signed in a document management system, it should be generated without ink signature fields. The customer must sign the EQP review documents and return an electronic copy to Agilent prior to qualification delivery. The delivery of the services is done according to the terms and conditions stated in the corresponding service exhibit. It is recommended that after approval, this EQP be archived with the electronic EQP file.

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## Understanding the Test Specification Section in Tabular Review Documents

(Applies to hardware qualifications only) For Agilent-recommended setpoints and limits, the range of allowable values (L for low, H for high) is included. As applicable, variances, customizations, and additional setpoints are listed beneath the Agilent recommended values and marked W (within range) or O (outside of range) in the left margin; values for added setpoints are also marked W or O and displayed after all configurator's values. Dual limits are marked DW or DO. Agilent is NOT responsible for test failures for out of range setpoints and limits. Optional tests that are enabled are included and marked as such; required tests that are disabled by the customer are included and marked as such.

NOTE: Limit ranges must be more tightly managed than setpoint ranges because they often reflect physical measurement limits and are directly linked to the testing method. Therefore "within range" user limits are subject to best effort repairs if they cannot be met. In particular, Agilent will not be responsible for test failures for limits tighter (more demanding or challenging) than the recommended values.

## Customer Responsibilities

If Agilent representatives use a customer CDS account to acquire test data, they log off from the CDS account at the end of test acquisition. Agilent Technologies has no responsibility for those account credentials. It is up to the customer to protect the CDS from misuse.

a (As applicable) Disable the account used by the Agilent representative to acquire CDS data.

a Safety store and archive this EQP.

c Maintain change control and revision history.

c Review and optionally sign the EQP, making sure the service delivery is what was approved.

c Review and approve any of the following variances from the Agilent recommended:

-Within Variance Range: changes to the Agilent recommended that are identified by Agilent as within the operational ranges determined in our test development.

-Outside of Variance Range: changes to the Agilent recommended that Agilent identifies as outside of the operational ranges determined in our test development. Agilent is not under any obligation to make the instrument pass the more stringent limits that fall in this range and this detail is called out in the EQP Test Specification.

-Optional Tests: additional tests that are available but not part of the core testing suite and cost extra.

-Disabled Tests: test for which all possible configurations have been disabled (tests are flagged in the test specification).

## Agilent Responsibilities

a Deliver the services following the test programs described in the customer EQP.

a Provide a locked and e-signed Qualification Report (EQR) upon completion of the service.

a If requested, provide an optional ink-signed EQR CD to the customer.

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## General Statements on the Testing Program

The recommended set of hardware OQ tests described in this EQP derives from Agilent's interpretation of authoritative expert literature issued by the FDA, USP, GAMP, ASTM 2500, and others. The OQ test design incorporates both modular and holistic testing, which is a "crown approach," acceptable to regulators. As prescribed by the "OQ test design methodology for Analytical Instrumentation Qualification (AIQ), the OQ step is separated from the PQ as recommended by the regulatory guidelines.

Agilent CrossLab Compliance uses a balanced selection of metrology and chemical tests to directly determine the performance of the systems without unnecessary reliance on inferred or "derived" results. For example, direct metrology is used to test crucial flow rates and thermal-controlled column compensation and autosampler modules. Intrinsic chemical testing is used to the evaluation of the following critical instrument characteristics: linearity, precision, signal-to-noise, and carry over.

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## Agilent CrossLab Compliance Services

Agilent CrossLab is designed to fit (and follow) quality systems used by firms and recognized by regulatory agencies worldwide. Note: Enterprise Edition has been renamed Agilent CrossLab Compliance; all functionality remains the same.

## How Agilent CrossLab aligns with a traditional, paper-based methodology:

- Policy documents (a detailed plan for validation and qualification of GMP/GLP systems and usually involving the OQ/IQ/OQ/PQ models), the precise procedures for IQ and OQ for each type of equipment are prescribed in an approved SOP, perhaps called SOP #123: Qualification of HPLC Systems. In Agilent CrossLab, the equipment qualification plan (EQP) has the same role as the traditional qualification SOP.
- The traditional SOP provides lists of test settings for the range of system configurations found in the laboratory. The EQP follows this concept: the inventory of systems covered by an SOP or EDP changes over time, so this is kept as a separate record.
- The traditional qualification SOP typically has blank results forms as attachments to be preprotocolled for each IQ or OQ event—the results reported in the manual calculations. In Agilent CrossLab, the execution process is streamlined and automated by use of Adobe forms and the Agilent Compliance Engine (ACE) delivery tool. It provides reports with no handwriting errors, validated calculations, automated pass/fail report traceability to raw data and the number of times a test was run. This automation provides efficiency and enforces compliance to procedures.
- The traditional qualification SOP is approved and released only once—replacing the need to author individual protocols for each chromatography system. This is the same concept for the EQP. The appropriate tests for each individual configuration are automatically selected by ACE from the list in the approved EDP at time of delivery. The final report is a unique file for each individual qualification event, but the single approved EDP covers a lab, department, or as wide a scope as desired.
- In the traditional qualification methodology, there is no convenient provision to record the actual work flow of the tests execution and results. In the event there is a problem during the Agilent CrossLab delivery, ACE maintains a counter per test which is automatically incremented for GMP compliant work, and the engineer generates a deviation note within the ACE report.



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## Design Qualification (DQ)

DQ for commercial lab instruments is recommended by some, but not all, guidelines and procedures. Definitions of DQ found in guidelines and firm-specific validation procedures vary widely around the world. Some firms require nothing more than a record (such as certificate) from the instrument manufacturer demonstrating that the lab system has been designed for purpose and manufactured to a quality standard. Others treat DQ as the development of a user requirement specification document (URS) which can be matched to the IQ and OQ specifications for a manufacturer. Other firms consider DQ as including the vendor selection activities.

USP Chapters literature definition of DQ:

*Design qualification (DQ) is the documented collection of activities that define the functional and operational specifications of the instrument and criteria for selection of the vendor, based on the intended purpose of the instrument. Design qualification (DQ) may be performed not only by the instrument developer or manufacturer but also may be performed by the user. The manufacturer is generally responsible for robust design and maintaining information describing how the analytical instrument is manufactured (design specifications, functional requirements, etc.) and tested before shipment to users. Nonetheless, the user should ensure that commercial off-the-shelf (COTS) instruments are suitable for their intended application and that the manufacturer has adopted a quality system that provides for reliable equipment. Users should also determine capability of the manufacturer for support installation, services, and training.*

For your reference, Agilent provides the following statements for DQ purposes:

- All Agilent hardware and software laboratory products including the ACE software used to deliver qualification services, are designed, manufactured, and tested according to Agilent internal Quality Life-Cycle Development Procedures.
- Certificates of Agilent testing, validation, and conformance to standards are provided with new Agilent instruments and similar certification is provided for ACE software. These documents are checked and recorded in Agilent CrossLab Compliance Services IQ.
- Agilent maintains information describing how products are manufactured and maintains a problem and bug reporting program as required by international software quality guidelines.
- The DQ specifications in this EDP can be used, as appropriate, by the user to prepare URS. The DQ specifications in this EDP represent the levels of performance acceptable to regulatory agencies for the technique: conform to typical specifications found in validation literature; are equally suitable for OQ at installation and on-going OQ throughout operational lifetime; are equivalent to the OQ specifications published in the legacy Agilent Classic OQ/PV protocols; and are suitable for most user requirements.
- Agilent Technologies is capable of installation, support, preventive maintenance, on-going qualification, and re-qualification after repair and user training worldwide.

## Installation Qualification (IQ)

IQ checks and tests for Agilent hardware and software products include the following:

- Purchase Order Details: Allows the customer to verify that the instrument being qualified matches their design requirements (if available) and purchase order.
- Preparation and Installation Details: Gathers and records information about preparation and installation documents.
- Documentation: Gathers and records information about reference and user manuals for initial installations.
- Product Quality Assurance Details: Collects and records certificates and other forms that verify that the vendor has developed and built the product according to internal standards.
- Startup: Verifies that all modules start up properly.
- Instrument Check (hardware only): Demonstrates that all modules of the instrument are correctly installed and connected. It does not test instrument performance as fully as OQ. This test is not necessary and therefore skipped if an IQ is to be performed by Agilent operator at installation after IQ.
- Installation Verification (software only): Verifies the correctness of all installation-related files.

## Operational Qualification (OQ)

Refer to the appropriate Test Definitions document for a detailed description of the testing program, setpoints, and acceptance limits for each system technique, category, and instrument configuration.

## Dual-Acceptance Limits

(Applies to hardware qualifications only)

Within the EDP of Agilent CrossLab, each of the tests final result can be compared against two different limits if required. This allows customer-configured OQ to report against a User Limit (Limit 1) and the Agilent Recommended Limit (Limit 2) simultaneously.

In the standard EDP documents, Limit 1 and 2 values are the same—effectively de-activating this feature. Custom EDPs can also be prepared on request, making effective use of the two-limit feature of the Agilent Compliance Engine (ACE). In those cases, Limit 2 will always be the Agilent Recommended limit, and Limit 1 will be the limit requested by the user.

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Agilent will not be under any obligation regarding the OQ testing results upon user-requested limits that are more stringent than the Agilent Recommended limits.

## Re-Qualification after Repair (RQ) Hardware

(Applies to hardware qualifications only)

In the event of a hardware breakdown followed by an engineered repair of a qualified instrument, it is necessary to re-qualify the system to an appropriate level before release back into operational use.

For some of the instrument techniques, Agilent offers a service contract (optional) and re-qualify an instrument during the period between scheduled annual OQs.

The level of re-testing is prescribed in the RQ section of ACE as a form is displayed for the operator showing all types of repair possible and the re-testing level required. Part of an example form is shown below.

Re-qualification after Repair			
Pump Strategies	Repaired/Replaced Strategy	Approaches	OQ/PV Testing
Isocratic pump head parts, solenoid inlet valve (or AUV cartridge), grade shift check valves, reference valves, inlet manifold or pump drive, or mixing pump head apart to clean (versus repair)	Any pump		Flow Accuracy & Precision
Pulse damp, pressure excuducer	Any pump		Flow Accuracy & Precision
Multi-channel gradient valve	Customer		Gradient Composition

The full list of repair and re-test guidance is available for review by customers of the RQ service.

The RQ form in ACE prescribes which tests the operator must perform for each repair circumstance. The test procedure, setpoints, and limits will be an exact repeat of the previous OQ test (regression-testing strategy).

Updated: November 2019

[www.agilent.com/chem/qualification](http://www.agilent.com/chem/qualification)

Information, descriptions and specifications in this publication are subject to change without notice.

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## Report and Delivery Options

(For hyphenated system types only; if different options are chosen for the ordinary and supported system types, the primary system options are used for both techniques in the EQR)

- Show chromatograms
- Show header and footer on cover
- Include repeated run logs
- Include Transaction logs

## Selected Signature Options

System EQP is not signed

- Reporting variance is allowed in this EQP

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## Customer Approval

Name: นางสาว พงษ์ผกา นิลทิพย์  
Title: Laboratory Manager  
Date: Feb 2, 2021  
Signature: [Signature]

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Date: \_\_\_\_\_  
Signature: \_\_\_\_\_

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Date: \_\_\_\_\_  
Signature: \_\_\_\_\_

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
Date: \_\_\_\_\_  
Signature: \_\_\_\_\_

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## Legal Notice

Agilent CrossLab Compliance and its primary component's ACE software tool, procedures, test origin, methodology tool, chemical reference standards, and operator training materials have been designed, tested, validated, and released for commercial use following Agilent's Life-Cycle Development Quality Assurance methodology.

Agilent CrossLab Group R&D VP and Dir. of Technology: Neil Cook, Santa Clara, California USA.  
Agilent CrossLab Group Quality Manager: Julio Hector, Santa Clara, California USA.

Agilent CrossLab Compliance is endorsed by Dr. Ludwig Huber on behalf of labcompliance.com.

ACE software is patented. Copyright is claimed by this statement for all original works comprising Agilent CrossLab Compliance. Any unauthorized use, reproduction, or translation will be prosecuted to the maximum extent possible by law. All customer copies of EQR approval, final qualification reports, and raw data provided to customer at delivery of the service become the property of the customer.

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## Protocol Details

Protocol Revision Used for this Document

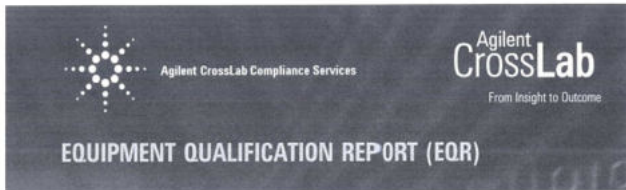
Protocol Revision Release Date

GC32.61

November 2020

NOTE: The Revision History - EQR factor document includes details for above and other available revisions.

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## Agilent CrossLab Compliance

Qualification Type: GC-OQ

System ID: UAE.TOX.007\_CN11021007

EQP Name: AgilentRecommended

EQP Revision: GC.02.51

EQP Publish Date: November 2020

Date: February 23, 2023 3:23:17 PM

Report Type: Report

Org. Name: United Analyst and Engineering Consultant Co., Ltd.

Org. Location: 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Date: February 23, 2023 3:23:17 PM  
System ID: UAE.TOX.007\_CN11021007

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## Test Summary

## Purpose:

This section includes the Overall Qualification Status and details for each test that meets at least one of the following criteria: (1) was not scheduled; (2) was scheduled but not run; (3) was processed more than once; (4) passed recommended limits only when dual limits were selected; (5) required deviation(s) or comment(s); (6) required integration event change(s). Tests that pass and do not meet any criteria above are not included.

For a complete list of scheduled tests, see the table of contents. For supporting documentation, refer to the Attachments section.

NOTE: A Pass for the Overall Qualification Status indicates that all scheduled tests were run and passed; R, I, D, and C are blank if not applicable for that specific test.

## R: runs

I: integration event changes

D: number of deviations submitted

C: number of comments submitted

Status: NS (not scheduled); NH (scheduled but not run); NC (unlocked but not completed)

## Details

Test	Status			
	R	I	D	C
GC Scouting Run - Injection Tower, Front SSL, Front UECD	Pass			
Injection Precision - Injection Tower, Front SSL, Front UECD	Pass			
GC Scouting Run - Injection Tower, Front SSL, Back FID	Pass			
Injection Precision - Injection Tower, Front SSL, Back FID	Pass			
Signal to Noise - Injection Tower, Front SSL, Back FID	Pass			

## Overall Qualification Status

Pass

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Service Details

Purpose  
This section includes the contract and delivery details for this service.

General Details

Service Order No./Request: SXC5796732  
BOM Name: AgilentRecommended  
FQP Revision: GC.02.51  
Report Type: Report

Organization Details

Name: United Analyst and Engineering Consultant Co., Ltd.  
Location: 3 Soi Udonsook 41, Sukhumvit Road, Bangkok, Phrakharong, Bangkok 10260

Local Contact Details

Name: K.Denjanan Viriyothai  
Job Title: Manager  
Qualification Location: Analytical Laboratory

Operator Details

Name: Saenguthai Tarak  
Job Title: Field Service Engineer

Data Acquisition Details

Acquisition Software Name: ChemStation  
Acquisition Software Revision: GC.11.1C Update GCPC17

Customer Data System (CDS): GC CrossLab CDS

Instrument Details

Purpose  
This section describes the as found system configuration.

Details

System

System ID: UAE.TOX.007\_CN11021007  
Manufacturer: Agilent Technologies  
Name: 7890  
Flow Data Input: Manual Data  
Temperature Data Input: Manual Data or Other Data Logging

Tested Combination1

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

Tested Combination2

Injection Technique: Injection Tower  
Inlet: Front  
Detector: Back  
LTM Included?: No

Sampler 1

Manufacturer: Agilent Technologies  
Type: Injection Tower  
Name: 7683B  
Model Number: G2613A  
Serial Number: CN28149436  
Firmware Revision: A.11.02  
Usage: Sample Injection  
Location: Front  
Syringe Volume (µL): 10

Sampler 2

Manufacturer: Agilent Technologies  
Type: Tray  
Name: 7683A  
Model Number: G2614A  
Serial Number: CN99248787  
Firmware Revision: A.02.01

Mainframe 1

Manufacturer: Agilent Technologies  
Name: 7890  
Model Number: G5440A  
Serial Number: CN11021007  
Firmware Revision: A.01.11  
Over Type: Standard

Inlet 1

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

Detector 1

Manufacturer: Agilent Technologies  
Name: 7890  
Type: UECD  
Serial Number: U1588E  
Adapter: Capillary  
Control Type: Electronic Pressure Control (EPC)  
Location: Front  
Makeup Gas: Nitrogen

Detector 2

Manufacturer: Agilent Technologies  
Name: 7890  
Type: FID  
Adapter: Capillary  
Control Type: Electronic Pressure Control (EPC)  
Location: Back  
Makeup Gas: Nitrogen

## Calculation Formulas

### Purpose

This section includes calculation formulas for all available tests. Depending upon which tests are scheduled, all or some apply to your qualification.

**Average**  $(X_{ave} = X_{total}) = \frac{\text{Absolute Average}}{n} = (X_{ave} - X_{ave})^2$  **Average** mean value of  $n$  observations:  $\frac{1}{n} \sum_{i=1}^n X_i$

$X_{ave}$  = Mean value  
 $X_{total}$  = Sum total  
 $X_i$  = Value of  $i^{th}$  observation  
 $n$  = Total number of observations

**% Carry Over**  $\frac{X_2}{X_1} \times 100$  **Correlation Coefficient**  $\frac{1}{\sqrt{\Delta X \Delta Y}} \times \left( n \sum_{i=1}^n X_i Y_i - \sum_{i=1}^n X_i \sum_{i=1}^n Y_i \right)$

$X_1$  = Response of blank injection  
 $X_2$  = Response of final standard injection  
 $\Delta X = n \sum_{i=1}^n X_i^2 - \left( \sum_{i=1}^n X_i \right)^2$   
 $\Delta Y = n \sum_{i=1}^n Y_i^2 - \left( \sum_{i=1}^n Y_i \right)^2$   
 $n$  = Number of data points  
 $X_i$  = Value of  $i^{th}$  point  
 $Y_i$  = Value of  $i^{th}$  point

**Drift** (slope of the regression)  $= \frac{1}{\Delta X} \left( n \sum_{i=1}^n X_i Y_i - \sum_{i=1}^n X_i \sum_{i=1}^n Y_i \right)$  **Coefficient of Determination**  $r^2$

$\Delta X = n \sum_{i=1}^n X_i^2 - \left( \sum_{i=1}^n X_i \right)^2$   
 $n$  = Number of data points  
 $X_i$  = Value of  $i^{th}$  point  
 $Y_i$  = Value of  $i^{th}$  point

**ASTM Noise**  $\frac{\sum_{i=1}^n X_i \mu_{i-1} \mu_i}{n}$  **Line Noise**  $\sqrt{\frac{\sum_{i=1}^n E_i^2}{2n-1}}$  **% Signal Noise**  $\frac{1}{\text{SD}}$

$X_i \mu_{i-1} \mu_i$  = Peak area in sequence  $i$   
 $n$  = Number of segments  
 $E_i$  = Individual voltage reading  
 $E$  = Average of measurements  
 $X$  = Amount  
 $Y$  = Response

**Parts Per Million (ppm)**  $\frac{(M_2 - M_1)}{M_1} \times 1,000,000$  **Stability**  $\left| \frac{H_{Tmax} - T_{min}}{T_{max}} \right|$

$M_1$  = Reported mass  
 $M_2$  = Theoretical mass  
 $T_{max}$  = Maximum noise  
 $T_{min}$  = Minimum value

**Standard Deviation (SD)**  $= \sqrt{\frac{1}{(n-1)} \sum_{i=1}^n (X_i - X_{ave})^2}$  **Relative Standard Deviation (RSD)**  $= \frac{SD}{X_{ave}} \times 100$

$X_i$  = Value of  $i^{th}$  observation  
 $X_{ave}$  = Mean value of observations  
 $n$  = Total number of observations  
 $SD$  = standard deviation  
 $X_{ave}$  = Mean value of observations

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NOTE: For many tests performed by the Automated Compliance Engine multi-step calculations are employed to reduce the raw data to a report-ready form. These calculations retain the full precision of each intermediate result as the algorithm progresses through the required reduction. Where intermediate or intermediate's display, these results must be rounded or truncated to provide the proper display values. Attempting to calculate the final value based on these display-modified intermediates can result in a small difference in the final result. These intermediates, when presented, are simply used to show a algorithmic progress through the calculation and not intended to act as a means of algorithmic validation. Beginning with GC.01.88, results are rounded to use the same number of decimal places as defined in the limit, which must be less than or equal to the resolution provided by the measuring equipment.

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## Protocol Details

### Purpose

This section lists the revisions for all test units used in this report. For complete test-specific and high-level change details, refer to the Revision History document.

Test Revision	Test
GC.01.51	Detector Flow Accuracy
GC.02.51	GC Oven Temperature Accuracy
GC.02.51	GC Oven Temperature Stability
GC.02.52	GC Scouting Run
GC.02.52	Injection Precision
GC.02.52	Inlet Pressure Accuracy
GC.02.52	Inlet Pressure Decay
GC.02.52	Noise and Drift
GC.02.52	Signal to Noise
GC.02.52	System Inspection and Basic Safety and Operation

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## System Inspection and Basic Safety and Operation

### Purpose

This test verifies that the GC is correctly installed and connected.

### Configuration Details

Name: 7890

### Selpoint

Results	Criteria	Observed Result	Expected Result	Status
Is the system in good operating condition (no physical damage)?		Yes	Yes	Pass
Are there apparent instrumental or environmental safety concerns?		No	No	Pass
Are required gases present and of appropriate pressure?		Yes	Yes	Pass
Is there continuity between the GC chassis and the ground pin?		Yes	Yes	Pass
Does the power-cycled GC complete the self-test without errors (a "not ready" status is considered to be without errors)?		Yes	Yes	Pass
Does the system reject operator entry of oven setpoint of 300°C?		Yes	Yes	Pass
Does a (hydrogen) safety shutdown start in approximately 4 - 10 minutes?		Yes	Yes	Pass

Setpoint Status: Pass Runs: 1

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

Pass

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## Inlet Pressure Decay

### Purpose:

This test demonstrates the pressure integrity of the GC inlet (with a valve controlled injection system, if applicable) and all flows controlled by the GC inlet pneumatics.

### Configuration Details

Name: 7890  
Front: SSL

Setpoint: Pressure 25.0 psi

### Measurements

Initial Pressure: 25.1 psi  
Final Pressure: 25.0 psi

### Results

Pressure Change: -0.1 psi 15 minutes  
Agilent Recommended:  $\leq -2.0$  psi  $\leq 0.5$

Setpoint Status: Pass Runs: 1

### Overall Inlet Pressure Decay Test Status

Pass

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## Inlet Pressure Accuracy

### Purpose:

This test uses a digital calibrated manometer to demonstrate the ability of the system to provide accurate pressure to the head of the column. Accuracy is calculated as the absolute difference between the measured pressure and setpoint.

### Configuration Details

Name: 7890  
Front: SSL

Setpoint: Inlet Pressure: 25.0 psi

### Measurements

Reading: 25.0 psi

### Results

Accuracy: 0.0 psi  
Agilent Recommended:  $\leq 1.2$  psi

Setpoint Status: Pass Runs: 1

### Overall Inlet Pressure Accuracy Test Status

Pass

Date: February 23, 2023 3:23:17 PM  
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## Detector Flow Accuracy

### Purpose:

Detector flow accuracy is determined by measuring the flows with a calibrated mass flowmeter and comparing them to the test setpoints and the values displayed by the GC (if applicable).

### Configuration Details

Name: 7690  
Front: UICLO

Setpoint: Flow Type: Makeup 25.0 mL/min

### Measurements and Results

Time: 10:02 Flow: 24.8 mL/min  
Accuracy: 0.1 mL/min  
Agilent Recommended:  $\leq 0.0$  % setpoint ( 2.5 mL/min )

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status: Pass Runs: 1

### Overall Detector Flow Accuracy Test Status

Pass

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## Detector Flow Accuracy

### Purpose:

Detector flow accuracy is determined by measuring the flows with a calibrated mass flowmeter and comparing them to the test setpoints and the values displayed by the GC (if applicable).

### Configuration Details

Name: 7800  
Back: FID

Setpoint: Flow Type: Fuel 30.0 mL/min

### Measurements and Results

Time: 10:05 Flow: 30.2 mL/min  
Accuracy: 0.2 mL/min  
Agilent Recommended:  $\leq 10.0$  % setpoint ( 3.0 mL/min )

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status: Pass Runs: 1

Setpoint: Flow Type: Oxidizer 400.0 mL/min

### Measurements and Results

Time: 10:08 Flow: 389.8 mL/min  
Accuracy: 10.4 mL/min  
Agilent Recommended:  $\leq 10.0$  % setpoint ( 40.0 mL/min )

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status: Pass Runs: 1

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## Scouting Run

## Purpose

This test is used to determine the chromatogram for presence of expected peaks, sufficient run time, and proper integration events prior to the start of the qualification runs.

## Sequence

The sequence has one line to perform a single injection of the evaluation standard.

Evaluation standard, 1 injection

## Configuration Details

Tested Combination:	Front	SSL	Front	UECD
	Injection Tower			
Name:	7689B			

Setpoint	Injection Volume on Column:	LS	UL
----------	-----------------------------	----	----

## Conditions

Y-Axis Unit: Hz

## Configuration

Sample: FCD Std Kit, 18713 8004C  
Evaluated Compound: Liraglutide  
Evaluation Standard Concentration: 0.035 mg/L (from Certificate of Analysis)

## Measurements

Does the run include sufficient tail case file for the SN test? Yes

Noise start time for Signal to Noise (minutes): 4.3

Run time for Signal to Noise (minutes): 4.6

Run time for tests not requiring extra noise interval (minutes):

Setpoint Status: Completed Runs: 1

## Data Audit Log

Host name: LAPTOP-QQ2S-KOMV  
Original Data Path: E:\UAE 2023\QQ2023\_ECD 2023-02-22 14-10-45  
Analyzed Data Path: SDS:\SessionData\QQ\Testing\GuScout\_0\_C\GuScout\_0\_C\_1\PreviousRunML11

Date: February 23, 2023 3:23:17 PM  
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## Integration Parameters:

Type of Integration: Injector

Integration Count: 1

Options Values:

Baseline Correction Mode: Advanced

Initial Slope Sensitivity: 10

Initial Peak Width: 0.01

Initial Area Reject: 0

Initial Height Reject: 100

Timepoint Table:

Integration Type	Value	Time
Integration	Off	0
Integration	On	7
Integration	Off	8

Acquisition operator: Seengulchai teak

Acquisition method: QQ2023\_JbCDU\_SC.M

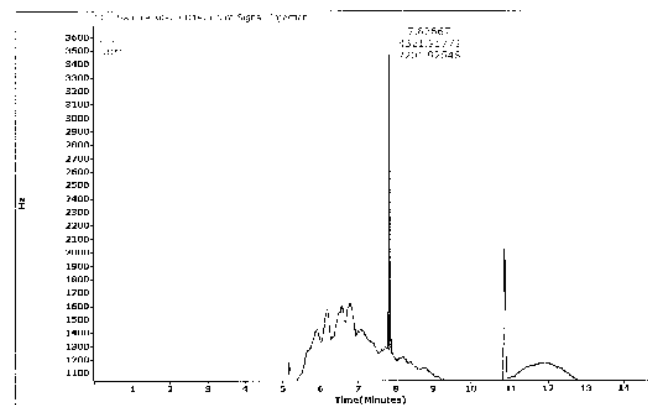
Data file analyzed for this test: QQ\_GC7689B\_LECD\_SC10.D

Acquisition Date: 22-Feb-23, 15:47:48

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## Overall Scouting Run Status

Completed

(Completed is expressed as Pass in the Test Summary section.)

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## Noise and Drift

## Purpose

This test determines the noise and drift of the detector signal. The base signal is recorded at the beginning of the test, noise is calculated as the average peak to peak noise in a number of signal segments, and drift is calculated as the slope of the linear regression for the signal.

## Sequence

Line 1: Blank run 1 injection

## Configuration Details

Tested Combination:	Front	SSL	Front	UECD
Name:	7689B			

Setpoint	Base Signal:	1212 Hz
Base signal is not evaluated and for recording purposes only.		

## Conditions

Noise Evaluation Start Time: 3.0 min

Noise Evaluation Duration: 20.0 min

Sample: Blank run

Oven Temperature: 100.0 °C

## Configuration

Y-Axis Unit: Hz

Results	ASTM Noise	Drift
	Hz	Hz/hr
	1.24	13.32
Agilent Recommended:	3.00	15.00
Status	Pass	Pass

After data is processed, test-specification limits on this form are rescaled for the CUS used to collect data.

Setpoint Status: Pass Runs: 1

## Data Audit Log

Host name: LAPTOP-QQ2S-KOMV  
Original Data Path: E:\UAE 2023  
Analyzed Data Path: SDS:\SessionData\QQ\Testing\IG-Nd\_0\_NGCNd\_D\_5\_1\PreviousRunRun1

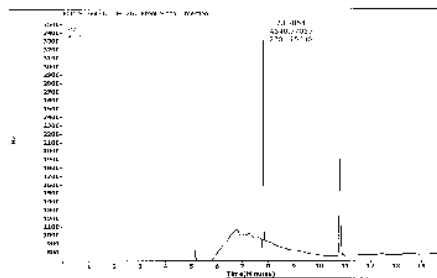
Date: February 23, 2023 3:23:17 PM  
System ID: UAE\_TOX\_307\_CN11021007

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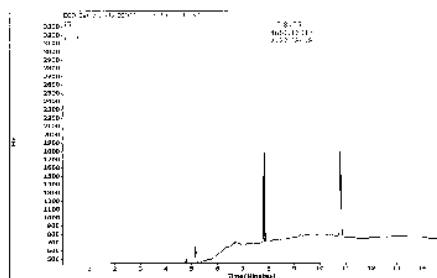
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Acquisition operator: Saenguthai tarak  
Acquisition method: OQ2023\_uECD\_SC.M  
Data file analyzed for this test: OQ\_GC7890\_uECD\_Pre01-023F.D  
Acquisition Date: 22-Feb-23, 20:30:07



Acquisition operator: Saenguthai tarak  
Acquisition method: OQ2023\_uECD\_SC.M  
Data file analyzed for this test: OQ\_GC7890\_uECD\_Pre01-023F.D  
Acquisition Date: 22-Feb-22, 21:13:24

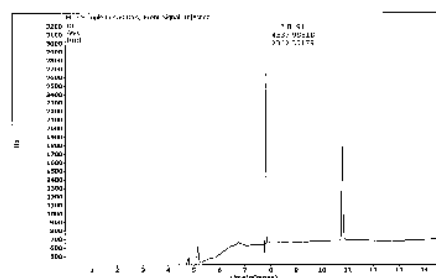


Date: February 23, 2023 3:23:17 PM  
System ID: UAE.TOX.007\_CN11021097

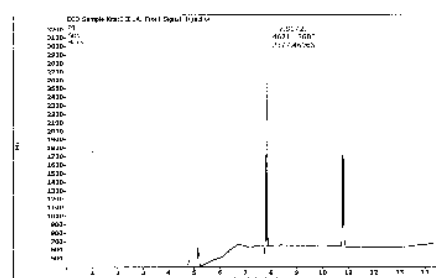
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Acquisition operator: Saenguthai tarak  
Acquisition method: OQ2023\_uECD\_SC.M  
Data file analyzed for this test: OQ\_GC7890\_uECD\_Pre01-023F.D  
Acquisition Date: 22-Feb-23, 21:30:40



Acquisition operator: Saenguthai tarak  
Acquisition method: OQ2023\_uECD\_SC.M  
Data file analyzed for this test: OQ\_GC7890\_uECD\_Pre01-023F.D  
Acquisition Date: 22-Feb-23, 21:47:54

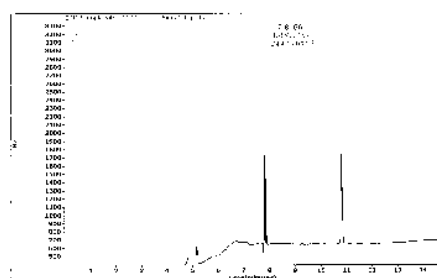


Date: February 23, 2023 3:33:17 PM  
System ID: UAE.TOX.007\_CN11021097

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Acquisition operator: Saenguthai tarak  
Acquisition method: OQ2023\_uECD\_SC.M  
Data file analyzed for this test: OQ\_GC7890\_uECD\_Pre01-023F.D  
Acquisition Date: 22-Feb-23, 22:06:06



Overall Injection Precision Test Status:  
Pass

Date: February 23, 2023 3:23:17 PM  
System ID: UAE.TOX.007\_CN11021097

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## Signal to Noise

### Purpose

This test uses a traceable standard to determine signal to noise.

### Sequence

Line 1: Evaluation standard, 1 injection

### Configuration Details

Tested Combination	Front	SSL	Flow	UECD
Injection Tower				
Name:	7890			

### Setup

#### Conditions

Injection Volume on Column: 1.0 µL  
Noise Evaluation Start Time/Duration: 13 min, 1.0 min

#### Configuration

Y-Axis Unit: Hz  
Sample: ECD Std Kil. #713-60040  
Evaluated Compound: lindane  
Evaluation Standard Concentration: 0.333 mg/L (Certificate of Analysis)

#### Measurements

Noise (Type/Value): ASTM / 2.97346 Hz  
Retention Time of Evaluated Peak: 7.80690 minutes  
Peak Height (Uncorrected/Corrected): 2470.23 Hz / 13479.23 Hz  
(Corrected for attenuation and difference between nominal and reported concentration; energy data is corrected for the applied signal reduction [range/allowance]).

#### Results

Signal to Noise: 4533  
Agilent Recommended: > 1500

ACE uses rounded values in its calculations; only the final result is rounded. Therefore, for a high signal-to-noise ratios (high peak/low noise), ACE calculations may appear to differ slightly from your manual calculations using the reported height and noise.

Setup Status: Pass

Run 1

#### Data Audit Log

Date: February 23, 2023 3:33:17 PM  
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Host name: LAPTOP-CQ3SKOMV  
Original Data Path: E:\UAE 2022  
Analyzed Data Path: SDS:\SessionData\COQ\Tests\G0651\_0\_0\G0651\_0\_0\_1\previousRun\Run1

Date: February 23, 2023 3:23:17 PM  
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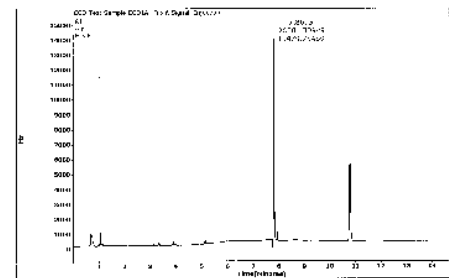
## Integration Parameters:

Type of Integration: Injection  
Integration Count: 0  
Optional Values:  
Baseline Correction Mode: Advanced  
Initial Slope Sensitivity: 10  
Initial Peak Width: 0.01  
Initial Area Reject: 0  
Initial Height Reject: 100

## Integrated Table:

Integration Type	Value	Time
Integration	OFF	0
Integration	ON	0.5
Integration	OFF	0

Acquisition operator: Saengutthai Jarak  
Acquisition method: OQ2023\_uECD\_SC.M  
Data file analyzed for this test: uECD\_SN\_01.D  
Acquisition Date: 23-Feb-23, 12:35:40

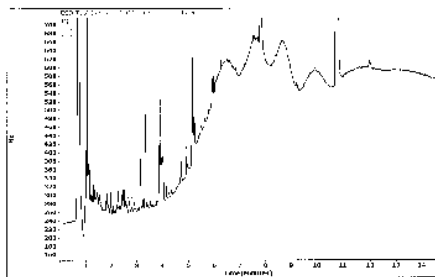


Date: February 23, 2023 3:23:17 PM  
System ID: UAE\_TOX\_007\_CN1071307

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Acquisition operator: Saengutthai Jarak  
Acquisition method: OQ2023\_uECD\_SC.M  
Data file analyzed for this test: uECD\_SN\_01.D  
Acquisition Date: 23-Feb-23, 12:35:40



Overall Signal to Noise Test Status:

Pass

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## Scouting Run

## Purpose

This test is used to determine the chromatogram for presence of expected peaks, sufficient run time, and proper integration events prior to the start of the qualification runs.

## Sequence

The sequence has one line to perform a single injection of the evaluation standard.

Evaluation standard, 1 injection

## Configuration Details

Tested Combination	2	Front	SSI	Back	FID
Name:	Injection Tower 7005B				

Setpoint: Injection Volume on Column: 1.0 µL

## Conditions

Y-Axis Unit: pA

## Configuration

Sample: FID MDL: Std Kit: 5158-6372  
Evaluated Compound: Sample Peak  
Evaluation Standard Concentration: 100 % (from Certificate of Analysis)

## Measurements

Does the run include sufficient flat baseline for the SN test?	Yes
Noise start time for Signal to Noise (minutes):	4
Run time for Signal to Noise (minutes):	5.5
Run time for tests not requiring extra noise intervals (minutes):	1

Setpoint Status: Completed

Run: 1

## Data Audit Log

Host name: LAPTOP-CQ3SKOMV  
Original Data Path: E:\UAE 2022  
Analyzed Data Path: SDS:\SessionData\COQ\Tests\G0650out\_0\_0\G0650out\_1\_0\_1\previousRun\Run1

Date: February 23, 2023 3:23:17 PM  
System ID: UAE\_TOX\_007\_CN11321007

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## Integration Parameters:

Type of Integration: Injection  
Integrator Count: 1

Optional Values:  
Baseline Correction Mode: Advanced  
Initial Slope Sensitivity: 10  
Initial Peak Width: 0.01  
Initial Area Reject: 0  
Initial Height Reject: 100

Times Event Table:

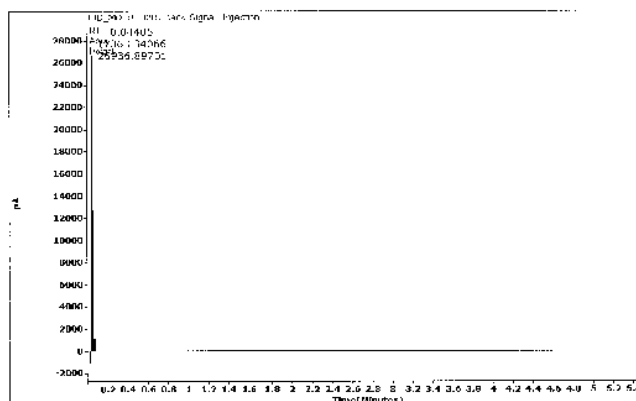
Integrator Type	Value	Time
Integrator	Off	0
Integrator	On	0.015
Integrator	Off	0.5

Acquisition operator: Saengulthaisrak  
Acquisition method: OQ2023\_QC.M  
Data file analyzed for this test: FID\_QC\_Q1.D  
Acquisition Date: 22-Feb-23, 11:50:54

Date: February 23, 2023 3:23:17 PM  
System ID: UAE.TOX.007\_CN11021007

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## Overall Scouting Run Status

Completed  
(Completed is expressed as Pass in the Test Summary section.)

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System ID: UAE.TOX.007\_CN11021007

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เอกสารไม่ควบคุม

## Noise and Drift

## Purpose:

This test determines the noise and drift of the detector signal. The base signal is recorded at the beginning of the test, noise is calculated as the average peak-to-peak noise in a number of signal segments, and drift is calculated as the slope of the linear regression for the signal.

## Sequence

Line 1: Blank run, 1 injection

## Configuration Details

Tested Combination2 Front SSL / Back FID  
Name: 7890

Setpoint Base Signal: 12.2 pA  
Base signal is not evaluated and for recording purposes only.

## Conditions

Noise Evaluation Start Time: 3.0 min  
Noise Evaluation Duration: 20.0 min  
Sample: Blank run  
Oven Temperature: 100.0 °C

## Configuration

Y-Axis Unit: pA

Results	ASTM Noise	Drift
	pA	pA/Hr
	0.04	0.07
Agilent Recommended:	<= 0.10	<= 2.50
Status:	Pass	Pass

After data is processed, test-specification limits on this form are rescaled for the CDS used to collect data.

Setpoint Status: Pass Runs: 1

## Data Audit Log

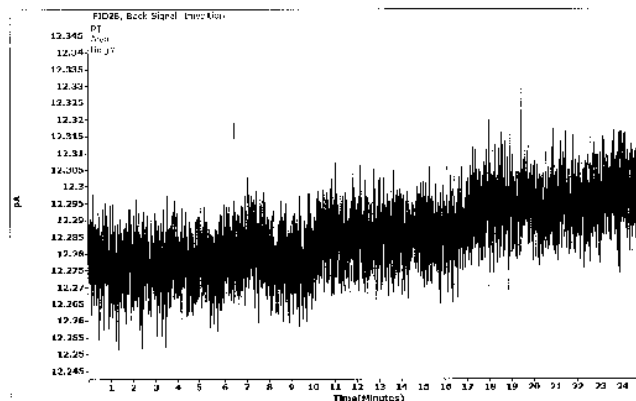
Host name: LAPTOP-CQ3SKOMV  
Original Data Path: E:\UAE 2023  
Analyzed Data Path: SDS://SessionData/OQ/Tests/GcNd\_1\_0/GcNd\_1\_0\_1/PreviousRun/Run1

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Acquisition operator: Saengulthaisrak  
Acquisition method: OQ2023\_uECD\_QC.M  
Data file analyzed for this test: OQ\_QC7890\_FID\_QC\_Q1.D  
Acquisition Date: 23-Feb-23, 10:34:49  
Noise Type: ASTM  
Noise Value: 0.04587  
Noise start time: 3.0  
Noise duration: 20.0  
Drift Value: 0.06818



## Overall Noise and Drift Test Status

Pass

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## Injection Precision

## Purpose:

This test uses a traceable standard to determine injection precision. The mean, standard deviation, and % RSD of six standard injections are calculated.

## Sequence

The sequence has two or eight lines depending upon whether you inject 7 times from the same vial or use 7 separate vials.

Evaluation standard, 1 injection (system equilibration)

Evaluation standard, 1 injection (6 of these)

Sample blank, 1 injection (applies only if carry over is run immediately after precision)

## Configuration Details

Tested Combination2 Front SSL / Back FID

Injection Tower

Name: 7683B

Setpoint Injection Volume on Column: 1.0 uL

## Conditions

Y-Axis Unit: pA

## Configuration

Sample: FID MDL Std Kit, 5188-5372

Evaluated Compound: Sample Peak

Evaluation Standard Concentration: 100 % (from Certificate of Analysis)

## Measurements

Area	Retention Time
15967.28	0.04601
15996.00	0.04578
16219.94	0.04568
16051.64	0.04562
16123.53	0.04577
16058.47	0.04654

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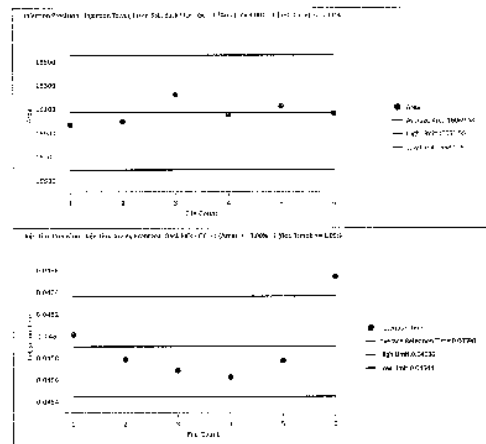
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Results:	Area	Retention Time
Average:	16069.48	0.04590
STD Deviation:	31.48010	0.00034
RSD:	0.57	0.74
Agilent Recommended:	≤ 10.00	≤ 1.00
Status:	Pass	Pass

Setpoint Status: Pass Runs: 11



## Data Audit Log

Host name: LAI7101-CQ3SKOMV

Original Data Path: F:\UAE 2023\02\2023-02-22 12:25:05

Analyzed Data Path: SDS:\SeesonData\OQ\Tests\Gdo\_1\_0\Gdo\_1\_0\_1\PreviousRun\Run1

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## Integration Parameters :

Type of Integration: Injector

Integrator Count: 1

## Operational Values :

Baseline Correction Mode: Adaptive

Initial Slope Sensitivity: 10

Initial Peak Width: 0.05

Initial Area Reject: 0

Initial Height Reject: 100

## Timed Event Table

Integration Type: Value Time

Integration: On 0

Integration: On 0.015

Integration: Off 0.2

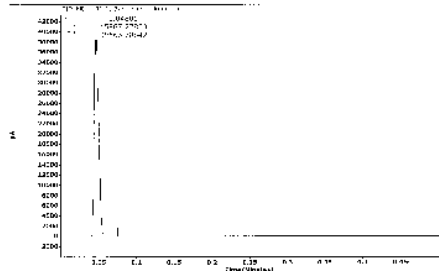
## Acquisition operator:

Saenguthai tarak

Acquisition method: OQ2023\_InjPre\_M

Data file analyzed for this test: OQ\_GC7890\_FIDP\_Pre0105.D

Acquisition Date: 22-Feb-22 12:28:41



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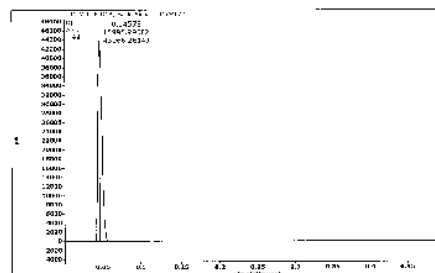
เอกสารไม่ควบคุม

Acquisition operator: Saenguthai tarak

Acquisition method: OQ2023\_InjPre\_M

Data file analyzed for this test: OQ\_GC7890\_FIDP\_Pre0105.D

Acquisition Date: 22-Feb-23, 12:30:59

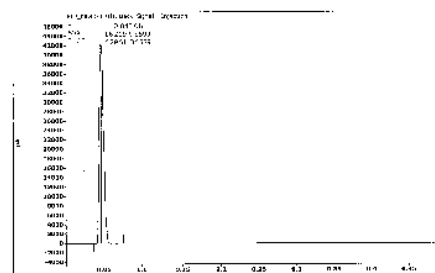


Acquisition operator: Saenguthai tarak

Acquisition method: OQ2023\_InjPre\_M

Data file analyzed for this test: OQ\_GC7890\_FIDP\_Pre0105.D

Acquisition Date: 22-Feb-23, 12:32:14



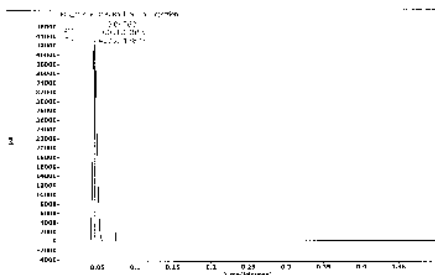
Date: February 23, 2023 3:23:17 PM

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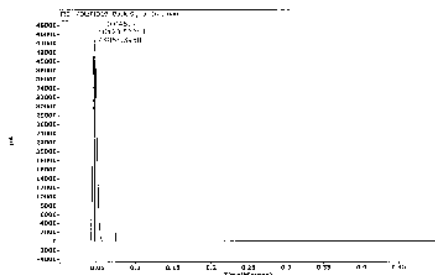
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Acquisition operator: Saenguthai tarak  
Acquisition method: CQ2025\_InjPre.M  
Data file analyzed for this test: CQ\_G07890\_FIDD\_Pre01.C8.D  
Acquisition Date: 22-Feb-23, 12:33:30



Acquisition operator: Saenguthai tarak  
Acquisition method: CQ2025\_InjPre.M  
Data file analyzed for this test: CQ\_G07890\_FIDD\_Pre01.C8.D  
Acquisition Date: 22-Feb-23, 12:34:18

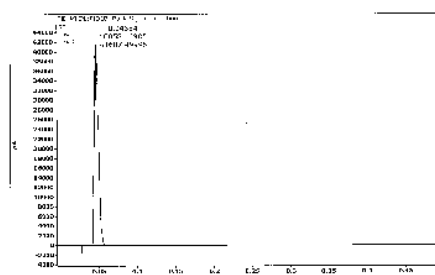


Date: February 23, 2023 3:23:17 PM  
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Acquisition operator: Saenguthai tarak  
Acquisition method: CQ2025\_InjPre.M  
Data file analyzed for this test: CQ\_G07890\_FIDD\_Pre01.C8.D  
Acquisition Date: 22-Feb-23, 12:36:01



## Overall Injection Precision Test Status

Pass

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## Signal to Noise

## Purpose

This test uses a traceable standard to determine signal to noise.

## Sequence

Line 1: Evaluation standard, 1 injection

## Configuration Details

Tested Combination2 Front SSL / Back: FID

Injection Tower

Name: 7890

## Setpoint

## Conditions

Injection Volume on Column: 1.0 uL

Noise Evaluation Start Time/Duration: 4 min. / 1.0 min.

## Configuration

Y-Axis Unit: pA

Sample: FID MDL Std Kit, 5188-5372

Evaluated Compound: Sample Peak

Evaluation Standard Concentration: 100 % (Certificate of Analysis)

## Measurements

Noise (Type/Value): ASTM / 0.04000 pA

Retention Time of Evaluated Peak: 0.04642 minutes

Peak Height (Uncorrected/Corrected): 46942.82 pA / 46942.82 pA

(Corrected for attenuation and differences between nominal and reported concentration; analog data is corrected for the applied signal reduction [range/attenuation].)

## Results

Signal to Noise: 1173500

Agilent Recommended: >= 300000

ACE uses unrounded values in its calculations; only the final result is rounded. Therefore, for high signal-to-noise ratios (high peaks/low noise), ACE calculations may appear to differ slightly from your manual calculations using the reported height and noise.

## Setpoint Status:

Pass

Runs: 1

## Data Audit Log

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Host name: LAPTOP-CQ3SKOMV  
Original Data Path: C:\UAC 2023  
Analyzed Data Path: SDS\Access1Data\OQ\Tox\GcSn\_1\_0\GcSn\_1\_C\_11\PreviousRuns\11

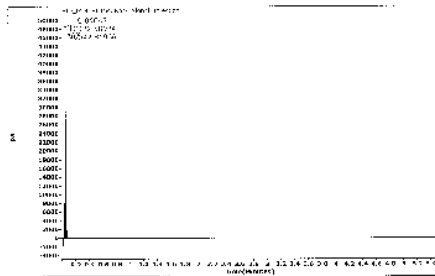
Date: February 23, 2023 3:23:17 PM  
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## Integration Parameters:

Type of Integration :	Injection	
Integration Count :	1	
Optimal Values :		
Baseline Correction Mode:	Advanced	
Initial Slope Sensitivity:	10	
Initial Peak Width:	0.25	
Initial Area Reject:	0	
Initial Height Reject:	100	
Timing Event Table :		
Integration Type	Value	Time
Integration	Off	0
Integration	On	0.015
Integration	Off	0.5
Acquisition operator:	Saenguthai tarak	
Acquisition method:	OQ2023_SC.M	
Data file analyzed for this test:	FID_SN_01.D	
Acquisition Date:	22-Feb-23, 12:48:53	

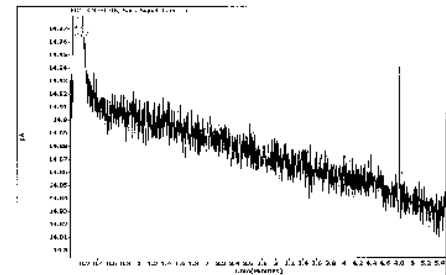


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Acquisition operator: Saenguthai tarak  
Acquisition method: OQ2023\_SC.M  
Data file analyzed for this test: FID\_SN\_01.D  
Acquisition Date: 22-Feb-23, 12:48:53



## Overall Signal to Noise Test Status

PBES

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## Declaration of Change Control

This document is under change control. Revision history is maintained and printed on each document. Access to the master documents is limited to process owners. Documents receive periodic review and cannot be assigned an evergreen status. The qualification performed according to this document refers only to the hardware/software configuration in place at the time of the qualification. Agilent Technologies recommends that instrument configuration change management procedures be in place in order to maintain the validation crosses. Any changes to the analytical or computer hardware or software must be clearly specified. A change management system provides a means for determining the degree of requalification required according to the extent of the changes made. All details of the changes must be thoroughly recorded and documented together with details of completed tests and their results. Note: It is the customer's responsibility to ensure configuration management is the customer's responsibility.

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## Attachments

Training requirements note: The delivery engineer attaches an ACE technique-specific training certificate to the Equipment Qualification Report (EQR). Obtaining ACE technique-specific certification includes pre-requisite trainings for Data Integrity, General Compliance topics (GMP, GLP, ALCOA, etc.), instrument hardware and software components, and the ACE technique itself. The one certificate encompasses all pre-requisite trainings as documented in the Agilent Learning Management System called Success Factors.

Location	Category	Document Name	Page
EQR	General	ACE Self Qualification Certificate	53
EQR	General	Operator's training certificate and qualifications	54
EQR	General	Operator's training certificate and qualifications	55
EQR	General	Operator's training certificate and qualifications	56
EQR	General	Operator's training certificate and qualifications	57
EQR	General	Operator's training certificate and qualifications	58
EQR	General	Operator's training certificate and qualifications	59
EQR	Tool	Certificate of Calibration Gas Flowmeter	60
EQR	Tool	Certificate of Calibration Manometer	64
EQR	Tool	Certificate of Calibration Thermometer Probe	68
EQR	Tool	Certificate of Calibration Thermometer	72
EQR	Tool	Certificate of Calibration Thermometer Probe	76
EQR	Tool	Certificate of Calibration Thermometer Probe	80
EQR	Material	Certificate of Analysis ECD std kit, 18773-60040	84
EQR	Material	Certificate of Analysis FID MDL std kit, 5188-5372	85
EQR	General	CDS Logon	96
EQR	General	Certificate of System Qualification	97
EQR	General	Certificate of System Qualification	98
EQR	General	Certificate of System Qualification	99

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Document Name: Certificate of Calibration Thermometer Probe

## Notes:

1. This calibration was performed based upon the item, artifact submitted, for the calibration and testing services required and the conditions under which the calibration and testing services are performed. This certificate is not intended to be representative or similar to equivalent services on similar or equivalent items and does not constitute an endorsement by ISOLAB (S) PTE LTD of the item or that ISOLAB (S) PTE LTD in anyway doesn't "guarantee" the later performance of the item. The user should determine the suitability of these instruments and equipment's for their intended purpose of use and application in terms of calibration data, correction, accuracy and uncertainties as well. ISOLAB (S) PTE LTD doesn't guarantee any extrapolation of calibration data beyond and outside the calibrated test point ranges.
2. Unless otherwise requested, a calibration report - test report shall contain only technical results by means of calibration data. Analysis and interpretation of the results and professional opinions and recommendations expressed thereupon, if requested shall be clearly indicated on the basis of national or international standards and guidelines before the calibration task is taken up. Any additional requirements to incorporate, such as professional opinions and recommendations may or may not be accepted by ISOLAB (S) PTE LTD and these additional requirements may require additional testing, data collection and reports subjected to additional charges to be paid by the clients and customers.
3. Reproduction and transmission of calibration and test certificates by email, fax and or by any other means of soft copies are usually restricted and controlled by ISOLAB (S) PTE LTD's quality management. Under any circumstances the calibration and test certificates shall not be reproduced other than in full except with prior and written approval by ISOLAB (S) PTE LTD. The full reproduction under "special circumstances" is only done by ISOLAB (S) PTE LTD in the form of black and white "Certified True Copy" with an attestation by ISOLAB's quality management or respective approved signatures.
4. Additional copies of this calibration and test certificates are available to the clients and customers at an additional, nominal fee. This is only available together with calibration artifacts (instruments and equipment's) and also should be requested in writing before calibration task is being carried out. No third party or subcontractor can obtain a copy of this certificate from ISOLAB, unless and otherwise it is a statutory or regulatory requirement initiated by the client and they have authorized in writing to do so to ISOLAB (S) PTE LTD, prior to calibration task.
5. ISOLAB (S) PTE LTD, shall under no circumstances be liable to the clients or its agents or representatives, in contract, including negligence or breach of contract duties or otherwise, for any direct or indirect loss or damage suffered by the clients, its agents or representatives however arising or in further connected with services provided by ISOLAB (S) PTE LTD.
6. ISOLAB (S) PTE LTD, doesn't guarantee the malfunction or error in measurements or comparisons with other equipment's and instruments with respect to calibration data provided at the time of calibration. The instruments and equipment's will be returned to clients "as and where condition" upon completion of calibration, and not responsible for non-working of power adapters, battery packs or sub-components in the event of calibration.
7. ISOLAB (S) PTE LTD, values and honours the inter-laboratory comparisons data(s) with same artefact (instruments and equipment's) are calibrated with same scope of accreditation schedule issued by SAC-SINGLAS. Any other features and functions are not calibrated or tested in the same artefact - are not falls under the responsibility of ISOLAB. The same conditions are applicable for customers calibration instruments and equipment's as well.
8. ISOLAB (S) PTE LTD, doesn't guarantee the integrity of calibration data, if the instruments and equipment's have malfunctioned, repaired, altered, modified and serviced after calibration as a whole or partly. The calibration labels and "void seal stickers" shall be maintained at all times on the equipment's and instruments.
9. ISOLAB (S) PTE LTD and their performance of the calibration of customer's instrument's and equipment's with "as and where condition" and does not constitute any responsibilities for old, used, drilled, damaged, under performance of instruments and equipment's with respect to manufacturers' or OEM specifications. If the instruments and equipment's bring within the adjustment capabilities and available options for adjustments, also with customers clear written agreement to make such adjustments, were made, however no guarantee for the inherent drift and non-linearity of the instruments and equipment's will be warranted.
10. The combined and expanded uncertainties are based on statistical calculations with respect to the guide for uncertainty measurement (GUM, JCGM), and also calibration and measurement capabilities (CMC\*) assigned by SAC-SINGLAS at the time of calibration. Expanded uncertainties reported in calibration certificates shall be separately added or subtracted with correction and errors indicated in the calibration and test certificates. These conditions shall follow the guidelines and requirements stated in ILAC-G8 Guidelines.

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Document Name: Certificate of Calibration Thermometer Probe

## CERTIFICATE OF CALIBRATION

Item : CS224299

Date of Issue: 06<sup>th</sup> September 2022Type: K Needle Probe  
Serial No: 146706161268N-73Page: 3 of 4  
Certificate Start Date: 29<sup>th</sup> August 2022  
Certificate Exp. Date: 02<sup>nd</sup> September 2023Results of Calibration  
The results of the calibration are shown in the below table. The expanded uncertainties of the measurements are at a level of confidence of approximately 95%, with coverage factor "k" as indicated below.

Calibration Results (As Found)				
Actual Temperature (°C)	UUT Average Value (°C)	Correction (°C)	Uncertainty (°C)	k-Factor
0.0	0.2	-0.2	0.4	2.00
100.0	99.8	0.2	0.4	2.00
220.0	219.2	-0.2	0.4	2.00
250.0	249.5	-0.2	0.5	2.00

Calibration Results (As Left)				
Actual Temperature (°C)	UUT Average Value (°C)	Correction (°C)	Uncertainty (°C)	k-Factor
0.0	0.3	-0.3	0.4	2.00
100.0	99.5	0.2	0.4	2.00
250.0	249.5	-0.3	0.4	2.00
250.0	249.5	0.2	0.5	2.00

\* Measurement's tolerance of  $\pm 0.25^\circ\text{C}$  at  $25^\circ\text{C}$ ,  $\pm 0.1^\circ\text{C}$  at  $100^\circ\text{C}$  and  $\pm 0.2^\circ\text{C}$  at  $250^\circ\text{C}$ .  
\* The results reported here have been determined in accordance with the terms of accreditation under ILAC.  
\* Coverage factor of 2.00

## Remarks:

1. No AC calibration were made during calibration.
2. Although there was no adjustment was made to the UUT, however, attached is label "As Found" and "As Left" tag for calibration history.

Gina A. Ochoa  
Calibration OfficerDate: February 23, 2023 3:23:17 PM  
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Document Name: Certificate of Calibration Thermometer Probe

Materials

Document Name: Certificate of Analysis ECD old RI: 18719-55040

Agilent Technologies

## Certificate of Analysis

Electron Capture Detector - Test Sample

Agilent Part Number: 14713-0023 Sample Lot Number: 0000700273  
This certificate is valid only for the specific instrument and sample lot number stated above. It is not valid for other instruments or sample lots. The certificate is valid only for the specific instrument and sample lot number stated above.Concentration: 0.001 mg/L in 20 µL  
Area: 0.001 mg/L in 20 µL

Solvent: Toluene

This certificate is valid only for the specific instrument and sample lot number stated above. It is not valid for other instruments or sample lots. The certificate is valid only for the specific instrument and sample lot number stated above.

Parameters: 0.001 mg/L in 20 µL  
Area: 0.001 mg/L in 20 µL  
Concentration: 0.001 mg/L in 20 µL

Typical Analysis Method: GC-Chromatography - gas chromatography-mass spectrometry

Date of receipt: 21 August 2022  
Date of expiration: 30 September 2024

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เอกสารไม่ควบคุม

Materials

Document Name: Certificate of Analysis FID MDL std kit, 51B8-5372



## Certificate of Analysis

## FID MDL Sample

Agilent Part Number: 51B8-5372 Sample Lot Number: 0000000000

This analytical reference material was manufactured and verified to accordance with applicable ISO 9001 registered quality system, and the purity of components was verified by an ISO 17025 accredited laboratory. The certified value for each analyte was determined gravimetrically.

Concentration:  
n-tetradecane 2.37 mg/L (± 0.5%)  
n-tridecane 2.36 mg/L (± 0.5%)  
n-pentadecane 2.38 mg/L (± 0.5%)  
n-hexadecane 2.36 mg/L (± 0.5%)  
Solvent: iso-octane

1 additional User-A platform and eleven bottles were used in the manufacture of this standard. Reference used in the manufacture of this standard are certified with weights traceable to NIST in compliance with 51B8-5372, 2-5B-1 and 51B-1901

Purity:  
n-tetradecane 99.9%  
n-tridecane 99.9%  
n-pentadecane 99%  
n-hexadecane 99%  
iso-octane 99.9%

## Typical Analytical Spectrum or Chromatography

GC Chromatography: n-tetradecane, n-tridecane, n-pentadecane and n-hexadecane in iso-octane



Date of release: 08 March 2022

Date of expiration: 31 March 2025

Agilent Technologies  
Merrill Bouquard  
DHS Representative

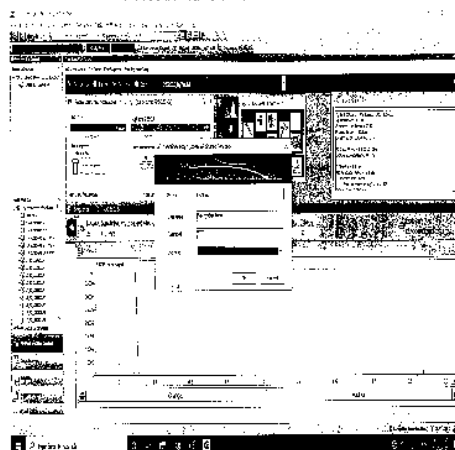
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General

Document Name: ICD6 Logon



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เอกสารไม่ควบคุม

General

Document Name: Certificate of System Qualification

## Software Verification Report

Ref	Version	Date	Platform	Product Name	Product Version
001	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
002	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
003	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
004	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
005	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
006	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
007	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
008	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
009	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
010	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0

Ref: Refers to the version of the software.

## Summary:

Overall System Status: Pass

## File System Summary

File System Summary:  
File System Summary:  
File System Summary:

## GAC File Report Summary

GAC File Report Summary:  
GAC File Report Summary:  
GAC File Report Summary:

## File Registration Report Summary

File Registration Report Summary:  
File Registration Report Summary:  
File Registration Report Summary:

## Registry Report Summary

Registry Report Summary:  
Registry Report Summary:  
Registry Report Summary:

## Details

ID	Description
01	Agilent CrossLab GTS Compliance (1.0.0.0) - 1.0.0.0
02	Agilent CrossLab GTS Compliance (1.0.0.0) - 1.0.0.0
03	Agilent CrossLab GTS Compliance (1.0.0.0) - 1.0.0.0
04	Agilent CrossLab GTS Compliance (1.0.0.0) - 1.0.0.0
05	Agilent CrossLab GTS Compliance (1.0.0.0) - 1.0.0.0
06	Agilent CrossLab GTS Compliance (1.0.0.0) - 1.0.0.0
07	Agilent CrossLab GTS Compliance (1.0.0.0) - 1.0.0.0
08	Agilent CrossLab GTS Compliance (1.0.0.0) - 1.0.0.0
09	Agilent CrossLab GTS Compliance (1.0.0.0) - 1.0.0.0
10	Agilent CrossLab GTS Compliance (1.0.0.0) - 1.0.0.0

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General

Document Name: Certificate of System Qualification

## Software Verification Report

Ref	Version	Date	Platform	Product Name	Product Version
001	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
002	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
003	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
004	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
005	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
006	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
007	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
008	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
009	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0
010	1.0.0.0	2022	Windows 10	Agilent CrossLab	1.0.0.0

Ref: Refers to the version of the software.

## Summary:

Overall System Status: Pass

## File System Summary

File System Summary:  
File System Summary:  
File System Summary:

## GAC File Report Summary

GAC File Report Summary:  
GAC File Report Summary:  
GAC File Report Summary:

## File Registration Report Summary

File Registration Report Summary:  
File Registration Report Summary:  
File Registration Report Summary:

## Registry Report Summary

Registry Report Summary:  
Registry Report Summary:  
Registry Report Summary:

Date: February 23, 2023 3:23:17 PM  
System ID: UAE.TOX.007\_CN11021007

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## General

Document Name: Certificate of System Qualification

## Software Verification Report

Date:	Wednesday, 22 February 2023	Time:	11:13:13 PM (UTC+07:00)	Run Name:	GC-09-A
Windows User Name:	GC-09A	Run Revision Number:	3.2	Product Name:	Agilent OpenLab Shared Services
Install Type:	Agilent OpenLab	Additional Package:	Details		

Base Reference File Name: AgilentOpenLab.rpt

## Summary:

Overall Evaluation of Simulation Check: PASS

## File Report Summary

- No missing files or invalid file found.
- No syntax file difference found.

## GAC File Report Summary

- No missing or invalid GAC file found.

## File Registration Report Summary

- File Registration check not required for this product.

## Registry Report Summary

- Registry check not required for this product.

## Details

ID	Description
011	Agilent OpenLab Shared Services (04 Jan 2023 0:42:01)
012	Agilent OpenLab Storage Client Services (23 Jan 2023)

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## Agilent Technologies Materials: GC/GCMS

This section lists details for a set of Agilent materials required for all qualifications. If several part numbers are listed for an item, only the one(s) that apply to the tested configuration are used.

## Retention Gap

For SS/STD, HS/SS/FID, HS/VH/FID tests; for SS/FID tests except Response Linearity

Part No. 19091-S0E20(E) or equivalent  
G3909-930C1 (Include 9009 GC)

## Capillary Column

HP-5 30 m x 0.32 mm x 0.25 µm; for FID Response Linearity, all other inlet/detector combinations.

Part No. 5981J-413(E) or equivalent  
5981J-413-INT or equivalent (Include 9009 GC)

## Capillary Column (SCD)

DB-1 30 m x 0.32 mm x 0.25 µm; for SCD.

Part No. 23-1033 or equivalent

## Capillary Column (SQ, TQ, Q-TOF)

HP-5MS 30 m x 0.25 mm x 0.25 µm; for SQ, TQ, and Q-TOF tests.

Part No. 5951S-433(C) or equivalent (5975 and below)  
1000-S-433UI or equivalent (5973 and up; TQ and Q-TOF)

## Capillary Column (ion Trap)

HP-4MS 30 m x 0.25 mm x 0.25 µm; for Ion Trap tests.

Part No. CP6844 or equivalent

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## Electronic Signature

## Purpose

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

## Details

Full Name of Signer: Saenguthai Terak  
Logged On User Name: saenguthai.terak@thai.agilent.com  
Signature Creation Date: February 23, 2023  
Reason for Signature: Executed protocol and published this original version of document.

## Regulatory Disclaimer

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

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System ID: UAE\_TOX\_007\_CN11021007

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User Name: saenguthai.terak  
Machine ID: LAETOP-008K-007System ID: UAE\_TOX\_007\_CN11021007  
Print Date: February 23, 2023 3:25:28 PM

UAE\_TOX\_007\_CN11021007 Transaction Log:

Time	Transaction State	Action Performed	Type of Transaction	Optional Information
February 23, 2023 8:10:11 AM	Alert	Session Overlaid	Session	None
February 23, 2023 3:19:11 AM	Alert	Data	Session	Transaction successfully completed or decided
February 23, 2023 3:16:11 AM	State	Configuration	Session	None
February 23, 2023 8:13:11 AM	Alert	Instrument	Linked	Session identifier generated: 0000-0000-0000-1111-1111-1111
February 23, 2023 8:10:23 AM	Alert	Instrument	Linked	Successfully initiated session identified by 0000-0000-0000-1111-1111-1111 with unique machine ID: 0000-0000-0000-1111-1111-1111
February 23, 2023 8:10:23 AM	Alert	Equipment	Session	LQ-4 display not primary instrument (log) - File path: C:\Program Files\Agilent\OpenLab\Shared Services\BDF File Name: [SCC2.01.log] EC# Name: [DataRetentionMethod] (Manual Retention [SCC2.01])
February 23, 2023 8:05:00 AM	End	Configuration	Session	None
February 23, 2023 8:04:37 AM	Start	Configuration	Session	None
February 23, 2023 8:25:00 AM	State	Instrument	Linked	System Location and Status, Safety, and Operator: 1989: Qualification Test: No network associated

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Date: February 23, 2023 3:23:17 PM  
System ID: UAE\_TOX\_007\_CN11021007

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เอกสารไม่ควบคุม

User Name: saengchai.sak  
Hostname: LAPTOP-G25K6QWY  
System ID: UAE.TOX.007\_CN1121007  
Print Date: February 23, 2023 3:27 PM

UAE.TOX.007\_CN1121007 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 3:29:24 AM	End	Executor	System Inspection and Zero Gravity and Overturn > 90° - Calibration Test - No results associated	Run Count: 1
February 23, 2023 3:29:26 AM	Start	Executor	Intel Pressure Decay - FID - GSEC Pressure Compensation - 0.75 Type 1 - 0.00 pressure - 0.00 sec	None
February 23, 2023 3:29:37 AM	End	Executor	Intel Pressure Decay - FID - GSEC Pressure Compensation - 0.75 Type 1 - 0.00 pressure - 0.00 sec	Run Count: 1
February 23, 2023 3:29:39 AM	Start	Executor	Intel Pressure Accuracy - FID - GSEC Pressure Compensation - 0.75 Type 1 - 0.00 pressure	None
February 23, 2023 3:29:46 AM	End	Executor	Intel Pressure Accuracy - FID - GSEC Pressure Compensation - 0.75 Type 1 - 0.00 pressure	Run Count: 1
February 23, 2023 3:29:48 AM	Start	Executor	Detector Flow Accuracy - FID - LECO Type: Molar - 0.200 mL/min - 0.00 % response	None
February 23, 2023 3:29:57 AM	End	Data	Detector Flow Accuracy - FID - Manual Data Entry - LECO Type: Molar - 0.200 mL/min - 0.00 % response	Run Data Entry
February 23, 2023 3:29:59 AM	End	Executor	Detector Flow Accuracy - FID - LECO Type: Molar - 0.200 mL/min - 0.00 % response	Run Count: 1
February 23, 2023 3:29:59 AM	Start	Executor	Detector Flow Accuracy - FID - LECO Type: Molar - 0.200 mL/min - 0.00 % response	None

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Date: February 23, 2023 3:27 PM  
System ID: UAE.TOX.007\_CN1121007

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User Name: saengchai.sak  
Hostname: LAPTOP-G25K6QWY  
System ID: UAE.TOX.007\_CN1121007  
Print Date: February 23, 2023 3:27 PM

UAE.TOX.007\_CN1121007 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 3:27:56 AM	Start	Data	Detector Flow Accuracy - FID - Type: Fuel - 0.380 mL/min - 0.00 % response	Run Data Entry
February 23, 2023 3:27:57 AM	End	Executor	Detector Flow Accuracy - FID - Type: Fuel - 0.380 mL/min - 0.00 % response	Run Count: 1
February 23, 2023 3:27:59 AM	Start	Executor	Detector Flow Accuracy - FID - Type: Fuel - 0.380 mL/min - 0.00 % response	None
February 23, 2023 3:28:01 AM	End	Data	Detector Flow Accuracy - FID - Manual Data Entry - FID Type: Fuel - 0.380 mL/min - 0.00 % response	Manual Data Entry
February 23, 2023 3:28:02 AM	End	Executor	Detector Flow Accuracy - FID - Manual Data Entry - FID Type: Fuel - 0.380 mL/min - 0.00 % response	Manual Data Entry
February 23, 2023 3:28:02 AM	End	Executor	Detector Flow Accuracy - FID - Manual Data Entry - FID Type: Fuel - 0.380 mL/min - 0.00 % response	Manual Data Entry
February 23, 2023 3:28:02 AM	End	Executor	Detector Flow Accuracy - FID - Manual Data Entry - FID Type: Fuel - 0.380 mL/min - 0.00 % response	Manual Data Entry
February 23, 2023 3:28:02 AM	End	Executor	Detector Flow Accuracy - FID - Manual Data Entry - FID Type: Fuel - 0.380 mL/min - 0.00 % response	Manual Data Entry
February 23, 2023 3:28:02 AM	End	Executor	Detector Flow Accuracy - FID - Manual Data Entry - FID Type: Fuel - 0.380 mL/min - 0.00 % response	Manual Data Entry
February 23, 2023 3:28:02 AM	End	Executor	Detector Flow Accuracy - FID - Manual Data Entry - FID Type: Fuel - 0.380 mL/min - 0.00 % response	Manual Data Entry

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Date: February 23, 2023 3:28 PM  
System ID: UAE.TOX.007\_CN1121007

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User Name: saengchai.sak  
Hostname: LAPTOP-G25K6QWY  
System ID: UAE.TOX.007\_CN1121007  
Print Date: February 23, 2023 3:28 PM

UAE.TOX.007\_CN1121007 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 3:28:04 AM	Start	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1
February 23, 2023 3:28:05 AM	End	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	None
February 23, 2023 3:28:05 AM	Start	Data	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Manual Data Entry
February 23, 2023 3:28:05 AM	End	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1
February 23, 2023 3:28:05 AM	Start	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	None
February 23, 2023 3:28:05 AM	End	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1
February 23, 2023 3:28:05 AM	Start	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	None
February 23, 2023 3:28:05 AM	End	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1
February 23, 2023 3:28:05 AM	Start	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	None
February 23, 2023 3:28:05 AM	End	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1

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Date: February 23, 2023 3:28 PM  
System ID: UAE.TOX.007\_CN1121007

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User Name: saengchai.sak  
Hostname: LAPTOP-G25K6QWY  
System ID: UAE.TOX.007\_CN1121007  
Print Date: February 23, 2023 3:28 PM

UAE.TOX.007\_CN1121007 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 3:28:05 AM	Start	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1
February 23, 2023 3:28:05 AM	End	Data	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Manual Data Entry
February 23, 2023 3:28:05 AM	Start	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1
February 23, 2023 3:28:05 AM	End	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1
February 23, 2023 3:28:05 AM	Start	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1
February 23, 2023 3:28:05 AM	End	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1
February 23, 2023 3:28:05 AM	Start	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1
February 23, 2023 3:28:05 AM	End	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1
February 23, 2023 3:28:05 AM	Start	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1
February 23, 2023 3:28:05 AM	End	Executor	GC Oven Temperature Accuracy - 7890 - Temperature - 0.00 - 0.00 % response	Run Count: 1

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Date: February 23, 2023 3:28 PM  
System ID: UAE.TOX.007\_CN1121007

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User Name: s3nguraj,iam  
 Program: \_GPTOP 0635 4/28/

System ID: LAE-CC-507-CHP-024567  
Print Date: February 25, 2020 9:25:53 PM

U6E TOX.NET\_CV11021007 Immigration log:

[illegible]

*J. Stat. Soc.* B 60: 711

Date: February 25, 2023 3:25:17 PM  
System ID: UAT-10X-607-CH-17027037

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[illegible]

System ID: 1.5E+08 2025\_081021144  
Print Date: February 25, 2025 2:20:42 PM

UAE\_TOX.017\_CN11021007 Tr2-metabolic9.3

Time	Transaction State	Activity Performance	Type of Transaction	Optional Comments
February 23 2003 2:53:23 PM	Start	Success	Access Granted - In: Back PID - Collection ID = 10462, <= 6.12 sec, < 0.00 sec, 0.00 p/s/KB	None
February 23 2003 2:56:05 PM	End	Fail	Access Granted - In: In: I - Collection ID = 10462, <= 6.12 sec, < 0.00 sec, 0.00 p/s/KB	Has the Path: E:\MSE 1270B28.ch
February 23 2003 2:54:10 PM	End	Success	Access Granted - In: In: I - Collection ID = 10462, <= 6.12 sec, < 0.00 sec, 0.00 p/s/KB	Has Error: 1
February 23 2003 2:54:15 PM	Start	Success	Operation Success - Operation: Read F59, Back PID - ID = 1, < 6.00 sec, < 0.00 sec, < 0.00 p/s/KB	None
February 23 2003 2:57:04 PM	Start	Success	Operation Success - Operation: Read F59, Back PID - ID = 1, < 6.00 sec, < 0.00 sec, < 0.00 p/s/KB	None
February 23 2003 2:57:37 PM	Start	Success	Operation Success - Operation: Read F59, Back PID - ID = 1, < 6.00 sec, < 0.00 sec, < 0.00 p/s/KB	None
February 23 2003 2:59:21 PM	End	Fail	Operation Success - Operation: Read F59, Back PID - ID = 1, < 6.00 sec, < 0.00 sec, < 0.00 p/s/KB	Collection Not: C:\E 202500225 20254025 2 25 25:00:00 057995.PID C:\E\057995.PID.ch
February 23 2003 2:59:21 PM	End	Fail	Operation Success - Operation: Read F59, Back PID - ID = 1, < 6.00 sec, < 0.00 sec, < 0.00 p/s/KB	Collection Not: C:\E 202500225 20254025 2 25 25:00:00 057995.PID C:\E\057995.PID.ch

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Date: February 23, 2023 3:23:17 PM  
System ID: JAE-TOX.007 CH11021307

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User Name: [sengul@cs.toruk](#)  
Host name: [6PTOP-QD18K014](#)

System: 67JAF TOX007\_0011021007  
Print Date: Fri, Aug 23, 2025 2:25:22 PM

UAE.TD8.027 CN11021007 Transaction log

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 2:45:02 PM	Start	Location	Signal to Follow - Location From: Ford 88, Ford, URGD. - Detects URGD - L = 500	Name
February 23, 2023 2:45:55 PM	Start	Execution	Signal to Follow - Location From: (mer)SP1, mer, URGD. - Detects URGD - L = 1500	Name
February 23, 2023 2:49:10 PM	Start	Call	Signal to Follow - Location From: (mer)SP1, mer, URGD. - Detects URGD - L = 1500	Location: Ford 88, 01 DED
February 23, 2023 2:51:07 PM	Start	Execution	Signal to Follow - Location From: Ford SP1, Ford, URGD. - Detects URGD - L = 1500	Name
February 23, 2023 2:51:14 PM	End	Finalize	Signal to Follow - Location From: Ford SP1, Ford, URGD. - Detects URGD - L = 1500	Run Count: 1
February 23, 2023 2:51:18 PM	Start	Finalize	OS Running Run - Location From: Ford SP1, Ford, URGD. - Part of System Preparation. No limits associated	Name
February 23, 2023 2:52:04 PM	Start	Finalize	OS Running Run - Location From: Ford SP1, Ford, URGD. - Part of System Preparation. No limits associated	Name
February 23, 2023 2:52:07 PM	Start	Finalize	OS Running Run - Location From: Ford SP1, Ford, URGD. - Part of System Preparation. No limits associated	Run Count: 1
February 23, 2023 2:52:14 PM	Start	Finalize	OS Running Run - Location From: Ford SP1, Ford, URGD. - Part of System Preparation. No limits associated	Name

Година 7. : 0

Date: February 23, 2023 3:23:17 PM  
System ID: UAE.TOX.007 CR11021007

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Lower bound:  $\approx 0.02 \cdot \text{PHE} \cdot \text{Incr}$   
 Upper bound:  $1.3111 \cdot 10^{-4} \cdot \sqrt{\text{PHE} \cdot \text{Incr}}$

System ID: UAE-0X507\_GN1'01'00  
Print Date: February 23, 2023 3:33:23 PM

116E 704 507, 041105,007 Transaction by:

Time	Transaction State	Amount Performed	Type of Transaction	Optional Information
February 25, 2023 2:05:32 PM	Audit	Data	Injection Prediction - Injection Tweak: 1,met(24),task: 12 GC: 1,1,2,3,4,5,6,7,8,9,10 1,2,3,4,5,6,7,8,9,10	Injection Path: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,632,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,653,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,674,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,695,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,737,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,842,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873,874,875,876,877,878,879,880,881,882,883,884,885,886,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,905,906,907,908,909,910,911,912,913,914,915,916,917,918,919,920,921,922,923,924,925,926,927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,947,948,949,950,951,952,953,954,955,956,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971,972,973,974,975,976,977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000,1001,1002,1003,1004,1005,1006,1007,1008,100

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Date: February 23, 2023 3:23:17 PM  
System ID: UAE-TOX-007 CN1:02:007

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User Name: samgulshah@agilent.com  
 Hostname: LAPTOP-GU9SH-DANV

System ID: J4E.TOL.07-0011021007  
 Print Date: February 23, 2023 3:23:25 PM

UAC TOX\_007\_0011021007 Transaction Log:

Date	Transaction State	Activity Performed	Type of Transaction	Optional Information
February 23, 2023 3:23:51 PM	Fail	Execution	Signal based Injection Toxic: FENICUL Bact-FIELD Detector: 112.1 L/min/SEC	Run Control
February 23, 2023 3:24:04 PM	Pass	Qualification	Execution	QC
February 23, 2023 3:24:09 PM	Pass	Injection	Execution	None
February 23, 2023 3:25:12 PM	Pass	Reporting	Generation	Report Generated: Path: C:\Users\sa
February 23, 2023 3:25:57 PM	Pass	Reporting	Execution	Report Generated: Path: C:\Users\sa File Name: J4E.TOL.07-0011021007 User Name: samgulshah@agilent.com File Name of Sample: Sample_001_001 Report Generation: Generated on local and published to cloud version of the system
February 23, 2023 3:25:57 PM	Pass	Reporting	Generation	Report Generated: Path: C:\Users\sa

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Date: February 23, 2023 3:23:27 PM  
 System ID: J4E.TOL.07-0011021007

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เอกสารไม่ควบคุม



## Agilent CrossLab Start Up Services

### Agilent 5100 5110 ICP-OES Preventive Maintenance

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

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

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



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## Agilent 5100, 5110 Preventive Maintenance Checklist



### Introduction

#### Customer Information

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



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**Important Customer Web Links**

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

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**Service Engineer's Responsibilities**

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

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**Instrument Maintenance****System Information**

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

Instrument System Name and ID	5110 VDV ICP-OES
Instrument System Site and Location	UAE

List System Component Product Numbers	List the Serial Numbers of each Component
1. G 3013A	77 16030001
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

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

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**Preparation**

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

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## Preventive Maintenance Procedures

### Record Pre-PM instrument performance

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

### Clean and inspect ICP-OES system

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

### Agilent Water Recirculator

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

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### SPS 3 Auto Sampler

- ☒ Service not applicable
- ☐ Power cycle the autosampler and verify successful initialization.
- ☐ Inspect X and Z axis belts for wear. Replace is necessary.
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

### SPS 4 Auto sampler

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

### AVS 4, 6, 7 Advanced Valve System

- ☒ Service not applicable
- ☐ Replace valve rotor seal
- ☐ Check fittings for signs of leaks
- ☐ Check tubing including autosampler tubing for kinks or excessive wear
- ☐ Check high flow pump for signs of leaks

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### ICP-OES adjustment

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

### Record Post-PM instrument performance

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

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### Restore Instrument

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

### Service Review

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

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## Test Results

## Instrument Performance Test Results Table

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

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial *	Radial	Axial*
Zn 213.857 nm SRBR	4190.5	6649.9	4700.6	7564.2
Mn 257.610 nm SRBR	13681.0	27295.3	14569.1	29992.5
Al 396.152 nm SBR	12.1	14.6	11.5	15.6
K 766.491 nm SBR	8.0	31.2	7.4	39.7

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

## Instrument Test Results Table

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

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

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## ICP-OES Status Results Table

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

Measurement	Standby Mode		Plasma On	
Mains Voltage	225.153	VAC	226.613	VAC
Mains Current	0.090	A	0.219	A
Instrument Temperature	24.0	°C	25.1	°C
RF Air Flow (sensor speed)	15.0	Hz	19.0	Hz
Plasma Exhaust Temperature	No measurement		39.2	°C
Water Flow Oscillator	No measurement		1.37	L/min
Water Flow Detector	0.94	L/min	0.81	L/min
Water Inlet Temperature	17.3	°C	17.8	°C
Polychromator Temperature	35.0	°C	35.0	°C
CCD Temperature	-39.8	°C	-39.8	°C
Thermal Stabilizer	35.0	°C	35.0	°C
Argon Supply Pressure	659.52	kPa	608.63	kPa
Purge Gas Supply Pressure*1	656.41	kPa	627.71	kPa
Option Gas Supply Pressure*1	-	kPa	-	kPa
Nebulizer Flow	No measurement		0.70	L/min
Nebulizer Back Pressure	No measurement		166.30	kPa
Plasma Gas Flow	No measurement		11.98	L/min
Auxiliary Gas Flow	No measurement		1.00	L/min
RF Power	No measurement		1199.5	W
RF Supply Current	No measurement		9.223	A
RF Supply Voltage	No measurement		194.481	V

\*1 If option installed

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## Consumed PM Parts

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

## Consumed Parts Reference

(Purchased by customer, not included as part of PM)

☐ Section Not Applicable.

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

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## Signature Page

## Service Engineer Comments (optional)

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

## Service Verification

Service Request Number: 6006371120 Date Service Completed: 13 Nov 2023

Service Engineer Name: Kanyakhorn S. Customer Name: Aphorn Onkong

Service Engineer Signature: Kanyakhorn S. Customer Signature: Aphorn Onkong

Total number of pages in this document: 14

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Report Summary	
Instrument Model	Agilent 6100/5-10 VDV ICP-OES
Instrument ID	GB011A/GB015A
Instrument Serial Number	MY16030001
Software Version	7.3.1.9507
Firmware Version	3442
Tested By	Kanyakorn S.
Test Completed On	11/13/2023 9:18:24 AM
Result Summary	
Subsystem Communications Test	Skipped
Air Flow Test	Skipped
Water Flow Test	Skipped
Gas Flows Test	Skipped
RF Generator Test	Skipped
Camera Test	Skipped
Optics Test	Skipped
Advanced Valve System Test	Skipped
Resolution Test	Pass
Sensitivity Test	Fail
Precision Test	Pass

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Resolution Test			Pass
Element Wavelength	Specification	Width	
N (174.212 nm)	≤ 9.40	6.92	
As (188.980 nm)	≤ 8.20	6.12	
Se (196.027 nm)	≤ 11.50	8.31	
Mo (202.032 nm)	≤ 8.20	6.36	
Cr (206.163 nm)	≤ 13.40	8.99	
Zn (213.857 nm)	≤ 8.70	6.64	
Pb (220.353 nm)	≤ 9.50	7.09	
Ca (228.615 nm)	≤ 17.20	11.58	
Ba (230.421 nm)	≤ 9.40	7.27	
Mn (257.610 nm)	≤ 13.30	9.46	
Mn (280.568 nm)	≤ 20.30	14.18	
Cr (267.716 nm)	≤ 11.00	8.91	
Cu (324.754 nm)	≤ 25.00	18.29	
Cu (327.395 nm)	≤ 14.20	11.29	
Sr (338.071 nm)	≤ 33.50	24.48	
Ba (455.403 nm)	≤ 44.00	33.62	
Sr (460.733 nm)	≤ 36.00	17.37	
Ba (493.408 nm)	≤ 36.00	25.47	
Ba (514.171 nm)	≤ 42.00	25.43	
Ar (875.283 nm)	≤ 74.00	60.50	
K (766.491 nm)	≤ 80.00	66.33	

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Sensitivity Test						Fail
Radial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 48.0	SRBR	142.0	958.5	41.7	
Se (196.026 nm)	≥ 41.0	SRBR	106.9	837.4	87.5	
Zn (213.857 nm)	≥ 1421.0	SRBR	4190.3	44372.5	111.6	
Pb (220.353 nm)	≥ 46.0	SRBR	213.9	2521.3	125.4	
Mn (257.610 nm)	≥ 3518.0	SRBR	13681.0	279051.7	416.8	
Al (396.152 nm)	≥ 3.4	SBR	12.1	52269.7	3694.3	
Ba (493.408 nm)	> 34.0	SUR	185.8	2294372.8	12260.0	
K (766.491 nm)	≥ 1.8	SBR	8.0	107401.4	11876.7	
Axial						
Element Wavelength	Specification	Method	Ratio	Standard	Blank	
As (188.980 nm)	≥ 208.0	SRBR	189.4	2285.0	129.5	
Se (196.026 nm)	≥ 150.0	SRBR	188.7	2813.7	233.8	
Zn (206.200 nm)	≥ 234.0	SRBR	905.0	10158.4	123.0	
Zn (213.857 nm)	≥ 1743.0	SRBR	6849.9	135760.6	360.6	
Cd (214.439 nm)	≥ 4227.0	SRBR	5697.6	92921.3	273.9	
Pb (220.353 nm)	≥ 320.0	SRBR	454.8	10111.2	461.1	
Mn (257.610 nm)	≥ 10625.0	SRBR	27295.3	1126118.1	1687.0	
Cr (267.716 nm)	≥ 1048.0	SRBR	3948.2	144875.3	1322.0	
Cu (324.754 nm)	≥ 18.0	SBR	49.2	341489.7	6798.2	
Al (396.152 nm)	≥ 6.0	SRR	14.6	236321.6	15043.9	
Ba (493.408 nm)	≥ 60.0	SER	183.3	8393101.3	16529.3	
K (766.491 nm)	≥ 24.0	SBR	31.2	1447045.2	44917.1	

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เอกสารไม่ควบคุม

Precision Test			Pass
Radial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 2.60	1.22	
Se (196.026 nm)	≤ 2.60	0.78	
Zn (213.857 nm)	≤ 1.50	0.33	
Pb (220.353 nm)	≤ 2.60	0.86	
Mn (257.610 nm)	≤ 1.50	0.45	
Al (396.152 nm)	≤ 1.50	0.37	
Ba (493.408 nm)	≤ 1.50	0.68	
K (766.491 nm)	≤ 1.50	0.38	
Axial			
Element Wavelength	Specification	Measured Value % RSD	
As (188.980 nm)	≤ 1.50	0.63	
Se (196.026 nm)	≤ 1.50	0.87	
Zn (206.200 nm)	≤ 1.50	0.59	
Zn (213.857 nm)	≤ 1.50	0.46	
Cd (214.439 nm)	≤ 1.50	0.70	
Pb (220.353 nm)	≤ 1.50	0.36	
Mn (257.610 nm)	≤ 1.50	0.95	
Cr (267.716 nm)	≤ 1.50	0.56	
Cu (324.754 nm)	≤ 1.50	0.99	
Al (396.152 nm)	≤ 1.50	0.53	
Ba (493.408 nm)	≤ 1.50	0.86	
K (766.491 nm)	≤ 1.50	1.13	

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เอกสารไม่ควบคุม

Report Summary	
Instrument Model	Agilent 5700/5110 VDV ICP-OES
Instrument ID	G8C11A/G8011GA
Instrument Serial Number	MY18030001
Software Version	7.3.1.5507
Firmware Version	3442
Tested By	Kanyakorn S.
Test Completed On	11/13/2023 11:10:02 AM
Result Summary	
Subsystem Communications Test	Pass
Air Flow Test	Skipped
Water Flow Test	Skipped
Gas Flows Test	Skipped
RF Generator Test	Skipped
Camera Test	Skipped
Optics Test	Pass
Advanced Valve System Test	Skipped
Resolution Test	Pass
Sensitivity Test	Pass
Precision Test	Pass
Subsystem Communications Test	Pass
Optics Test	
Radial	Axial
Intensity	3522054
Wavelength	737.212

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เอกสารไม่ควบคุม

Resolution Test		
Element Wavelength	Specification	Width
N (174.213 nm)	≤ 9.40	6.92
As (188.980 nm)	≤ 8.20	8.08
C (183.027 nm)	≤ 11.50	8.33
Mo (202.032 nm)	≤ 6.20	8.31
Cr (206.169 nm)	≤ 13.40	8.68
Zn (213.857 nm)	≤ 8.70	8.73
Pb (220.353 nm)	≤ 9.50	7.02
Co (228.615 nm)	≤ 17.20	11.65
Ba (230.424 nm)	≤ 8.40	7.38
Mn (257.610 nm)	≤ 13.30	9.46
Mn (260.588 nm)	≤ 20.30	14.05
Cr (267.716 nm)	≤ 11.00	7.92
Cu (324.754 nm)	≤ 25.00	18.84
Cu (327.395 nm)	≤ 14.20	11.21
Sr (338.071 nm)	≤ 33.50	24.18
Se (396.152 nm)	≤ 44.00	33.28
Sr (407.773 nm)	≤ 38.00	17.41
Ba (455.408 nm)	≤ 33.00	25.43
Se (414.171 nm)	≤ 47.00	25.27
Ar (696.283 nm)	≤ 74.00	56.87
K (766.491 nm)	≤ 80.00	55.88

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เอกสารไม่ควบคุม

Sensitivity Test					
Radial					
Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 45.0	SRBR	166.6	1284.6	53.3
Se (196.026 nm)	≥ 41.0	SRBR	122.4	1258.0	90.7
Zn (213.857 nm)	≥ 1421.0	SRBR	4700.5	53870.1	130.7
Pb (220.353 nm)	≥ 46.0	SRBR	238.0	3100.6	155.7
Mn (257.610 nm)	≥ 3518.0	SRBR	14569.1	319308.1	476.2
Al (396.152 nm)	≥ 3.4	SBR	11.5	56510.5	4761.6
Ba (493.408 nm)	≥ 34.0	SBR	170.8	2490635.6	14514.2
K (766.491 nm)	≥ 1.8	SBR	7.4	117808.7	14024.1
Axial					
Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 208.0	SRBR	214.5	2706.2	142.8
Se (196.026 nm)	≥ 159.0	SRBR	188.0	3262.8	255.9
Zn (213.857 nm)	≥ 234.0	SRBR	1088.2	12794.8	135.3
Cr (214.439 nm)	≥ 4227.0	SRBR	6647.3	116284.7	304.4
Pb (220.353 nm)	≥ 320.0	SRBR	519.3	12490.2	530.3
Mn (257.610 nm)	≥ 10625.0	SRBR	29992.5	1306852.5	1890.2
Cr (267.716 nm)	≥ 1048.0	SRBR	4366.5	173343.4	1547.9
Cu (324.754 nm)	≥ 19.0	SBR	46.8	381093.0	7563.6
Al (396.152 nm)	≥ 6.0	SBR	15.6	274029.5	18436.6
Ba (493.408 nm)	≥ 80.0	SBR	203.6	9028914.5	44122.1
K (766.491 nm)	≥ 24.0	SBR	39.7	1701621.4	41771.8

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เอกสารไม่ควบคุม

Precision Test		
Radial		
Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 2.60	0.85
Se (196.026 nm)	≤ 2.60	1.26
Zn (213.857 nm)	≤ 1.50	0.42
Pb (220.353 nm)	≤ 2.80	0.54
Mn (257.610 nm)	≤ 1.50	0.50
Al (396.152 nm)	≤ 1.50	0.47
Se (493.408 nm)	≤ 1.50	0.68
K (766.491 nm)	≤ 1.50	0.50
Axial		
Element Wavelength	Specification	Measured Value % RSD
As (188.980 nm)	≤ 1.50	0.42
Se (196.026 nm)	≤ 1.50	0.66
Zn (213.857 nm)	≤ 1.50	0.42
Cr (214.439 nm)	≤ 1.50	0.42
Pb (220.353 nm)	≤ 1.50	0.22
Mn (257.610 nm)	≤ 1.50	0.54
Cr (267.716 nm)	≤ 1.50	0.49
Cu (324.754 nm)	≤ 1.50	0.85
Al (396.152 nm)	≤ 1.50	0.61
Ba (493.408 nm)	≤ 1.50	0.78
K (766.491 nm)	≤ 1.50	1.00

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เอกสารไม่ควบคุม

# Report Summary

Instrument Model Agilent 5100/5110 VDV ICP-OES  
Instrument ID G6011A/G6015A  
Instrument Serial Number MY18030001  
Software Version 7.3.1 9507  
Firmware Version 3412  
Tested By Kanyakorn S.  
Test Completed On 11/13/2023 11:15:43 AM

## Result Summary:

Subsystem Communications Test Pass  
Air Flow Test Pass  
Water Flow Test Pass  
Gas Flows Test Pass  
RF Generator Test Pass  
Camera Test Pass  
Optics Test Skipped  
Advanced Valve System Test Skipped  
Resolution Test Skipped  
Sensitivity Test Skipped  
Precision Test Skipped

Subsystem Communications Test Pass

Air Flow Test Pass

30% Air Flow (relative speed) 14.00  
75% Air Flow (relative speed) 23.00

Water Flow Test Pass

RF Water Flow (L/min) 1.27  
Camera Water Flow (L/min) 0.81  
Water Inlet Temperature (°C) 20.37

เอกสารไม่ควบคุม

# Gas Flows Test

Pass

Nebulizer Target Flow	Actual Flow	Back Pressure	Auxiliary Target Flow	Actual Flow	Back Pressure
0.70	0.70	271.82	2.00	2.00	111.13

Makeup Target Flow	Actual Flow	Back Pressure	Plasma Target Flow	Actual Flow	Back Pressure
2.00	2.03	118.00	18.00	17.94	23.11

# RF Generator Test

Pass

RF Power Supply Test Passed  
RF Power Supply (V) 147.380  
RF Oscillator Test Passed  
RF Oscillator Frequency (MHz) 25.843  
Work Cell Current (A) 44.410  
RF Power Supply Current (A) 1.999

# Camera Test

Pass

	Integration Time (ms)	Standard Deviation	Status
Electron's Offset Test	1000	5.361	Passed
Dark Current Test	8000	0.779	Passed
Array Test	5	0.025	Passed
Linearity Test		0.118	Passed

เอกสารไม่ควบคุม



Request No. 25-66 / 0323

MTC. ACL No. 387 / 66

## CALIBRATION CERTIFICATE

NOMENCLATURE : 1. Atomic Absorption Spectrophotometer "Agilent Technologies" Model AA240FS, Serial No. MY13160001  
2. Working standard solution "Inorganic Ventures" Multi Analyte Custom Grade Solution, Lot No. S2-MEB708640  
SUBMITTED BY : United Analyst and Engineering Consultant Co., Ltd.  
3. Sol Udomsuk41, Sukhumvit Road, Bangchak, Prakanong, Bangkok 10260

CALIBRATION PROCEDURE : 1. Performance Verification of Atomic Absorption Spectrophotometer (WI-500-02-30)

2. Estimation Uncertainty of Measurement in Analytical Chemistry (QP-513)

CALIBRATION RANGE: 0.02,0.10,0.30,0.50,0.70 mg/l at 228.8 nm.Cd, 0.10,0.20,0.30,0.50,0.70 mg/l at 357.9 nm.Cr, 0.05,0.10,0.30,0.50,0.70 mg/l at 324.7 nm.Cu, 0.10,0.30,0.50,0.70,1.00 mg/l at 248.3 nm.Fe, 0.20,0.50,0.70,1.00,1.50 mg/l at 217.0 nm.Pb, 0.05,0.10,0.30,0.50,0.70 mg/l at 279.5 nm.Mn, 0.10,0.30,0.50,0.70,1.00 mg/l at 232.0 nm.Ni, 0.05,0.10,0.30,0.50,0.70 mg/l at 213.9 nm.Zn

CALIBRATION DATE : 2 February 2023

REFERENCE MATERIAL : Traceable to NIST "Carlo Erba", "PanReac AppliChem"

Cadmium Lot No. 1152457, Chromium Lot No. 1793249, Copper Batch No. T117098A, Iron Batch No. T126087A, Lead Lot No. 1227873, Manganese Batch No. T109228A, Nickel Batch No. T270178A, Zinc Batch No. T820140A

AMBIENT CONDITIONS : Temperature 22 °C Relative humidity 58 %

The Atomic Absorption Spectrophotometer has been calibrated against Reference Material traceable to National Institute of Standards and Technology (NIST) by The Analytical Chemistry Laboratory. The results are attached herewith.

Calibrated by 1. (Mr. Danal Srithongkum)

Approved by (Miss Sutadha Deawong)

2. (Mr. Atipat Ratana)

Acting Director of Analytical Chemistry Laboratory  
Ref. 2015266012600366001  
Issued Date : 15 February 2023

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Request No. 25-66 / 0323

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## CALIBRATION DATA

### 1. Noise Level

Element	Cd	Cr	Cu	Fe	Pb	Mn	Ni	Zn
Absorbance	0.0020	0.0000	0.0008	0.0000	-0.0009	0.0021	-0.0016	-0.0022
	0.0015	0.0006	0.0005	-0.0009	-0.0014	0.0018	0.0002	-0.0023
	0.0014	0.0006	0.0010	-0.0009	0.0015	0.0008	-0.0004	-0.0015
	0.0021	-0.0008	0.0013	-0.0010	0.0005	0.0005	-0.0008	-0.0004
	0.0020	-0.0012	0.0004	0.0003	-0.0004	0.0001	-0.0024	-0.001
	0.0021	-0.0011	0.0011	0.0003	0.0006	0.0009	-0.0002	-0.0013
	0.0017	-0.0009	0.0001	-0.0015	0.0010	0.0007	0.0001	-0.0016
	0.0024	-0.0012	0.0004	-0.0002	0.0008	-0.0005	-0.0012	-0.0019
	0.0011	-0.0002	0.0015	-0.0004	0.0004	0.0008	-0.0003	-0.0017
	0.0017	0.0000	0.0009	0.0004	0.0001	0.0015	-0.0009	-0.0024
	0.0019	-0.0004	0.0004	0.0000	0.0006	0.0010	-0.0005	-0.0016
	0.0016	-0.0025	0.0003	0.0005	0.0009	-0.0004	-0.0013	-0.0016
	0.0018	-0.0014	0.001	-0.0009	-0.0006	0.0010	-0.0004	-0.0017
	0.0019	-0.0006	0.0011	-0.0008	0.0011	0.0004	-0.0003	-0.0005
	0.0024	0.0003	0.0005	-0.0012	-0.0002	0.0012	-0.0006	-0.0011
	0.0023	-0.0012	0.0006	-0.0007	0.0002	0.0014	-0.0012	-0.0013
	0.0020	-0.0014	0.0009	-0.0018	0.0003	0.0012	-0.0012	-0.0013
	0.0010	-0.0015	0.0002	0.0004	0.0017	0.0011	-0.0018	-0.0013
	0.0016	-0.0011	0.0013	0.0003	0.0007	0.0026	-0.0006	-0.0006
	0.0001	-0.0007	0.0009	-0.0003	0.0008	0.0008	0.0000	-0.0001
Average Absorbance	0.002	-0.001	0.001	0.000	0.000	0.001	-0.001	-0.001

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MTC. ACL. No. 387 / 66

## 2. Precision

Element	Conc. (mg/L)	Absorbance										Ave. Abs.	SD	%RSD
Cd	0.02	0.0085	0.0084	0.0090	0.0089	0.0089	0.0090	0.0086	0.0092	0.0090	0.0089	0.009	0.0003	2.88
	0.30	0.0993	0.1001	0.1007	0.1004	0.1004	0.0995	0.0997	0.0998	0.0999	0.0996	0.100	0.0005	0.45
	0.70	0.2238	0.2229	0.2244	0.2249	0.2243	0.2233	0.2235	0.2231	0.2251	0.2240	0.224	0.0007	0.33
Cr	0.10	0.0088	0.0087	0.0094	0.0086	0.0086	0.0091	0.0099	0.0095	0.0076	0.0085	0.009	0.0006	7.25
	0.30	0.0257	0.0265	0.0255	0.0270	0.0266	0.0258	0.0261	0.0262	0.0274	0.0262	0.026	0.0006	2.25
	0.70	0.0573	0.0590	0.0580	0.0576	0.0578	0.0579	0.0593	0.0599	0.0586	0.0594	0.058	0.0009	1.51
Cu	0.05	0.0083	0.0084	0.0084	0.0075	0.0086	0.0086	0.0081	0.0080	0.0087	0.0092	0.008	0.0005	5.45
	0.30	0.0430	0.0444	0.0426	0.0429	0.0435	0.0432	0.0428	0.0441	0.0427	0.0436	0.043	0.0006	1.41
	0.70	0.0981	0.0992	0.0990	0.0997	0.0977	0.0986	0.0990	0.0982	0.0988	0.0980	0.099	0.0006	6.63
Fe	0.10	0.0109	0.0104	0.0087	0.0100	0.0087	0.0094	0.0102	0.0092	0.0094	0.0100	0.010	0.0007	7.53
	0.50	0.0456	0.0442	0.0450	0.0444	0.0450	0.0455	0.0455	0.0441	0.0446	0.0444	0.045	0.0006	1.27
	1.00	0.0904	0.0901	0.0891	0.0876	0.0873	0.0901	0.0876	0.0886	0.0879	0.0901	0.089	0.0012	1.38
Pb	0.20	0.0093	0.0099	0.0104	0.0102	0.0104	0.0109	0.0102	0.0103	0.0115	0.0117	0.010	0.0007	6.85
	0.70	0.0344	0.0336	0.0336	0.0328	0.0338	0.0346	0.0336	0.0331	0.0343	0.0350	0.034	0.0007	2.02
	1.50	0.0709	0.0718	0.0706	0.0713	0.0698	0.0718	0.0712	0.0713	0.0715	0.0719	0.071	0.0006	0.90
Mn	0.05	0.0115	0.0130	0.0131	0.0127	0.0135	0.0136	0.0124	0.0133	0.0124	0.0130	0.013	0.0006	4.88
	0.30	0.0709	0.0700	0.0714	0.0704	0.0700	0.0705	0.0714	0.0698	0.0694	0.0700	0.070	0.0007	0.96
	0.70	0.1619	0.1633	0.1646	0.1638	0.1646	0.1614	0.1632	0.1614	0.1636	0.1652	0.163	0.0014	0.83
Ni	0.10	0.0113	0.0105	0.0113	0.0114	0.0110	0.0113	0.0117	0.0112	0.0107	0.0117	0.011	0.0004	3.45
	0.50	0.0509	0.0517	0.0508	0.0502	0.0517	0.0516	0.0516	0.0523	0.0518	0.0503	0.051	0.0007	1.36
	1.00	0.0997	0.1006	0.1006	0.1006	0.0996	0.0998	0.1007	0.1000	0.1013	0.0999	0.100	0.0006	0.55
Zn	0.05	0.0315	0.0309	0.0322	0.0304	0.0329	0.0312	0.0313	0.0319	0.0308	0.0311	0.031	0.0007	2.35
	0.30	0.1705	0.1728	0.1688	0.1693	0.1711	0.1704	0.1704	0.1707	0.1708	0.1688	0.170	0.0012	0.70
	0.70	0.3559	0.3572	0.3548	0.3560	0.3559	0.3550	0.3579	0.3552	0.3574	0.3573	0.356	0.0011	0.31

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Request No. 25-66 / 0323

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MTC. ACL. No. 387 / 66

## 3. Trueness

## 3.1 Reading on wavelength- Cadmium(Cd) at 228.8 nm.

Element	Standard Value of RM (mg/L)	Reading (mg/L)	Error of Measurement (mg/L)	Error of Measurement (%)	Uncertainty (mg/L)
Cd	0.02002	0.021	0.001	4.90	± 0.005
	0.30030	0.298	-0.002	0.77	± 0.005
	0.70070	0.675	-0.026	3.67	± 0.008

## 3.2 Reading on wavelength- Chromium (Cr) at 357.9 nm.

Element	Standard Value of RM (mg/L)	Reading (mg/L)	Error of Measurement (mg/L)	Error of Measurement (%)	Uncertainty (mg/L)
Cr	0.1001	0.101	0.001	0.90	± 0.009
	0.3003	0.293	-0.007	2.43	± 0.012
	0.7007	0.648	-0.053	7.52	± 0.023

## 3.3 Reading on wavelength- Copper (Cu) at 324.7 nm.

Element	Standard Value of RM (mg/L)	Reading (mg/L)	Error of Measurement (mg/L)	Error of Measurement (%)	Uncertainty (mg/L)
Cu	0.050	0.046	-0.004	8.00	± 0.003
	0.300	0.289	-0.011	3.67	± 0.009
	0.700	0.674	-0.026	3.71	± 0.020

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MTC. ACL. No. 387 / 66

## 3.4 Reading on wavelength- Iron (Fe) at 248.3 nm.

Element	Standard Value of RM (mg/L)	Reading (mg/L)	Error of Measurement (mg/L)	Error of Measurement (%)	Uncertainty (mg/L)
Fe	0.100	0.095	-0.005	5.00	± 0.014
	0.500	0.474	-0.026	5.20	± 0.016
	1.000	0.950	-0.050	5.00	± 0.029

## 3.5 Reading on wavelength- Lead (Pb) at 217.0 nm.

Element	Standard Value of RM (mg/L)	Reading (mg/L)	Error of Measurement (mg/L)	Error of Measurement (%)	Uncertainty (mg/L)
Pb	0.200	0.207	0.007	3.50	± 0.014
	0.700	0.673	-0.027	3.86	± 0.030
	1.500	1.417	-0.083	5.53	± 0.061

## 3.6 Reading on wavelength- Manganese (Mn) at 279.5 nm.

Element	Standard Value of RM (mg/L)	Reading (mg/L)	Error of Measurement (mg/L)	Error of Measurement (%)	Uncertainty (mg/L)
Mn	0.04995	0.046	-0.004	7.91	± 0.005
	0.29970	0.294	-0.0057	1.90	± 0.007
	0.69930	0.694	-0.0053	0.76	± 0.014

Continue 5 / 5

INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

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FMBL.MTC.002 Rev.4

Head Office  
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Tel. (66) 0 2577 9000  
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E-mail : numpai@tistr.or.th Website:www.tistr.or.th

Office/Laboratory  
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,  
Amphoe Muang, Changwat Samutprakan 10280, Thailand  
Tel. (66) 0 2323 1672-80 ext. 115, 116  
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Request No. 25-66 / 0323

5 / 5

MTC. ACL. No. 387 / 66

## 3.7 Reading on wavelength- Nickel (Ni) at 232.0 nm.

Element	Standard Value of RM (mg/L)	Reading (mg/L)	Error of Measurement (mg/L)	Error of Measurement (%)	Uncertainty (mg/L)
Ni	0.1001	0.103	0.003	2.90	± 0.013
	0.5005	0.501	0.001	0.10	± 0.018
	1.0010	0.987	-0.014	1.40	± 0.032

## 3.8 Reading on wavelength- Zinc (Zn) at 213.9 nm.

Element	Standard Value of RM (mg/L)	Reading (mg/L)	Error of Measurement (mg/L)	Error of Measurement (%)	Uncertainty (mg/L)
Zn	0.050	0.046	-0.004	8.00	± 0.013
	0.300	0.311	0.011	3.67	± 0.013
	0.700	0.665	-0.035	5.00	± 0.019

Remark : The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2 (k = 2)  
which gives a level of confidence of approximately 95%

Calibrated by 1. *Atipat*

(Mr. Danai Srithongkum)

2. *Atipat*

(Mr. Atipat Ratana)

Approved by *Suladda*

(Miss Suladda Deawong)

Senior Technical Officer

Acting Director of

Analytical Chemistry Laboratory

Issued Date : 15 February 2023

INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

End of Certificate

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Head Office  
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Thailand  
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Fax. (66) 0 2579 8592  
E-mail : sumalee@tistr.or.th

เอกสารไม่ควบคุม 5225, 5217

DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

**CERTIFICATE OF CALIBRATION**

Certificate No. : SP22-007 Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong,  
Bangkok 10260

Location of calibration : Laboratory 315

Equipment : UV-Vis Spectrophotometer

Manufacturer : Hitachi

Model : U-1900

Serial No. : 2021-064

ID No. : UAE.WAS.006/2552

Received Date : 20 January 2022

Calibration Date : 20 January 2022

Issue Date : 24 January 2022

Condition Instrument : Good

Calibrated by : รณวิทย์ Approved by : ชลวิจิรา  
(Mr. Tanawut Ritsidach) (Ms. Chonchicha Sangngern)  
Technical Manager Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the DQE Services Co., Ltd.

FM-708-02 R01 1/11/2021

เอกสารไม่ควบคุม

DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

**REPORT OF CALIBRATION**

Certificate No. : SP22-007 Page 2 of 5

Environment Condition : Ambient Temperature  $25 \pm 5$  °C  
Relative humidity  $55 \pm 20$  %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	95935	22 October 2023
Absorbance Standard set	25757	95929	22 October 2023
Wavelength Standard set	25806	95916	22 October 2023
Wavelength Standard set	25758	95915	22 October 2023

Traceability This certification is traceable to the International System of Unit maintained at National -  
Institute of Standards and Technology (NIST) through Sarna Scientific Limited

Spectral Band Width of UUC : 4.0 nm.

Scan Speed of UUC : 200 nm/min

Scan Interval of UUC : 0.1 nm.

Resolution of UUC : Photometric 0.001 Abs.  
Wavelength 0.1 nm.

FM-708-02 R01 1/11/2021

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DQE Services Co.,Ltd.  
32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230  
Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

**REPORT OF CALIBRATION**

Certificate No. : SP22-007 Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5787	0.577	0.0017	0.0031	2.00
	1.0490	1.050	-0.0010	0.0029	2.00
	2.1900	2.183	0.0070	0.0080	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5607	0.560	0.0007	0.0034	2.00
	1.0247	1.023	0.0017	0.0035	2.00
	2.1229	2.118	0.0049	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5236	0.521	0.0026	0.0030	2.00
	0.9634	0.963	0.0004	0.0029	2.00
	1.9763	1.974	0.0023	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5191	0.518	0.0011	0.0031	2.00
	1.0003	1.000	0.0003	0.0033	2.00
	1.9987	1.996	0.0027	0.0084	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5523	0.552	0.0003	0.0030	2.00
	1.0809	1.082	-0.0011	0.0030	2.00
	2.0391	2.033	0.0061	0.0079	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5601	0.562	-0.0019	0.0031	2.00
	1.0512	1.052	-0.0008	0.0030	2.00
	1.9294	1.925	0.0044	0.0079	2.00

FM-708-02 R01 1/11/2021

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**REPORT OF CALIBRATION**

Certificate No. : SP22-007 Page 4 of 5

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7478	0.746	0.0018	0.0057	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8686	0.861	0.0076	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2912	0.291	0.0002	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6448	0.638	0.0068	0.0055	2.00

FM-708-02 R01 1/11/2021

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<b>REPORT OF CALIBRATION</b> Certificate No. : SP22-007 Wavelength Accuracy : Page 5 of 5				
CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.54	240.8	0.74	0.18	2.00
279.40	278.5	0.90	0.18	2.00
288.70	288.0	0.70	0.18	2.00
334.22	333.5	0.72	0.18	2.00
361.26	360.5	0.76	0.18	2.00
418.48	418.0	0.48	0.18	2.00
446.70	446.0	0.70	0.18	2.00
453.20	453.0	0.20	0.18	2.00
460.06	459.5	0.56	0.18	2.00
536.90	536.0	0.90	0.18	2.00
637.94	637.2	0.74	0.18	2.00
440.74	440.0	0.74	0.18	2.00
472.22	471.6	0.62	0.18	2.00
513.70	513.0	0.70	0.18	2.00
528.72	528.0	0.72	0.18	2.00
574.60	573.8	0.80	0.18	2.00
585.48	584.6	0.88	0.20	2.00
684.63	684.0	0.63	0.18	2.00
740.27	739.8	0.47	0.20	2.00
748.28	747.8	0.48	0.18	2.00
807.16	806.4	0.76	0.18	2.00
879.70	878.8	0.90	0.18	2.00

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k,

which for a normal distribution corresponds to a coverage probability of approximately 95%

- \* Indicates ISO 17025 accredited

- End of Certificate -

FM-208-02 R01 1/11/2021

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## Certificate of Calibration

Equipment: CONDUCTIVITY METER  
Model: Lab 955  
Serial No. (or ID.): 16300356  
Manufacturer: SI Analytics  
Electrode Serial No. 16070067  
Condition: In Condition

Certificate No.: C24230059  
Issued Date: 16 March 2023  
Job No.: KSPR2304472  
Page: 1 of 2  
Model : LF413T Brand : SI Analytics

Customer: United Analyst and Engineering Consultant Company Limited  
3 Soi Udumsuk 41 Sukhumvit Road,  
Bangkok, Prakanong, Bangkok 10260 Thailand

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

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

Calibration By: Mr. Atachai Ngamchanat  
Calibration Date: 16 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

(Mr. Atachai Ngamchanat)  
Person in charge

(Mr. Nittun Srihawan)  
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 in 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.  
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DKSH Technology Limited  
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260  
2533 Sukhumvit Road, Bangkok, Phrakhanong, Bangkok 10260  
Phone : +66 2639 7000 Email : info.calibration@dksh.com Website : www.dksh.com/scientific-thailand  
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CAL-FM-C24-09: 12 Sep 2022



Certificate No.: C24230059 Page: 2 of 2

### Calibration Results:

#### Before Adjustment

Standard Conductivity Solution	Unit Under Calibration Reading	Correction	Coverage Factor (k)	Uncertainty (±)
25.000 µS/cm	24.5 µS/cm	0.500 µS/cm	2.00	0.21 µS/cm
1413.0 µS/cm	1403 µS/cm	10.0 µS/cm	2.00	9.0 µS/cm
111.3 mS/cm	108.5 mS/cm	2.80 mS/cm	2.00	0.67 mS/cm

#### After Adjustment ; at 1413 µS/cm

Standard Conductivity Solution	Unit Under Calibration Reading	Correction	Coverage Factor (k)	Uncertainty (±)
25.000 µS/cm	24.8 µS/cm	0.200 µS/cm	2.00	0.21 µS/cm
1413.0 µS/cm	1413 µS/cm	0.0 µS/cm	2.00	9.0 µS/cm
111.3 mS/cm	108.8 mS/cm	2.50 mS/cm	2.00	0.67 mS/cm

The End of Certificate

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

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CAL-FM-C24-09: 12 Sep 2022

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## ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: KSPR2304472

ชนิดเครื่องมือ: CONDUCTIVITY METER รุ่น: Lab 955 หมายเลขเครื่อง: 16300356

ตรวจสอบ (วัน)		รายการตรวจเช็ค	ตรวจสอบ (สัปดาห์)		หมายเหตุ
16 Mar 2023			16 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 Switch)	<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 วัสดุอุณหภูมิได้ 25.1°C โดย Control Waterbath ที่ 25.0 ± 0.1°C

Mr. Atachai Ngamchanat  
Service Engineer

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

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CAL-FM-R31-03: 20 Jul 2022

## Calibration Certificate

Certificate No.: 2301846-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
Address: 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakanong, Bangkok 10260

Page 1 of 5

Equipment: pH Meter  
Manufacturer: Mettler Toledo  
Model: SevenEasy TM S20 pH  
Serial No.: 1231155210  
ID No.: UAE.WAT.010/2553  
Order No.: 2301846  
Operation No.: 2301846-001  
Date of Receipt: 17 February 2023  
Date of Calibration: 24 February 2023

Calibrated by Mr. Worapob Sooktong  
Scientist  
Approved by N. Niyomchart  
(Mr. Nuttapol Niyomchart)  
Specialist, Division of Calibration Laboratory  
Responsible for the Technical Management Team  
Date of Issue: 24 February 2023

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65

## Calibration Report

Certificate No.: 2301846-001-01  
Equipment: pH Meter  
Resolution: 0.01 pH ; 1 mV  
Manufacturer: Mettler Toledo  
Model: SevenEasy TM S20 pH  
Serial No.: 1231155210  
Type: Bench top  
ID No.: UAE.WAT.010/2553

Date of Calibration: 24 February 2023  
Location: Chemical Calibration Laboratory, National Food Institute  
Environment Condition: Ambient Temperature: ( 25.1 ± 1.5 ) °C Relative Humidity: ( 50 ± 5 ) %  
Condition of Equipment: Good Condition

### Condition of this Results of Calibration

1. Calibration Method In house method : W-CC-002 based on direct measurement by using standard voltage calibrator and certified reference material (CRM)  
2. Reference Standards / Certified Reference Material

Instruments	Serial / ID No.	Manufacturer	Certificate No.	Due Date	
2.1 DC Voltage Calibrator	2709007	Fuka	22E1909	17 June 2023	
2.2 Digital Thermometer	2709007	Fuka	CC 650577-01	30 October 2023	
2.3 Thermo-Hygro Meter	NF1.BTH 007/18	PONPE 490	QR22-0888	26 April 2023	
Certified Reference Material		Lot No.	Manufacturer	Ref N	Expiry Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)		832606	CPAchem	PH216.L5	8 August 2024
2.5 pH buffer 6.865 (Primary pH buffer Solution)		832607	CPAchem	PH217.L5	8 August 2024
2.6 pH buffer 10.01 (Primary pH buffer Solution)		832608	CPAchem	PH220.L5	8 August 2023
2.7 pH buffer 7.00 (Standard pH buffer Solution)		832610	CPAchem	PH107.L5	8 August 2023

### 3. This certification is traceable to The International System of Unit (SI Unit)

- 3.1 Instruments No.2.1 through NSC-TIS-TIS 17025 Laboratory Accreditation of Calibration No.0008
- 3.2 Instruments No.2.2 through NSC-TIS-TIS 17025 Laboratory Accreditation of Calibration No.0061
- 3.3 Instruments No.2.3 through NSC-TIS-TIS 17025 Laboratory Accreditation of Calibration No.0292
- 3.4 Certified Reference Material No. 2.4 to 2.6 traceable to Primary measurement method- Harned cell using calibrated thermometer, barometer, and nanopotentiometer. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025
- 3.5 Certified Reference Material No.2.7 traceable to BM RefH H-27 LotN 04.06.2021; BM RefH H-28 LotN 28.05.2021; BM RefH H-27 LotN 04.06.2021; BM RefH H-28 LotN 28.05.2021, the Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

F-CS-012 Revision: 01 Date: 20-04-65

## Calibration Report

Certificate No.: 2301846-001-01  
Equipment: pH Meter  
Resolution: 0.01 pH ; 1 mV  
Manufacturer: Mettler Toledo  
Model: SevenEasy TM S20 pH  
Serial No.: 1231155210  
Type: Bench top  
ID No.: UAE.WAT.010/2553

Date of Calibration: 24 February 2023  
Page 3 of 5

### 1. Calibration of pH Meter (Manual Temperature Compensation at 25 °C)

Nominal pH	DC Voltage Standard (mV)	Average Indicator Reading		Uncertainty (mV)	Coverage Factor (k)
		mV	pH		
0	414.120	414	0.00	0.58	2.00
2	295.814	296	2.00	0.58	2.00
4	177.464	178	4.00	0.58	2.00
6	59.160	59	6.00	0.58	2.00
7	0.000	0	7.00	0.58	2.00
8	-59.158	-59	8.00	0.58	2.00
10	-177.460	-177	10.00	0.58	2.00
12	-295.811	-296	12.00	0.58	2.00
14	-414.117	-414	14.00	0.58	2.00

### 2. Calibration of pH Meter with Electrode (Manual Temperature Compensation at 25 °C)

Equipment: pH Electrode  
Type: Combined Electrode  
Manufacturer: Mettler Toledo  
Model: InLab Solids  
Serial No.: 9018311  
ID No.: N/A

Performance of Electrode system (Three-Point Calibration at pH 4, pH 7 and pH 10)

Certified Value @25 °C (pH)	Average Indicator Reading		Relative Slope (%)	Uncertainty (± pH)	Coverage Factor (k)
	pH	mV			
4.008	4.01	186	-	0.0071	2.00
6.865	6.90	19	97.68	0.0075	2.00
10.008	10.01	-160	97.29	0.0096	2.00
6.985	6.99	15	-	0.0092	2.00

F-CS-012 Revision: 01 Date: 20-04-65

## Calibration Report

Certificate No.: 2301846-001-01  
Equipment: Digital Thermometer with RTD  
Resolution: 0.1 °C  
Model: SevenEasy TM S20 pH  
Serial No.: 1231155210  
ID No.: UAE.WAT.010/2553  
Manufacturer: Mettler Toledo

Date of Calibration: 24 February 2023  
Page 4 of 5

Location: Chemical Calibration Laboratory, National Food Institute

Environment Condition: Ambient Temperature 25 °C ± 1 °C  
Relative Humidity 48 % ± 3 %

### Condition of this results of Calibration:

1. Calibration Method : - In house method: W-TE-025 by comparison with standard thermometer.  
- The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.  
- The temperature scale in use at this laboratory is the International Temperature scale of 1990 (ITS-90).
2. Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER	1523	2118154	PSL-T 0673/65	07-Jun-23	TISTR
Platinum Resistance Thermometer (PRT)	5627A	877332			

Support Equipment : - Low Temperature Bath (Micro Bath), Model: 7103, S/N: A39538, AN65 A85181.

3. This certificate is traceable to International System of Units (SI Units).
4. This certificate was certified only for the instrument we calibrated.
5. This result of calibration was found accurate as shown on date and place of calibration only.
6. Condition of Calibrated item : Good
7. Result of Calibration : ☒ Without adjustment ☐ After adjustment

F-CS-012 Revision: 01 Date: 20-04-65

